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REVIEW

The popularization of innovative education: Social background, theoretical basis, and action strategies

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ABSTRACT

Within an information or intelligent society, the individualized-needs-oriented social production objectively requires creative labor to replace standardized labor. Basic education bears the significant foundational responsibility of cultivating creative laborers. The theory of cognitive diversity serves as the intrinsic basis for the popularization of innovative education. Tools such as the "Seven Levels of Change" theory, the Creative Problem-Solving (CPS) model, and the educator-learner behavior checklists for innovative classrooms provide foundational support for this popularization. Key strategies for action include identifying the main characteristics of creative laborers, emphasizing the development of students' meta-cognitive abilities, and enhancing the leadership of schools and teachers in innovative education.

Key words: education, innovative education, creative laborers

INTRODUCTION

In contemporary society, whether we refer to it as the "information society", the "knowledge economy era", or the "intelligent era", they are all characterized by accelerated technological progress, exacerbated changes, and uncertainty. These realities and trends oblige us to rethink the questions of whom education should cultivate and how to achieve this cultivation. Relevant theories and practices have demonstrated that the effective ways of addressing changes and the uncertainty are to equip students or future laborers with innovation and creativity (Shi *et al.*, 2018).

Thus, promoting the comprehensive implementation of innovative education within the educational system is a critical task for applying with the Party's new-era educational policy and realizing the fundamental goals of education. The popularization of innovative education has profound social backgrounds and reliable intrinsic foundations (Shi & Han, 2008).

SOCIAL DEVELOPMENT TRENDS DEMAND THE CULTIVATION OF CREATIVE LABORERS IN EDUCATION

Advancements in information technology and other high technologies have profoundly transformed the processes of production and lifestyles in human society. First, production driven by personalized demand is gradually replacing the traditional standardized production. The abundance of social products has effectively stimulated people's desire for a better life and individual needs. To achieve a competitive advantage within the complex marketing environment, the modern market system, which is characterized as a "buyer's market", must pander to individual needs. Additionally, social production driven by personalized needs demands

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laborers form the entire value chain equipped with innovative capacity. is naturally altering and replacing standardized production. It is easy to understand that even ordinary workers must make adaptive changes to their tasks and products in response to customers' personal demands, which inherently involves creativity and innovation (Qin & Ding, 2024).

Changes that have happened in social production processes further promote the transformation of lifestyles. These changes are characterized not only by vertical innovations distinct from the past, but also by horizontal innovations that are based on diverse values. For instance, people not only increasingly use online communication as a substitution for traditional face-to-face interaction, but also choose different online platforms based on their personal preferences. Similar changes as such have permeated into every corner of society, turning lifestyle innovation from fantasy into reality.

The changing tendencies in social production and lifestyles objectively require education to serve the cultivation of creative laborers. The term creative laborers here refer to modern laborers capable of constantly generating unique ideas and outcomes. These individuals may be professional talents or skilled workers. The Party's new-era educational policy, which aims to "cultivate socialist builders and successors with all-round moral, intellectual, physical, aesthetic, and labor development", reflects the strategic foresight of national policymakers in anticipating social development trends. The inclusion of "labor education" highlights the recognition of labor's importance in this vision. Similarly, President Xi Jinping's call for "honest labor", "diligent labor", and "creative labor" aptly responds to the societal need for fostering creative laborers (Yin & McBride, 2015).

Given the foundational position of basic education in the educational system and the vital stage of personality and cognitive development in primary and secondary school students, basic education must undertake the responsibility of laying the groundwork for cultivating creative laborers (Xia & Zhou, 2025). Consequently, the pervasiveness of innovative education at the foundational level is particularly urgent and essential.

COGNITIVE DIVERSITY AS THE THEORETICAL FOUNDATION FOR POPULARIZING INNOVATIVE EDUCATION

Nearly all psychological researchers agree that creativity can be cultivated (Lin & Hu, 2012). The formation of students' personality and their intrinsic motivations are critical to the development of creativity (Lin, 2000). Therefore, we can presume that creativity is universal, and students' individualized development is the source of innovation and creation. Innovation and creativity are not privileges of a select few—everyone can solve problems in their unique ways. Carl Jung's personality type theory and M. J. Kirton's Adaption-Innovation (KAI) theory provide reliable theoretical bases for popularizing innovative education from the perspective of cognitive diversity.

Carl Jung's personality type theory

Jung's personality type theory has been epitomized as the Myers-Briggs Type Indicator (MBTI), a well-known psychological tool based on Jung's framework. According to Jung, Isabel Briggs Myers, Katharine Briggs, and other researchers, the theory describes personality along four dichotomous dimensions: Extroversion (E) *vs.* Introversion (I); Sensing (S) *vs.* Intuition (N); Thinking (T) *vs.* Feeling (F); Judging (J) *vs.* Perceiving (P). Every individual will present the entire features among different periods, but all of us possess intrinsic and stable preferences. The MBTI tool is able to identify these preferences (Jablokow, 2001).

MBTI tends to reflect the disparity between individuals. These discrepancies happen are contributed to: Where individuals focus their attention and derive energy (Extroversion *vs.* Introversion); how individuals perceive the world and gather information (Sensing *vs.* Intuition); the basis for decision-making (Thinking *vs.* Feeling); and attitudes toward the external world and lifestyle preferences (Judging *vs.* Perceiving). These four dimensions combine to form 16 personality types (*e.g.*, ESFP, ISFP). MBTI assesses individuals' preferences across these dimensions, providing insights into their cognitive tendencies and behavioral inclinations.

KAI theory

KAI theory classifies individuals into two categories based on their cognitive style: adapters (who prefer "doing things better"), and innovators (who focus on "doing things differently") (Kirton, 1976). To put it in another way, while adapters tend to adhere to existing norms and organizational frameworks, innovators will actively break through the existing norms and frameworks, thinking and solving problems from new perspectives (Xu & Tian, 2002).

KAI theory is grounded in two premises:(1) Everyone has creative potential. (2) Everyone is capable of solving problems (Stum, 2009). The theory emphasizes that differences in cognitive styles, spanning a continuum from highly adaptive to highly innovative, significantly influence how individuals approach problem-solving processes and outcomes.

The KAI inventory is a highly valuable psychological assessment tool and Kirton's KAI theory enters in practical application through applying and explaining the KAI inventory. The KAI inventory consists of three components: originality, efficiency, and rule/group conformity. While innovators often generate novel ideas or products, adaptors tend to ensure accuracy, reliability, and systematic execution. Meanwhile, adaptors also feature as systemic, prudent, and adherent to organizational norms. The KAI inventory is constructed using a 5-point Likert scoring method, whose scores range from 32 to 160, with a mean score of 96. Lower scores indicate a more adaptive cognitive style, while higher scores suggest a more innovative style. The KAI inventory helps individuals understand their problem-solving styles and guides the formation of balanced, complementary teams in innovation practices. By leveraging diverse cognitive styles, these teams can enhance efficiency and creativity.

The guiding significance of the cognitive diversity theory for innovative education

Cognitive diversity theories, represented by Jung's personality type theory and KAI theory, function as significant theoretical foundations and practical guidelines for innovative education.

Jung's personality type theory acknowledges the discrepancies of personality differences and internal preferences. Since the continuous enhancement of students' innovation and creativity depends on the effective development of their potential, fostering these abilities must align with their natural tendencies. This entails identifying students' individual preferences and applying influences that promote personal growth—transforming preferences into strengths. On this basis, students can be guided to absorb new knowledge, methods, and skills, thereby gradually developing unique innovative thinking abilities and fostering their innovation literacy through various task contexts and comprehensive practices (Gu, 2023). Personality type theory indicates that personality types only reflect differences, and that there is no "better" or "worse". Individuals grow in diverse and unique ways, and the most effective and brilliant results of education can be achieved by celebrating the diversity.

KAI theory interprets innovation styles from the perspective of cognitive diversity, defining innovation as "doing things differently". The KAI inventory, with its simplicity, ease of use, and high reliability and validity, accurately measures whether individuals belong to an innovative or adaptive cognitive style. Individuals are able to adjust their ways of thinking and solving problems according to the inventory's results. Furthermore, individuals will identify the effective approaches to develop their innovative capacity based on the personality type results from the MBTI test. Additionally, the value of the KAI theory lies in its discovery that teams consist of individuals with diverse cognitive styles achieve higher efficiency and innovation capacity than those with homogeneous styles, thereby providing a theoretical foundation for assembling differentiated task groups or innovation teams.

ACTION STRATEGIES FOR THE POPULARIZATION OF INNOVATIVE EDUCATION

To popularize innovative education, particularly during the basic education period, it is essential to move beyond national or regional top-level designs and incentive policies. Ultimately, implementation must occur at the micro-level. The focus on cultivating creative laborers should transfer to the grassroots level of educational practice. This section discusses strategies for promoting innovative education within schools and their courses.

Correctly understanding and grasping the major characteristics of creative laborers

In simple terms, innovation refers to utilizing and transforming existing resources within the social ethics and legal frameworks. It can generate new value or functions or deliver new satisfaction at lower costs. Innovation, in other words, is a breakthrough by standing on the shoulders of giants. However, innovation must not come at the expense of harming others or society or by increasing personal and social costs. Therefore, creative laborers should possess the following main characteristics.

First, they should have complete sense of self-awareness, innovation awareness, ethical and legal consciousness. Individuals can only cultivate strengths, offset weaknesses, and discover unique problem-solving approaches through a clear understanding of their own advantages and limitations. This process enables sustained and high-level innovation based on accumulated knowledge and skills. They must also recognize the complexity of contemporary and future societies characterized by change and the significance of innovation for personal survival and development. This understanding helps individuals accumulate the human capital needed for innovation throughout their lives (Kretschmann, 2024). Moreover, they must understand that all innovation must comply with legal norms and ethical boundaries, avoiding any illegal or unethical "innovation".

Second, they should possess a personalized knowledge and methodological system which is conducive to innovation. The driving force and outcomes of innovation come from the effective development of individual intelligence. Effective development relies on students

constructing their own knowledge and methodological systems based on their unique characteristics and learning goals. The effectiveness of this construction aligns with the principle of personalized education within modern human-centered educational philosophies. Modern education aimed at cultivating creative laborers must respect student diversity, promote their unique development, and guide their interest and direction in knowledge construction (Luo *et al.*, 2025). While personalized development provides the intrinsic motivation for innovation, the accumulation of knowledge and approaches determines the foundation and level of innovation. Without a rich accumulation of methods and abundant knowledge, innovation often remains at a low level.

Third, they should be equipped with unique innovative thinking styles. Innovative thinking is the core foundation of innovation, determining its direction and height. Innovative thinking is essentially a goal-oriented way of thinking, which encompasses "vision distinction-resource integration-problem resolution". Though innovative thinking may appear systematic, it is inherently individualized, with every detail marked by personal characteristics. Simply put, even with the same goal, differences in personal resources and cognitive preferences lead to variations in factors, methods, directions, and approaches during resource integration and problem-solving. This process ultimately results in diverse solutions unique to each individual. The main features of innovative thinking include: fluency, flexibility, originality, and elaboration (Scott *et al.*, 2004).

Fourth, they should embody qualities such as confidence, honesty, openness, cooperation, courage, and perseverance. Innovation cannot be achieved merely through knowledge, approaches and innovative thinking capacities, and it correlates positively with personal qualities. Confidence, derived from self-awareness, acts as the internal drive for innovation. Honesty is a fundamental requirement and ethical principle for innovation. Openness broadens the boundaries of innovation through mutual exchange and absorption. Cooperation integrates diverse strengths to achieve innovation goals. Innovation is rarely easy, requiring courage to face challenges and difficulties. Finally, innovation often involves repeated attempts, and success requires steadfast belief and unwavering determination. In a word, innovation is the outcome of firm faith and perseverance.

The "seven levels of change" theory by Rolf Smith

Rolf Smith's "Seven Levels of Change" theory (Smith, 2008) describes an action strategy aimed at enhancing creativity, encouraging innovation, and promoting continuous improvement. Some of the world's largest organizations, such as Texaco, the Royal Bank of Canada, IBM, Exxon Mobil, and General Mills, have applied this theory to internal brainstorming and individual research initiatives. The theory categorizes innovation into seven levels. (1) Effectiveness: Doing the right thing. (2) Efficiency: Doing the right thing correctly. (3) Improvement: Doing things better. (4) Elimination: Stopping certain actions. (5) Adaptation: Doing what others are doing. (6) Innovation: Doing what others have never done. (7) Breakthrough: Doing what others cannot do.

This theory encourages people to achieve different results through unique thinking, supported by tools and mind maps that foster positive change. It liberates people from linear thinking and opens doors to a world of "infinite possibilities".

The application of the "Seven Levels of Change" theory in education has become increasingly widespread. It helps students understand different levels of innovation, enabling them to determine and visualize their current level of innovation and facilitate constant progress from lower to higher levels. Students can also jump between levels directly, depending on their circumstances and aspirations. For example, they may move directly from Level 1 to Level 3 or even span to Level 7.

Applying the creative problem-solving (CPS) model in innovation practice

Innovation, in essence, involves solving problems in different ways. The CPS model, developed from the research of Alex Osborn and Sidney Parnes, provides an approach to the problem-solving process (Jablokow, 2001). The CPS model consists of six stages. (1) Constructing Opportunities: Identifying, capturing, and articulating the problem. (2) Researching Data: Collecting and analyzing information related to the problem. (3) Defining the Problem: Clarifying and specifying the nature of the problem. (4) Generating Ideas: Exploring multiple solutions, selecting potential ideas, and refining them. (5) Developing Solutions: Evaluating favorable and unfavorable factors, and choosing the most effective solution. (6) Reaching Consensus: planning actions, and overcoming obstacles to achieve goals.

This model can be simplified into three main stages: understanding challenges, generating ideas, and preparing for action. The phase of understanding challenges consists of the first three of the six stages. They are the prerequisites that guarantee innovation directions and potentials. The phase of generating ideas includes stage four, which determines the quality and quantity of the possibility of solving questions. It also

influences how unique the approaches will become. The preparatory action stage includes the fifth and sixth stages, which point to the consensus and action to achieve the goal.

Each step of the CPS model obtains the idea of divergent thinking and convergent thinking. Divergent thinking seeks a variety of unconventional possibilities, while convergent thinking directs numerous possibilities towards a single optimal outcome. It enables teachers and parents to guide children through creative thinking and problem-solving processes, making it highly suitable for direct classroom use.

The importance of developing students' meta-cognitive abilities in innovative education

Relevant research indicates that the level of thinking development determines an individual's direction, vision, and depth. Generally, individuals with well-developed innovative thinking are more likely to innovate. The development of innovative thinking relies on enhancing meta-cognitive abilities, which involve reflecting on one's thinking processes and finding ways to improve them. This process is associated with the following content: to achieve different results, one must use different methods. To use different methods, one must approach problems from different perspectives. To think from different perspectives, one must reflect on and improve their thinking patterns. Meta-cognition—"thinking about thinking"—is the originality of creativity. Cognitive transformation is a dual-feedback, spiral process. Sustained transformation fosters the continuous advancement of innovative thinking and creativity.

In school education, whether through interdisciplinary courses like Science, Technology, Engineering, and Mathematics (STEM), maker education, and comprehensive practical courses, or traditional subject learning, all can serve as platforms for evolving innovative thinking. Courses at all levels can become stages for cultivating meta-cognitive abilities. Developing meta-cognitive abilities requires comprehensive guidance from teachers and it also needs to be supported by specific activities such as scenario-based thinking explorations (individual or group activities) and writing thinking journals (Zeng, 2025). To be more specific, thinking explorations concern balancing divergent and convergent thinking while integrating various thought processes. Writing thinking journals tends to help students accurately describe their thinking patterns and processes, identify how their cognitive preferences influence outcomes, recognize deficiencies, and devise ways to improve their thought processes. Through such practices, students can build stronger meta-cognitive capabilities, enabling them to refine their innovation skills effectively.

Enhancing schools' and teachers' leadership in innovation education

The realization of the educational goal of "cultivating creative laborers" ultimately depends on the effective unleashing of the innovative vitality of micro-level subjects (schools, teachers, students, parents, *etc.*). Beyond the policy-driven efforts at the macro and meso levels, this largely relies on the innovation education leadership demonstrated by schools and teachers.

At the school level, innovation education leadership is primarily reflected in the following aspects: whether the efficient decision-making mechanism has been established based on cultivating creative laborers—namely, whether decisions are made based on fostering creative laborers and whether various resources are effectively integrated to this end; whether institutional frameworks support an environment conducive to innovation and actively promote the development of an innovation culture; whether leadership styles facilitate free flow of information and protect grassroots innovation vitality; whether the contribution of information technology to innovative education and teaching is genuinely meaningful; and whether legal and ethical leadership is exercised in promoting personalized education, thus imparting political and moral education with characteristics that are more grounded in legal principles, humanistic values, and individual needs.

The vitality of innovation education ultimately derives from its primary level—the interaction between teachers and students in the classroom. Teachers are the subjects that interact with students daily and carry the mission of fulfilling educational and teaching tasks. To promote innovation education, teachers must first step down from the pedestal of knowledge authority and become guides, supporters, collaborators, and assistants in students' innovation journeys, transforming the hierarchical teacher-student relationship into one of equal, interactive collaboration. Second, fostering students' ability to innovate requires teachers to possess innovative potentials themselves. The improvement of such abilities also relies on the effective development of teachers' individual wisdom. Thus, cultivating the creative laborers is contingent upon a teaching workforce equipped for personalized professional development (Huang *et al.*, 2006). Furthermore, teachers must not only actively promote the interaction and transformation of their own educational visions and practices but also accurately guide students in integrating and evolving their own ideas and behaviors. By using concepts to direct behavioral changes and reinforcing and elevating concepts through behavioral transformation, teachers

Table 1: The Innovation Classroom Teacher Behavior Inventory

No.	Indicator	No.	Indicator
1	Master subject knowledge and methodological systems	2	Understanding the disciplinary competencies that students should acquire
3	Possess of unique and mature teaching style	4	Understanding cognitive diversity and respecting students' personal characteristic
5	Properly recognizing and addressing one's strengths and weaknesses	6	Always encouraging students to learn new knowledge and skills
7	Preferring to open questions without standard answers	8	Able to use innovative teaching methods such as PBL proficiently
9	Always protecting students' imagination and curiosity	10	Cautiously or never using "yes" or "no" to evaluate students' learning outcomes
11	Consistently guiding students to think about and solve problems from multiple perspectives	12	Skilled in using educational technology tools to organize and enhance personalized teaching
13	Always praising students for their understanding of learning materials and their problem-solving processes	14	Proficient in guiding students to transfer disciplinary thinking methods across subjects
15	Value students' interdisciplinary competencies and encouraging the integration and application of knowledge across disciplines	16	Maintaining an equal and collaborative teacher-student relationship
17	Encouraging students to collaborate and leverage others' cognitive strengths to solve problems	18	Emphasizing the cultivation of students' career awareness and global awareness
19	Prioritizing the development of students' innovative qualities such as confidence, honesty, openness, cooperation, bravery, and perseverance	20	Always requiring oneself and students to think and make progress based on existing knowledge and experience
21	Consistently requiring oneself and guiding students to refine self-awareness	22	Always encouraging and guiding students to engage in innovative practices within legal and ethical frameworks
23	Valuing the shared growth of teachers and students in the teaching and learning process	24	Consistently requiring oneself and guiding students to reflect on and improve their problem-solving processes and methods

IC-TBI: Innovation Classroom Teacher Behavior Inventory

play a crucial role in advancing innovation education.

Guiding and regulating teacher and student behavior with innovation behavior checklists

The effective implementation of innovation education relies on the development of various types of innovative classrooms, including both subject-specific and interdisciplinary classrooms. Whether the behaviors of teachers and students shift toward fostering students' innovative thinking and enhancing their innovation capabilities is a critical indicator for assessing the efficiency and quality of innovation education.

Drawing upon personality type theory (cognitive diversity based on personality diversity), KAI theory (cognitive diversity based on cognitive style diversity), and the KAI inventory, which measures innovative cognitive styles aimed at "doing things differently" (Xu & Tian, 2002), the author integrates insights from the "Seven Levels of Change" theory on innovation hierarchy, the CPS model—which follows the problem-solving process of "clarify the problem, generate ideas, reach consensus, and prepare for action" and Project-Based Learning (PBL), a new learning approach combining independent thinking and collaborative learning with the goal of solving problems (Marra *et al.*, 2014). Additionally, the study incorporates perspectives from developmental psychology that emphasize focusing on students' growth processes rather than innate "talent" (Yin & McBride, 2015), as well as other theories conducive to personalized student development.

By fully considering the application scenarios for developing students' innovative and creative abilities in various classroom settings, the author has developed two innovation behavior checklists: the Innovation Classroom Teacher Behavior Inventory (IC-TBI; Table 1) and the Innovation Classroom Student Behavior Inventory (IC-SBI; Table 2), designed specifically for primary and secondary school settings. These tools aim to guide and regulate teachers' and students' behavior toward the effective implementation of innovation education.

The underlying logic is as follows: everyone possesses creativity, though it manifests in different ways; creativity can be cultivated, and various types of classrooms serve as the primary environments for students to develop their innovative abilities. Innovation classrooms aimed at fostering students' creativity require both teachers and students to adopt behaviors conducive to the development of innovation capabilities. These classrooms should also emphasize career awareness and vocational education, which are closely linked to personalized education (Shi *et al.*, 2018), and focus on adapting to and transcending rapidly changing environments (Ruttenberg & Maital, 2014). This approach aims to guide the direction and quality of innovation classroom development and promote a spiral cycle of "behavior-concept-behavior" in innovation education.

Table 2: The Innovation Classroom Student Behavior Inventory

No.	Indicator	No.	Indicator
1	Being aware of one's strengths and weaknesses	2	Able to correctly understand the purpose of learning
3	Actively learns new knowledge and skills	4	Able to solve real-word problems by applying to existing subject knowledge and experience
5	Maintains strong curiosity and thirst for knowledge	6	Know one's stable personal interests
7	Able to learn independently and faces challenges in learning with courage	8	Enjoys asking questions and challenging ideas
9	Able to interact and collaborate equally and amicably with teachers and peers	10	Adapts to and proficiently applies new learning methods such as PBL
11	Able to apply the CPS model (understanding problems-generating ideas–solving problems) in learning	12	Proficiently uses information technology tools and makes good use of information resources
13	Consistently thinks from multiple perspectives and generates many new ideas	14	Often solves problems through distant association
15	Enjoys solving problems by changing routines or rules	16	Frequently addresses learning and life challenges in unique ways
17	Effectively leverages others' strengths to collaboratively solve practical problems	18	Relates academic knowledge to social professions and uses it to address vocational challenges
19	Abide by legal norms and social ethics	20	Transfers subject-specific thinking methods to other disciplines
21	Always capable of articulating and describing problems and the process of solving them clearly	22	Understands the role of personal cognitive preferences in learning
23	Frequently reflects on learning and thinking processes to continuously improve	24	Enjoys and quickly adapts to constantly changing (classroom) environments

IC-SBI: Innovation Classroom Student Behavior Inventory

The IC-TBI and the IC-SBI are designed to achieve the goals of innovation classroom construction by effectively advancing personalized education and personalized learning. Since innovation capabilities are deeply rooted in individual personality traits, rely on extensive knowledge accumulation, and are enhanced through personalized development, the growth of students' innovative abilities also demands thought patterns and behaviors that release individual creative potential. Furthermore, such growth requires continuous reflection to improve meta-cognitive abilities (thinking about thinking), which are hallmarks of innovative thinking. Individuals with innovative thinking are more likely to engage in innovation.

Therefore, IC-TBI and IC-SBI measure the direction and extent of behavioral changes among teachers and students in innovation classrooms, guiding the transformation of traditional classrooms toward environments that adapt to and transcend change while enhancing students' innovative abilities. These tools are applicable to other stages of education, with modifications as needed, to support broader adoption.

The IC-TBI and IC-SBI adopt a 5-point Likert scale to evaluate the innovative tendencies, potential, and abilities of both teachers and students through behavioral assessments. Higher scores indicate stronger innovation potential and capabilities.

To address the potential for subjective bias in behavioral assessments, IC-TBI and IC-SBI should be used in conjunction with other methods such as peer evaluations, observations, 360° interviews, and tools like big data analysis. This combined approach enhances the validity and reliability of assessment results.

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