Contemporary Education Frontiers, 2026, Volume 4, Issue 7
https://bbwpublisher.com/journal/CEF
Online ISSN: 3029-1860
Print ISSN: 3029-1879

Research on Cultivating University Students' Innovation Ability in the Context of Generative Artificial Intelligence

Zishuo Zheng*

School of Marxism, Tianjin University of Finance and Economics, Tianjin 300222, China

****Author to whom correspondence should be addressed.***

Copyright: © 2026 Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), permitting distribution and reproduction in any medium, provided the original work is cited.

Abstract: Generative artificial intelligence (Gen AI), represented by ChatGPT, is lowering the cost of knowledge acquisition and integration. While providing intelligent support for cultivating university students' innovation ability, it also brings risks such as a weakened willingness to explore independently, impaired critical thinking, and a diluted sense of responsibility. Taking the constituent dimensions of university students' innovation ability as an analytical framework, this paper examines the empowering opportunities and weakening effects of Gen AI. Cultivating university students' innovation ability in the context of generative AI is both a contemporary issue that technological change poses for higher education and an educational requirement of the mission of fostering virtue through education in universities in the new era. To this end, coordinated efforts should be advanced at the three levels of content, practice, and institution: reshaping the content and methods of innovation ability cultivation in universities, emphasizing the building of human-machine collaborative platforms and practical components, and improving the support mechanism for cultivating university students' innovation ability, so as to stimulate university students' motivation to innovate and sense of responsibility, and make technology serve their growth and talent development.

Keywords: Generative artificial intelligence; University students; Innovation ability; Practice

Online publication: July 26, 2026

1. Introduction

In recent years, with the rapid development of generative artificial intelligence technologies such as ChatGPT, DeepSeek, and Doubao, the content and methods of cultivating university students' well-rounded development have changed. As university students are a new force in building a great modern socialist country, their innovation ability is crucial to the development of an innovative talent team, to achieving high-level scientific and technological self-reliance and self-improvement, and to national development and the great cause of national rejuvenation. Therefore, on the basis of systematically clarifying the core

connotations of university students' innovation ability, this paper analyzes the empowering opportunities and weakening effects of generative AI on the cultivation of university students' innovation ability, and then explores cultivation pathways from the three levels of content, practice, and institution. This study is of great significance for meeting university students' needs for well-rounded growth and talent development, cultivating high-quality innovative talents suited to the requirements of the new era, and advancing the building of an innovative country.

2. The core connotations of university students' innovation ability

University students' innovation ability refers to the ability to generate new ideas, put them into practice, and create new things. It is particularly important for both individual growth and national development. Its core connotations should form a structure composed of four aspects: innovative thinking ability as the foundation, tenacious perseverance as the driving force, teamwork ability as the focus, and innovative practical ability as the guarantee of implementation.

2.1. Foundation: University students' innovative thinking ability

Innovative thinking ability is an organic integration of abstract thinking and imaginal thinking, divergent thinking and convergent thinking, lateral thinking and vertical thinking, reverse thinking and forward thinking, logical thinking and dialectical thinking, among others. Specifically, it refers to the ability to innovate upon others' existing achievements and generate new ideas. University students are the backbone of the innovation-driven development strategy. University students rely on innovative thinking as the foundation for translating their innovations into practice, and every stage of their practical innovation depends on innovative thinking. General Secretary Xi Jinping emphasized: "To improve innovative thinking ability, one must have the boldness to dare to be the first, break free from the habitual mindset of blindly trusting experience, book doctrines, and authority, abandon outdated old concepts, and open up new prospects for work with a new leap in ideological understanding [1]." This requires university students to have both pioneering thinking that dares to be the first and critical thinking that breaks inertia. First, university students' innovative thinking ability should involve critical and divergent thinking. When facing problems and challenges, university students should not rely entirely on Gen AI and, by combining existing theoretical knowledge and practical conditions, explore unknown theories from multiple angles and directions. Second, university students' innovative thinking ability should involve associative and convergent thinking. In the process of acquiring knowledge and summarizing experience, university students should abandon closed-minded thinking, draw associations across diverse phenomena, conduct comparative analysis, and derive open-ended ideas that break through convention. Finally, university students' innovative thinking ability should involve forward-looking and reverse thinking. When participating in various scientific research and innovation activities, university students should give full play to their subjective initiative, apply forward-looking awareness and complementary forward-reverse reasoning methods, and develop exploratory, predictive, and reverse-oriented ideas.

2.2. Driving force: University students' tenacious perseverance

Tenacious perseverance is an essential requirement for university students to achieve scientific research results and an inexhaustible driving force for the smooth advancement of scientific research work. In the fast-paced context of artificial intelligence, without tenacious perseverance, university students may abandon their efforts midway. At a symposium on strengthening basic research, General Secretary Xi Jinping emphasized: "Basic research is a cause that lays the foundations and yields long-term benefits. One should neither seek quick success and instant benefits nor remain passive and inactive. Instead, one should possess the

vision and commitment embodied in the adage 'the earlier generation plants trees so that later generations may enjoy the shade', and the perseverance and resolve of 'taking ten years to sharpen a sword [2]'." In the process of conducting scientific research work, difficulties and challenges are inevitable. This requires innovative talents in science and technology to possess the perseverance of water dripping through stone and the determination to overcome difficulties. First, tenacious perseverance among university students should involve a spirit of enduring hardship. Young university students are important members and sources of the nation's strategic talent force. Only by demonstrating the spirit of enduring hardship and the willingness to "gnaw on hard bones" in major national scientific and technological tasks can they overcome bottleneck problems, master a large number of core technologies, and contribute youthful strength to achieving high-level scientific and technological self-reliance and self-strengthening. Second, tenacious perseverance among university students should include the ability to withstand setbacks. When carrying out high-pressure scientific research tasks, university students with strong setback resistance can grow braver with each setback and discover innovation points through repeated trial and error. Finally, tenacious perseverance among university students should be accompanied by a sense of social responsibility. Although Gen AI is an intelligent tool for university students to seek innovative ideas, it also poses potential risks in many aspects, such as privacy and security, human misuse, cognitive rigidity, and social ethics. This requires university students to have a sense of social responsibility, properly address issues of security, ethics, and governance caused by Gen AI, align personal pursuits with the nation's strategic development needs, and enhance China's scientific and technological innovation ability.

2.3. Focus: University students' teamwork ability

With the further advancement of the new round of scientific and technological revolution and industrial transformation, the industrial division of labor has become more refined, and the connections among people in production relations have become closer. Innovation in all fields is inseparable from teamwork. Teamwork can pool collective wisdom, inspire creative thinking and accumulate strength, thereby enhancing new quality productive forces more efficiently. University students' teamwork ability is the core priority of their innovation ability and an important factor in their well-rounded development. First, university students' teamwork ability should involve a shared innovation goal. If members of a university student team conduct research separately, their innovative forces may become fragmented, affecting the efficiency of scientific research results. Only a harmonious and mutually supportive team can pool its members' strengths, identify innovation goals, and achieve win-win outcomes for both the team and its members. Second, university students' teamwork ability should involve self-positioning within the team. In the face of an increasingly refined industrial division of labor, university students should understand their own strengths and weaknesses, actively participate in projects, and take on appropriate responsibilities. In various project activities, university students engage in intellectual exchanges and the exchange of views, sparking new innovative inspiration through mutual learning. Finally, university students' teamwork ability should include awareness of collaborating with Gen AI. Teamwork is embodied not only in cooperation among people but also in cooperation between people and Gen AI. Through networks, people can interact with one another and with Gen AI, share theoretical knowledge, engage in creative production of knowledge, and jointly use knowledge to find solutions. At the same time, Gen AI can expand the space of learning resources for university students, provide personalized learning and diversified supply, and help university students think about problems from multiple perspectives.

2.4. Key: University students' innovative practical ability

Marx pointed out: "All social life is essentially practical [3]." Practice is the activity by which people understand and transform the world, and innovation builds on prior practice. University students' innovative practical ability mainly refers to their ability to solve real-world problems in innovation activities. Its essence is to achieve innovation through the integration of theory and practice, and it is a key component of university students' innovation ability. Innovative thinking divorced from practice can only remain at the level of conceptual proposals. On the one hand, university students' innovative practical ability should have innovative methods for solving problems. Innovative methods for solving problems derive from university students' professional theoretical foundation and accurate grasp of practical problems, and directly affect the quality of innovative outcomes. Gen AI can serve as an expanded tool for sources of innovative methods, provide interdisciplinary knowledge and methods, and help university students overcome rigid personal thinking patterns and efficiently identify solutions to problems. On the other hand, university students' innovative practical ability should have the hands-on ability to transform innovative thinking into testable outcomes. In Theses on Feuerbach, Marx clearly stated: "Man must prove the truth—i.e. the reality and power, the this-sidedness of his thinking in practice [4]." Practice is the sole criterion for testing the truth of cognition. The reason why university students' innovative practical ability is crucial to their innovation ability is rooted in the practical nature of innovation activities. New theoretical issues emerge from practice, innovation proposals must be tested through practice, and the value of new innovative methods must be judged by practice. Therefore, innovative practical ability is a necessary condition for achieving innovation outcomes.

3. The impact of generative artificial intelligence on university students' innovation ability

Gen AI, represented by ChatGPT, has demonstrated a wide range of intelligent applications across multiple domains, bringing both opportunities and challenges to the development of higher education. On the one hand, generative artificial intelligence provides university students with personalized, high-quality educational resources and readily available educational support services, expanding the conditions for cultivating university students' innovation ability. On the other hand, Gen AI may undermine university students' independent thinking ability and autonomous innovation ability, posing risks to the cultivation of university students' innovation ability.

3.1. The empowering effects of generative artificial intelligence on university students' innovation ability

The technological revolution and industrial transformation represented by Gen AI have permeated every aspect of university students' learning and daily life, expanding their cognitive space and bringing personalized possibilities and convenience beyond temporal and spatial constraints to innovation ability education for university students. First, Gen AI can reduce the costs of knowledge acquisition and integration. In the past, university students spent considerable time and energy on retrieving, reading, and integrating information, which seriously affected the efficiency of their innovation work. Gen AI can complete data comprehension and screening, language processing, and structured creation and generation in a short period, helping university students broaden their knowledge horizons and accelerate knowledge acquisition, thereby improving the efficiency of interdisciplinary knowledge recombination required for innovation. Second, Gen AI can enhance university students' self-efficacy. Based on individual university students' learning interests and

knowledge bases, Gen AI generates personalized learning tasks and moderately challenging goals, alleviating anxiety about difficulty at the initial stage of tasks and allowing university students to accumulate mastery experiences through scaffolded tasks, thereby enhancing self-efficacy. A high level of self-efficacy can enhance university students' learning initiative and motivation, stimulate their innovative inspiration, and further contribute to the creation and development of innovative outcomes. Finally, Gen AI can provide diverse innovative approaches. Innovation stagnation often results from the solidification of university students' thinking. University students find it difficult to break free from their established experiential frameworks, habitually following predecessors' path dependence and conformist approaches to method selection, and they easily fall into the rut of familiar methodological paths. Gen AI can integrate knowledge systems from different disciplines, generate multiple solutions around the same issue, provide instrumental support, and enable university students to more quickly enter the stage of transforming innovative outcomes for the issue.

3.2. The weakening risks of generative artificial intelligence on university students' innovation ability

While empowering university students' innovation, Gen AI may also bring risks of weakening innovation ability due to excessive dependence or improper use. First, Gen AI may weaken the willingness for autonomous exploration. In the era of artificial intelligence, university students' use of Gen AI tools has become an irreversible trend. In tasks such as generating text, code, research frameworks, project plans, and proposals, some university students excessively rely on Gen AI tools, skipping the processes of independent conception and autonomous exploration. This can produce problems such as thinking inertia, lack of imagination, and weak frustration tolerance, and gradually lose the innovative motivation for active exploration. Second, Gen AI may hinder the formation of critical thinking. Gen AI poses potential risks such as inaccurate information and algorithmic bias. University students are at the stage of forming logical thinking and critical thinking. If they lack awareness of problems and directly accept erroneous information wholesale, they may be misled, limiting the cultivation of critical thinking and creativity. Finally, Gen AI may give rise to ethical and moral issues. Some university students may engage in technology misuse, directly using Gen AI tools to fabricate false data and directly copy generated text, resulting in academic integrity problems and the gradual decline of university students' innovation ability, directly compromising their ability to take responsibility in future innovation projects.

4. Pathways for cultivating university students' innovation ability in the context of generative artificial intelligence

As a tool for university students to carry out innovation activities, Gen AI itself has no clear value orientation. Whether it enhances or weakens university students' innovation ability depends on how the corresponding cultivation and guidance of university students' innovation ability is conducted.

4.1. Content level: Reshaping the content and methods of innovation ability cultivation in higher education institutions

Higher education institutions are the primary base for cultivating innovative talents and should fully leverage the advantages of Gen AI technology to promote innovation education reform. On the one hand, course content should keep pace with the times. Evaluating the content and inferences generated by Gen AI requires

university students to possess solid professional theoretical foundations and to be able to discern the content presented independently. Higher education institutions should strengthen basic course teaching, broaden the breadth and depth of university students' knowledge, and consolidate the theoretical foundation for cultivating innovation ability. At the same time, they should establish and improve the innovation education curriculum system for university students, base it on the latest developments in disciplinary fields and national strategic needs, update cutting-edge developments and innovative methods in a timely manner, and enhance university students' innovation ability. On the other hand, course formats should be flexible and diverse. Traditional indoctrination-based teaching methods easily rigidify university students' thinking, hinder the formation of critical thinking, and make it difficult for them to develop a questioning mindset. In terms of course formats, various flexible formats such as problem-oriented salon seminars, interactive thematic lectures, and interdisciplinary exchange courses should be adopted.

4.2. Practice level: Emphasizing the construction of human-machine collaborative platforms and practical components

The cultivation of university students' innovation ability is an essential requirement for higher education institutions to serve the national innovation-driven development strategy. Enhancing university students' innovation ability requires providing testable platforms at the practical level. On the one hand, human-machine collaborative practice platforms should be established. Higher education institutions should, based on national strategic needs and regional educational characteristics, leverage course instruction and research projects to build technical practice platforms, integrate Gen AI tools, introduce innovation theories from various disciplinary fields, and promote the construction of collaborative education platforms among universities, enterprises, and research institutes, thereby providing platform support for stimulating university students' innovation ability. On the other hand, attention should be paid to the practical components of the second classroom. Higher education institutions should make good use of platforms such as club activities, social practice, and open laboratories to conduct activities such as AI literacy training, hands-on AI practice, AI innovation competitions, and AI implementation projects, forming a practice system with institution-specific characteristics, thereby enhancing university students' digital literacy, human–AI collaboration ability, and interdisciplinary innovation ability through practice.

4.3. Institutional level: Improving the guarantee mechanisms for cultivating university students' innovation ability

In recent years, new technologies such as Gen AI and deep synthesis have developed rapidly. While improving efficiency and enriching content, they have also brought problems such as the spread of false information and the degradation of the online ecosystem. The Measures for Labeling Artificial Intelligence-Generated and Synthesized Content, which took effect on September 1, 2025, regulate labeling behavior in all aspects of content production and dissemination, thereby promoting the healthy and orderly development of artificial intelligence. The governance logic of these Measures can be applied to safeguard mechanisms for innovation ability cultivation in higher education institutions [5]. Academic misconduct and plagiarism caused by improper use of generative AI are not uncommon in higher education institutions, and cultivating university students' innovation ability therefore requires institutional safeguards. Accordingly, efforts to improve university governance mechanisms and academic norms should proceed simultaneously in three

areas: usage norms, evaluation systems, and incentive mechanisms. First, education on norms for generative AI use should be strengthened, along with education aimed at cultivating innovation ability, so as to guide students to form proper motivations for utilizing AI tools and enhance their innovative and critical thinking abilities. Second, formative assessment of innovation ability should be implemented. With the help of Gen AI, assessment data on innovation ability should be collected in real time, teaching plans should be adjusted promptly to ensure their appropriateness, teaching content and methods should be flexibly optimized, and the quality of cultivating university students' innovation ability should be enhanced. Finally, the incentive mechanism for cultivating university students' innovation ability should be improved. Higher education institutions should, in light of institutional contexts and the technical features of generative AI, provide financial and technical support for innovation ability training, create a campus culture that encourages innovation, promote the integration of teaching with research innovation, stimulate students' enthusiasm for innovation, and cultivate their innovation ability [6].

5. Conclusion

Gen AI has provided intelligent support for the cultivation of university students' innovation ability, while also posing risks such as reduced willingness for autonomous exploration, impeded critical thinking, and a weakened sense of responsibility. Technology itself has no inherent value orientation; the key lies in how it is guided and cultivated. Higher education institutions should coordinate efforts across content, practice, and institutional dimensions to cultivate high-quality innovative talents who can shoulder the mission of the times and contribute to the construction of an innovative nation.

Disclosure statement

The author declares no conflict of interest.

References

[1] The Propaganda Department of the Central Committee of the Communist Party of China, 2016, Reader of General Secretary Xi Jinping's Series of Important Speeches. Beijing: Study Press, People's Publishing House, 288.

[2] Xi J, 2026, Speech at the Symposium on Strengthening Basic Research. Qiushi, (18): 4–7.

[3] Marx K, Engels F, 1995, Selected Works of Marx and Engels: Volume 1. Beijing: People's Publishing House, 56.

[4] Marx K, Engels F, 2009, Collected Works of Marx and Engels: Volume 1. Beijing: People's Publishing House, 500.

[5] Jin X, 2025, Promote Full Chain Governance from Generation to Dissemination. People's Daily, March 19, 2025.

[6] Zhang Z, 2017, Analysis and Strategies for Cultivating Innovation Ability of University Students. Shenyang: Liaoning Science and Technology Press, 181.

Publisher's note

Bio-Byword Scientific Publishing remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.