A Study on the Cultivation Pathways of Vocational Undergraduate Students in Metallurgical Majors from the Perspective of High-Quality Employment

Yang Liu, Jinhui Zhao*, Chen Wang

School of Materials Engineering, Hebei Vocational University of Industry and Technology, Shijiazhuang, 050091, China
**Corresponding author: 18713727708@126.com*

Abstract: *Full, high-quality employment is the basic aim of vocational undergraduate education. The iron and steel industry is now transforming in ways that are intelligent and green, and this raises a direct question: how should vocational undergraduate students in metallurgical majors be trained to meet the requirements of high-quality employment? This paper begins from the policy and theoretical meaning of high-quality employment and argues that vocational undergraduate training should stop judging its success by the employment rate alone and start judging it by employment quality. It then works through the logic of building cultivation pathways for these students. The pathways bring together three channels, namely classroom teaching, out-of-class activities, and cooperation between schools and enterprises, and link them into a loop of goal setting, pathway design, process delivery, and evaluation and feedback. The paper concludes that a usable pathway has to align what industry needs, how students grow, and what education supplies, so that the resulting system can be operated, assessed, and adjusted over time. This offers a reference for reforming talent cultivation in metallurgical majors.*

Keywords: *high-quality employment; vocational undergraduate education; metallurgical majors; cultivation pathways; pathway construction*

1. Introduction

1.1 Research Background and Significance

Employment is the most fundamental livelihood issue. The proposal of the 15th Five-Year Plan reviewed and adopted by the Fourth Plenary Session of the 20th Central Committee of the Communist Party of China explicitly called for "promoting high-quality and full employment" and incorporated it into the important arrangements for safeguarding and improving people's livelihood[1]. The Employment-First Strategy "15th Five-Year Plan" issued by the State Council further proposed to promote "more efficient matching between people and positions," accelerate the development of modern vocational education, and build a number of high-level vocational undergraduate schools with distinctive school-running characteristics[2]. Previously, the "Opinions on Implementing the Employment-First Strategy to Promote High-Quality and Full Employment" issued by the Central Committee of the Communist Party of China and the State Council had already emphasized "accelerating the development of modern vocational education, promoting the integration of vocational education and general education, and the integration of industry and education," so as to cultivate more high-quality technical and skilled talents[3].

This series of policies provides the fundamental guidance for the development of vocational undergraduate education and has also shifted the quality inspection standard of vocational undergraduate institutions from "whether students can be employed" to "whether they can achieve high-quality employment." Vocational undergraduate education in metallurgical majors shoulders the important task of delivering to the iron and steel industry composite talents who "understand technical principles, master operational skills, and possess greater development potential." Against the backdrop of the transformation and upgrading of the iron and steel industry, exploring the cultivation pathways of vocational undergraduate students in metallurgical majors from the perspective of high-quality employment is of great practical significance for enhancing the fit between talent cultivation and industrial demand.

1.2 Research Purpose and Approach

This paper asks how vocational undergraduate students in metallurgical majors should be cultivated when judged against high-quality employment. It combines theoretical discussion with pathway construction. It first clarifies what high-quality employment means and what it demands of vocational undergraduate training, then looks at the contradictions in how these students are currently cultivated, and then spells out the logic and concrete design of the cultivation pathways. The last part discusses the mechanisms that support implementation, so that the paper as a whole moves from value positioning through pathway design to mechanism guarantee.

2. The Theoretical Logic of High-Quality Employment and Talent Cultivation

2.1 Definition of the Connotation of High-Quality Employment

The term high-quality employment entered Chinese policy discourse as employment goals shifted from expanding total volume to raising quality. Yue Changjun (2023) reads the concept at two levels. At the macro level, it concerns how well the employment structure matches the industrial structure, and therefore how efficiently labor resources are allocated. At the micro level, it concerns the quality of a person's own job: pay, stability, room for career growth, satisfaction, and labor protection. For vocational undergraduate education, the micro level matters more. It asks that graduates do more than find a job; they should be able to apply what they learned and keep improving their vocational competence once employed. Put plainly, training should give students the capacity to get a job, keep it, and eventually move beyond it.

2.2 Theoretical Basis for Cultivation Pathway Construction

Research on employability offers a foundation for designing cultivation pathways. Early studies treated employability as a set of personal attributes; more recent work regards it as something that can be built through deliberate training. Fugate et al. (2004) describe employability as a psycho-social construct, an adaptive capacity that people draw on when their careers change. They identify three components: career identity, personal adaptability, and social and human capital, which together position the individual as an active agent rather than a passive recipient in career development. McQuaid and Lindsay (2005), writing from a policy perspective, treat employability as the product of individual factors, personal circumstances, and external conditions; it cannot be explained by the supply side or the demand side alone. Chinese studies reach a similar conclusion. Mei Weihui and Shao Di (2024) see employability as a combination of human capital, social capital, personal attitudes and behavior, and labor market conditions. A national survey of vocational college graduates goes further, breaking employability capital into human, social, cultural, psychological, and identity capital (Liu Yaxuan & Yang Po, 2026). Because vocational undergraduate programs aim to produce "high-level technical and skilled talents," the employability they cultivate has to be both theoretical and practical, both technical and developmental. The pathway must therefore address the full employability structure. It has to run through classroom instruction, hands-on practice, and the student's own developing sense of the profession; none of these can be left out.

3. A Realistic Examination of the Cultivation of Vocational Undergraduate Students in Metallurgical Majors

3.1 Analysis of the Fitness of the Current Cultivation Status

Judged against the requirements of high-quality employment, the current state of cultivation still falls short. Take the match between people and positions. Although the cultivation program stresses the integration of industry and education and the unity of theory and practice, the channel through which job demands reach the program is not smooth enough, and course content tends to lag behind changes in industry and technology. Take sustainable development. The program does too little to build students' awareness of career planning and their ability to keep developing after they start work. Take social recognition. Vocational undergraduate education is still at an early stage in this respect, and it has to earn the trust of industry and society by visibly producing capable graduates.

3.2 Three Structural Contradictions in the Cultivation Process

Looking at the cultivation process as a whole, three structural contradictions stand out in metallurgical majors.

The first is an emphasis on skills at the expense of principles, which leaves theoretical foundations weak. Some courses and teaching practices, following the tradition that skill is the standard, spend too much time on operational drill and too little on process principles, systematic thinking, and the judgment needed to handle anomalies. Students then get started quickly but lack staying power, and they struggle with value-added tasks such as parameter optimization and fault diagnosis on production lines that are becoming more intelligent every year.

The second is an emphasis on results at the expense of process, which fragments the educational chain. Evaluation concentrates on outcome indicators such as graduation rates, employment rates, and certificate pass rates, while the process through which students form professional qualities and practical abilities is rarely recorded, guided, or fed back. The first classroom and the second classroom are only loosely connected, and out-of-class cultivation has no institutionalized carrier.

The third is an emphasis on the school at the expense of the enterprise, which keeps industry-education collaboration shallow. Cooperation rarely goes beyond arranging internships and organizing visits. A deeper mechanism in which enterprise demand feeds into the cultivation process and cultivation results are fed back to the enterprise has not yet formed, so the supply side of cultivation and the demand side of industry remain disconnected.

These three contradictions reinforce one another. Together, they are the underlying reason employment quality is constrained, and they point to the direction in which cultivation pathways need to be rebuilt. They also confirm the constructivist view of employability set out earlier: what a graduate can do depends not only on the qualities the person has formed but also on the environment and conditions in which they were trained. The mismatch between people and positions can only be resolved by acting at the source, that is, at the supply side of cultivation.

4. Construction Ideas and Specific Design of Cultivation Pathways

4.1 Construction Principles

Four principles guide the construction of these pathways.

Demand orientation comes first. Cultivation objectives and content are designed backward from what industries and enterprises actually need, and new industrial technologies and standards are turned into teaching resources without delay.

The second principle is systematic integration. The three educational channels are coordinated around the employability structure, so that they work as one whole instead of separately.

The third is whole-process integration. Employability cultivation runs through the student's entire time on campus, rather than being crammed into a short burst of employment education just before graduation.

The fourth is closed-loop improvement. A loop of goal setting, pathway design, process delivery, evaluation and feedback, and dynamic optimization keeps the pathways correcting themselves.

4.2 The First Classroom: Consolidating Professional Theoretical Foundations through a "Principle-Oriented" Approach

The first classroom responds to the problem of skills being taught at the expense of principles. Its reform centers on moving the curriculum from an operation-oriented to a principle-oriented approach. This means teaching process principles in a more sustained way: the course follows a main line from process principles to phenomenon analysis to optimization intervention, so that students learn not only how to do something but why it is done that way and how to adjust when something goes wrong. The aim is to lift them from operator to technician. The reform also strengthens professional language and familiarity with standards, adding modules such as professional English and the interpretation of industry standards, so that students are not held back when they step onto a modern production line. At the same time, theory and practice are taught together. Teaching makes use of on-campus training bases

and the practical resources of enterprises, and it is organized around projects and tasks, so that students apply their knowledge in real or simulated production settings.

4.3 The Second Classroom: Promoting the Implementation of Capacity Transformation through a "Transcript" System

The second classroom responds to the problem of results being emphasized over process. The aim is to make students' quality formation and capacity transformation outside the classroom institutionalized, process-based, and visible. A modular activity system is built first, organized around the employability structure. It brings together activities in ideological growth, professional improvement, innovation and entrepreneurship, practical internship, and volunteer service, turning what used to be scattered points into a coherent system. A "second classroom transcript" then puts these activities into credit management. An information platform handles the whole cycle digitally, from publishing activities and recording participation to certifying what students have done, so that a student's development becomes visible. This gives students a basis for knowing themselves and gives employers a credible window into their qualities. Finally, activities are graded in difficulty by year, so that employability cultivation continues across the whole period of study.

4.4 School-Enterprise Collaboration: Deepening Industry-Education Integration through a "Demand-Cultivation-Feedback" Closed Loop

The third channel, school-enterprise collaboration, responds to the problem of the school being emphasized over the enterprise. It tries to move beyond superficial cooperation toward deep embedding through a loop of demand, cultivation, and feedback.

The first task is reverse demand input. The school regularly investigates enterprises and tracks its graduates, and it feeds the real demands it finds into the revision of cultivation programs and courses.

The second is collaboration between enterprise mentors and teachers. Technical backbone and management experts from enterprises take part in teaching, while in-service teachers practice in enterprises, and together they build dual-qualified teaching teams.

The third is a collaborative education platform led by the Party and the Communist Youth League building. Ideological and political education is combined with professional practice; students do their internships in steel enterprises, and value guidance and ability cultivation reinforce each other in real career settings.

The fourth is joint evaluation and feedback. Schools and enterprises draw up internship assessment standards together, take part in evaluating students together, and enterprise evaluation is written into the quality evaluation system.

These three channels are not separate modules. They are one whole, and their common goal is employability cultivation. The first classroom answers the question of where knowledge comes from, and it supplies the theoretical foundation. The second classroom answers the question of how abilities are formed, and it turns knowledge into qualities. School-enterprise collaboration answers the question of how talents are tested, and it checks cultivation results against real career situations. Each channel leads into the next, and together they make up a complete educational chain.

5. Safeguard Mechanisms for the Implementation of Cultivation Pathways

The implementation of cultivation pathways depends on the support of a systematic safeguard mechanism. In terms of organizational guarantee, a diversified collaborative architecture of school leadership, college implementation, and enterprise participation is constructed, with clear clarification of the rights and responsibility boundaries between schools and enterprises. In terms of institutional guarantee, institutional norms such as the "second classroom transcript" credit recognition and the employment management of enterprise mentors are improved, so that pathway implementation has rules to follow. In terms of resource guarantee, on-campus and off-campus practical teaching resources are coordinated, high-level productive training bases are built, and teachers' teaching capability in industry-education integration is enhanced. In terms of quality guarantee, a quality monitoring and evaluation system covering the entire cultivation process is established, incorporating student development data, enterprise evaluation feedback, and graduate tracking information into quality analysis, thereby forming a quality improvement cycle of evaluation, feedback, and improvement.

6. Conclusion and Prospects

6.1 Research Summary

Starting from what high-quality employment prescribes, this paper sets out the construction of cultivation pathways for vocational undergraduate students in metallurgical majors. In value positioning, it moves from judging employment by rate to judging it by quality. In pathway design, it builds an educational system of three channels: classroom teaching, out-of-class activities, and school-enterprise cooperation, which respectively strengthen professional theoretical foundations, carry out capacity transformation, and deepen industry-education collaboration. In operational mechanism, it sets up a closed loop of goal setting, pathway design, process delivery, and evaluation and feedback. This system turns the requirements of the national employment-first strategy into practical cultivation measures, and it can serve as a reference for reforming talent cultivation in metallurgical majors.

6.2 Research Prospects

The construction of cultivation pathways from the perspective of high-quality employment is a continuously evolving process. As an emerging type of education, the maturity of vocational undergraduate education's cultivation model still depends on long-term exploration in educational practice and the continuous deepening of theoretical research. Metallurgical majors should adhere to the cultivation positioning of "high-level technical and skilled talents," keep pace with the trend of intelligent and green transformation of the iron and steel industry, and continuously optimize cultivation pathways. Future research may further focus on the quantitative evaluation of the implementation effects of cultivation pathways, the construction of an employment-quality evaluation index system, and the comparative reference of cultivation experiences among different types of vocational colleges, so as to provide more solid support for the realization of the goal of high-quality employment.

Fund Project

This paper is an outcome of the 2025 school-level teaching reform project of Hebei Vocational University of Industry and Technology (Project No.: JGJZ010203).

References

[1] The Fourth Plenary Session of the 20th Central Committee of the Communist Party of China. Proposal of the Central Committee of the Communist Party of China on Formulating the 15th Five-Year Plan for National Economic and Social Development. 2025.
[2] The State Council. Employment-First Strategy "15th Five-Year Plan". Guo Fa[2026] No. 16, 2026.
[3] The Central Committee of the Communist Party of China, The State Council. Opinions on Implementing the Employment-First Strategy to Promote High-Quality and Full Employment. 2024.
[4] YUE C. The connotation and realization path of high-quality and full employment. People's Tribune, 2023(14): 63-66.
[5] MEI W, SHAO D. College students' employability: connotation interpretation, international actions and improvement strategies. China College Students' Employment, 2024(9): 43-53.
[6] LIU Y, YANG P. The formation of employability capital and its employment effects: an empirical analysis based on a national survey of vocational college graduates. China Vocational and Technical Education, 2026(7): 5-17.
[7] FUGATE M, KINICKI A J, ASHFORTH B E. Employability: a psycho-social construct, its dimensions, and applications. Journal of Vocational Behavior, 2004, 65(1): 14-38.
[8] MCQUAID R W, LINDSAY C. The concept of employability. Urban Studies, 2005, 42(2): 197-219.