Multidimensional Applied Talent Cultivation in the Context of European and American Universities: Practical Dilemmas and Social Path Reconstruction

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Abstract. Cultivating applied talents for future industries is a key strategy for addressing dilemmas in socioeconomic development and industrial restructuring. In view of the structural dilemmas in China's current applied undergraduate talent cultivation, such as discipline-based path dependence, insufficient capacity to solve complex engineering problems, and weakened humanistic value cultivation, this paper systematically extracts the institutional experience and social logic of applied talent cultivation in European and American universities from the perspective of sociology of higher education and governance theory. It further constructs a four-dimensional social path framework, including multi-cooperative quality evaluation, industry-oriented curriculum system, interdisciplinary collaborative education, and value guidance with humanistic value shaping. This study aims to reveal the deep-seated systematic dilemmas of applied talent cultivation in universities, and provide theoretical references and practical solutions for resolving the misalignment between talent supply and demand, improving universities' social service capabilities, and optimizing the university talent training system.

Keywords: applied talent cultivation; higher education governance; industry-education integration; social pathway; experience of Europe and the United States

1 Introduction

The practical criterion for evaluating the quality of applied undergraduate education is whether it can supply suitable high-quality applied and technical talents to meet the needs of future industries. The Future Industries Research Institute based on the whole-process innovation chain, released by the U.S. President's Council of Advisors on Science and Technology (PCAST) in January 2021, is a new future-oriented scientific and technological innovation medium that effectively integrates basic scientific research,

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applied scientific research and the industrialization of scientific and technological achievements. It clearly regards talent team construction as the core element of scientific and technological achievement transformation and industrial upgrading, highlighting the fundamental position of applied talents in the modern economic system [1]. Against the background of intelligent manufacturing and digital economy, applied talent cultivation is no longer a simple university education issue, but an important social topic related to employment structure, industrial transformation and competitiveness, and social governance efficiency.

However, China's current applied undergraduate talent cultivation still faces significant institutional dilemmas: the cultivation philosophy is confined by disciplinary boundaries with insufficient market and social orientation; the cultivation objectives overemphasize knowledge imparting and lag behind the cultivation of complex engineering problem-solving abilities; the talent quality structure prioritizes professional skills over humanistic character, leading to the lack of value shaping and professional ethics; the cultivation mode lacks top-level design, and the multi-agent collaborative governance mechanism of university-government-enterprise has not been truly formed [2]. According to the 2025 China College Student Employment Report released by MyCOS Institute, the job-major matching rate of applied undergraduate graduates is only about 62%, and nearly 38% of graduates work in positions unrelated to their majors. Meanwhile, more than 40% of enterprises in advanced manufacturing and digital economy sectors report a shortage of qualified applied talents, revealing a severe structural mismatch between talent supply and industrial demand [3].The traditional perspective of higher education is difficult to solve such deep-seated contradictions. It is urgent to proceed from the social pathway and governance logic, adapt to the trend, effectively learn from the applied talent cultivation experience of industrial powers such as Europe and the United States, and reconstruct the applied talent cultivation system oriented to social needs, so as to provide theoretical support and pathway references for the modernization transformation of applied talent cultivation in China.

2 Typical Models and Experiences of Applied Talent Cultivation in Developed European and American Countries

The applied talent cultivation system in Europe and the United States is rooted in industrial practice and social demand, forming a mature institutional arrangement centered on governance mechanisms, market orientation, quality certification, and industry-academia collaboration, with distinct social science characteristics.

2.1 The United States: Market-Driven and Multi-Stakeholder Governance for Industry-Academia Collaboration

The goal of applied talent cultivation in American higher education is to be social demand-oriented and competence-based [4]. First, through market demand surveys for applied talents, universities conduct a thorough analysis of specific competency and quality requirements in the engineering sector. They then add or adjust engineering majors, clarify training objectives and curriculum systems, and optimize teaching methods to better align talent output with industrial development needs. Notably, the enactment of the School-to-Work Transition (STW) Act in 1994 institutionalized industry-university cooperation in applied talent development, making training more scientific, targeted, and diversified in American universities. For instance, programs such as the Undergraduate Research Opportunities Program (UROP) and STEM education initiatives enable undergraduates to take part in engineering practice during spare time and vacations under the guidance of experienced faculty, which effectively promotes the development of professional engineering competencies [5]. Furthermore, American universities value character cultivation and value shaping more than pure knowledge acquisition, emphasizing the development of public virtues including patriotism, responsibility, and empathy.

2.2 The United Kingdom: Quality Governance with Local Embedding and Third-Party Evaluation

Applied talent cultivation in UK universities relies on polytechnics, which feature a strong local and practical orientation. These institutions emphasize job applicability and competency development while reducing emphasis on pure theoretical learning. As a key component of the UK's binary higher education system, polytechnics have formed the distinctive "Sandwich" model [6], a three-tier cyclic structure: university (theoretical learning) – enterprise (practical practice) – university (theoretical advancement), which continuously improves the effectiveness of applied talent education. With its focus on its emphasis on university-enterprise cooperation and industry-education integration, a matching teaching quality assessment system has been established to effectively integrate teaching, learning and practice. The social third-party quality evaluation and assurance mechanism of British polytechnics relies on independent social assessment institutions, usually led by national degree-awarding bodies. These institutions supervise not only curriculum quality but also faculty recruitment and teaching practices. Such a well-structured quality assessment mechanism provides valuable implications for applied undergraduate universities in China.

2.3 Germany: Institutionalized Cultivation with Dual Structure and Industry Coupling

German Universities of Applied Sciences aim to cultivate applied talents with both solid theoretical knowledge and professional skills, which clearly distinguishes their educational positioning from comprehensive universities in other countries. Applied talent training in Germany is mainly completed through two consecutive stages: basic and advanced [7]. The basic stage covers the first two academic years, focusing on fundamental courses such as advanced mathematics and general engineering, and ends with a four-month compulsory industrial internship. The advanced stage covers the last two academic years, emphasizing industrial practice courses including professional engineering technology and advanced design theories. In terms of faculty, German Universities of Applied Sciences adopt a dual-qualified structure where academics possess both academic competence and industrial experience. Professors are required to have at least five years of practical engineering experience in enterprises, enabling them to maintain close links with industry, effectively arrange student internships, expand practical platforms, and enhance students' engineering skills and hands-on experience. Regarding the teaching quality assurance and monitoring system, quality evaluation is conducted by governmental higher education authorities, industrial consulting or assessment institutions, and independent third-party agencies. To ensure standardized accreditation, German Universities of Applied Sciences have established independent accreditation committees for bachelor's and master's programs, composed of the Rectors' Conference and the Standing Conference of the Ministers of Culture of the Federal States. Supported by diversified and high-standard quality accreditation mechanisms, institutions of applied sciences in Germany have achieved stable enrollment and an international reputation. Therefore, the dual-qualified professor system and effective, high-quality, independent third-party evaluation institutions provide important references for the construction of China's applied talent cultivation mechanism.

In summary, the shared social logic of applied talent cultivation models in Europe and the United States can be concluded as follows: taking industrial structure, labor market and public demand as the fundamental orientation, forming a multi-stakeholder governance pattern with the participation of government, universities, enterprises and third-party institutions, establishing an institutionalized quality assurance system through external evaluation, process supervision and continuous improvement, and adhering to the holistic development goal that integrates technical competence, practical literacy and social values, so as to promote the deep integration between the education system and social needs.

3 Practical Dilemmas and Institutional Causes of Applied Talent Cultivation in China

The core function of applied undergraduate education is to provide high-quality applied and skilled talents for social industrial transformation and economic development. The fundamental criterion for evaluating its cultivation quality lies in social adaptability and employment effectiveness. However, China's applied undergraduate talent cultivation system still faces structural and institutional dilemmas, which are rooted in the path dependence of traditional higher education, the disconnection between educational logic and social logic, and inadequate institutional support.

3.1 Monotonous Evaluation Replaces Diversified Quality Assessment

Traditional applied universities largely rely on knowledge imparting and standardized assessment in teaching, resulting in a monotonous teaching quality evaluation system that fails to form a full-coverage, whole-process and all-round closed-loop evaluation mechanism. A sound and institutionalized whole-chain evaluation system has not yet been established in terms of evaluation stakeholders, indicators, methods and feedback mechanisms.

3.2 Discipline-Oriented Logic Weakens Social Demand Orientation

At present, the applied talent cultivation philosophy in Chinese universities has not fully broken away from the inertia of traditional academic education. The discipline-centered and major-boundary logic still dominates the whole training process. The curriculum system is arranged progressively according to disciplinary knowledge, emphasizing the integrity of professional knowledge while ignoring practical application and interdisciplinary integration. Consequently, universities respond slowly to regional industrial restructuring, emerging technology application and market position demands, leading to a structural mismatch between talent supply and social demand.

3.3 Lack of Institutional Guarantees for University-Government-Enterprise Collaborative Governance

At the level of talent cultivation mechanisms in applied universities, no institutionalized collaborative framework with clear rights and responsibilities, resource sharing, and win–win interests has been formed among universities, enterprises, and the government. Practical teaching remains largely campus-based; enterprises lack sufficient motivation to participate in education and have limited involvement in curriculum development, quality assessment, and other key links. In addition, the government has not given full play to its roles in policy guidance, resource coordination, and supervision and evaluation. As a result, the collaborative practical education mechanism is incomplete and unable to support in-depth industry–education integration.

3.4 Instrumental Rationality Crowds Out Value Rationality and Humanistic Cultivation

In the quality structure of applied talent cultivation in universities, there is a general tendency to emphasize technology over literacy and ability over values. Talent training overemphasizes instrumental rationality at the expense of value rationality, leaving students deficient in professional reverence, teamwork spirit, and social responsibility. As a result, it is difficult to meet the comprehensive quality requirements of modern industries for talents who integrate moral integrity and professional competence, with morality as the priority.

4 Multidimensional Paths for Applied Talent Cultivation Toward Future Industrial Needs

Based on China's institutional context and drawing on governance experience from Europe and the United States, this paper constructs a four-dimensional social path at the levels of governance structure, institutional arrangement and operation mechanism, so as to advance talent cultivation from teaching reform toward social governance innovation.

4.1 Dimension 1: Constructing a Multi-Cooperative Teaching Quality Evaluation System

Centered on Outcome-Based Education (OBE) and social evaluation, a full-coverage, whole-process, and all-round closed-loop quality governance system should be established. Firstly, the teaching quality evaluation system requires qualified monitoring subjects. These monitors should have a sufficient understanding of the OBE concept, be familiar with the processes involving teaching design, implementation, assessment, and evaluation, and be able to judge whether students' learning outcomes meet the standards to a certain extent. In addition, they should possess rich engineering practice experience and a solid background in enterprises and industries, and have a clear understanding of the graduation requirements that graduates of the major should meet. The "dual-qualified faculty" system is proposed to ensure the professional skills and quality of teachers, requiring professors to have enterprise practice experience, either being employed by enterprises or holding important positions. This promotes close ties between teachers and enterprises, enabling teachers to understand the current status, dilemmas, and bottlenecks of the majors they teach [8]. As the destination of talent delivery, enterprises have a clearer understanding and orientation of talent needs. Drawing on the excellent practices of teaching quality monitoring in European and American universities, the government (such as county/city education bureaus, provincial departments of education, and the Ministry of Education) can provide policy guarantees to encourage enterprises to participate in the teaching quality evaluation of universities, playing an effective role in evaluation and supervision.

Secondly, clear evaluation indicators should be constructed. Curriculum teaching objectives are closely related to graduation requirements, and they must support the indicators of graduation requirements. The design of quantitative indicators for curriculum teaching objectives, content, and methods should serve the curriculum teaching objectives. In daily teaching activities, teachers need to make students clear about the intrinsic relationship between professional curriculum objectives and graduation requirements, and help them understand the professional literacy they can acquire through learning the course.

Thirdly, evaluation methods should be diversified. Due to the diversity of learning outcomes, a single evaluation method is relatively one-sided. More emphasis should be placed on students' ability to apply comprehensive knowledge and solve complex engineering problems using professional knowledge. Therefore, curriculum evaluation can adopt more process-oriented evaluation methods, shifting from evaluating teachers' teaching process to evaluating students' learning process. Integrating curriculum assessment throughout the entire professional learning process can effectively highlight students' individual differences, and stimulate their self-identity through the systematic design of the curriculum assessment process.

Finally, based on the feedback from curriculum assessment and evaluation, effective measures for the sustainable improvement of curriculum teaching should be constructed. According to the teaching quality evaluation data, it is necessary to analyze the achievement of curriculum objectives. The monitoring team objectively evaluates each student's achievement of curriculum teaching objectives under different evaluation methods, summarizes their strengths and weaknesses, and applies them to the curriculum design of the next teaching cycle in a targeted manner, thus forming a benign closed-loop teaching quality monitoring system.

4.2 Dimension Two: Optimizing an Industry-Oriented Modular Curriculum System

It is essential to break disciplinary barriers and construct an interdisciplinary and industry-oriented curriculum system. Engineering problems faced by modern engineering majors are increasingly hierarchical, nonlinear, and strongly coupled. Therefore, solving complex engineering problems relies on interdisciplinary and integrated knowledge, which reshapes students' perspective of systematic cognition and inspection of engineering issues. However, the current discrete and rigid professional curriculum structure seriously restricts students' comprehensive practical and engineering application abilities across disciplines. To this end, it is necessary to optimize and redesign the current curriculum system and build an adaptive system with integrated curriculum modules. In European and American universities, project-based design serves as the main driving force for curriculum optimization and reform. Under the background of engineering education accreditation, a feasible applied talent training program should first be formulated based on OBE to clarify training objectives. Guided by these objectives, a curriculum project design guideline should be developed according to the analysis of students' professional ability demands collected from employers including the government, alumni, and enterprises, specifying the content, framework and scope of curriculum projects. Within this framework, disciplinary levels and priorities of professional courses are allocated, centering on traditional core engineering courses and modern engineering education courses, so as to achieve the modern talent cultivation goal of "classified guidance and targeted improvement". Core professional courses and engineering education courses can be horizontally connected and vertically integrated at different educational stages, hierarchically meeting the progressive objectives of cultivating comprehensive applied talents for the future. At the key and comprehensive educational levels, the STEM-based project teaching adopted in the United States and Germany can be effectively referenced to design and optimize the curriculum system for applied talent cultivation. At each disciplinary level, all professional courses are divided into major and elective courses according to project requirements, allowing students to make flexible choices to meet practical project needs.

The outcomes of curriculum projects are mainly evaluated by the teaching team to determine whether they meet curriculum objectives and requirements. If achieved, experience should be summarized, archived, and extended to other curriculum project management. If not, in-depth and detailed cause analysis should be conducted to identify core problems, and an analysis report should be submitted to the curriculum evaluation team or academic committee to formulate necessary improvement measures and further optimize curriculum allocation. Curriculum project content fully reflects the actual needs of external employers. As requirements for professional talents continuously evolve with policy orientation, market demand and technological breakthroughs, the curriculum project design guideline can be dynamically adjusted to further optimize curriculum structure, thus establishing a sustainable curriculum improvement mechanism, as shown in Fig.1.

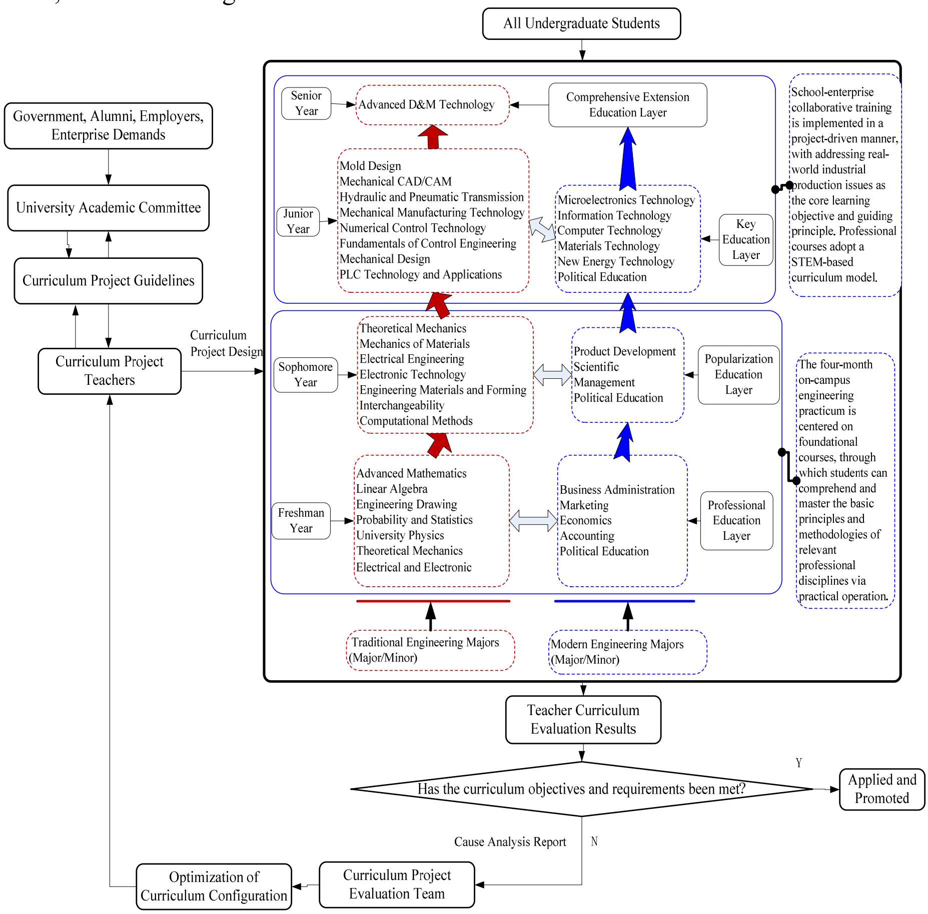

Fig. 1. Curriculum Framework for Applied Talent Training.

4.3 Dimension Three: Innovating a University-Government-Enterprise Collaborative Practical Education Mechanism with Interdisciplinary Integration

Solving complex engineering problems relies on comprehensive applied talents with integrated multi-disciplinary knowledge. Therefore, it is necessary to innovate practical teaching methods featuring interdisciplinary integration. Such innovation should not be limited to on-campus platforms; instead, it requires effective cooperation with governments and enterprises outside the campus, encouraging students to participate in interdisciplinary research teams to realize practical teaching with interdisciplinary integration [9].

Project-driven practical teaching has become a key approach to address interdisciplinary integrated education. Internationally, in countries such as the United States, the United Kingdom, and Germany, interdisciplinary projects and effective evaluation of project outcomes serve as the main basis for cultivating students' interdisciplinary literacy and comprehensive capabilities. This enables engineering students to deeply understand the inherent relationships between science, technology, economy, and the environment. Guided by enterprise application needs, students independently form project teams, with members from diverse disciplinary backgrounds covering professional knowledge in multiple fields such as science, technology, and culture. Funding for project research can come from governments, universities, enterprises, or individual sponsorships. During project implementation, one or more teachers with different professional backgrounds provide collaborative guidance, conducting full-process monitoring and guidance on the formulation, implementation, and effect of the project team's plan. Project teams submit phased progress reports on a weekly or monthly basis, and the project guidance team (including teachers and enterprise representatives) conducts process evaluation based on these reports. At the end of the project, the team is required to submit a technical report, which is then centrally reviewed by supervisors and project funding units. The review focuses on assessing how well the project meets curriculum objectives, graduation requirements, and university training goals. Effectively implementing project-driven practical teaching can further deepen effective cooperation between universities, governments, and enterprises. It also helps avoid drawbacks such as mismatches between professional training and enterprise needs, and the mechanical operational environment of assembly lines—issues that often lead to students' lack of a sense of accomplishment and loss of interest in exploration and innovation, which arise from mere enterprise-based practical training.

By involving senior students in project-driven interdisciplinary practical education from their senior year, they are immersed in a workplace-like environment, where they can gradually clarify enterprises' requirements for professional knowledge and real talent needs through participation in interdisciplinary project practice. This helps students develop a clear self-positioning, encourages them to take the initiative in learning and practice, and enhances their professional literacy through positive feedback.

4.4 Dimension Four: Strengthening Value Guidance and Integrated Cultivation of Humanistic Quality

Ultimately,

The ancient Greek philosopher Protagoras advocated that "man is the measure of all things"; Henry Smith Pritchett, President of the Massachusetts Institute of Technology (MIT), believed that character takes precedence over intelligence in engineering talent cultivation [10]. Sima Guang, a famous historian of the Northern Song Dynasty in China, also clearly pointed out in "Zizhi Tongjian" that "a person with complete talent and virtue is called a sage". It is evident that the shaping of humanistic quality for engineering students also occupies an important position in engineering education. The unity of technical education and humanistic education relies on the curriculum planning and effective curriculum evaluation of ideological and political education in universities. The purpose of humanistic education is to enable students to understand and abide by engineering professional ethics and norms in engineering practice, independently assume different roles in interdisciplinary teams, and effectively communicate and interact with the outside world in a cross-cultural context when facing complex engineering problems. Therefore, the evaluation method limited to final exams can hardly meet the diverse needs of students' humanistic cultivation. For this reason, effective ideological and political education curriculum planning becomes particularly important. First of all, curriculum planning should clarify the training objectives that students need to achieve, such as curriculum goals and graduation requirements. These courses can be set as compulsory or elective, with a certain scope and applicability, and try to meet students' personalized needs. Only with policy guidance and interest-oriented education can we better stimulate students' desire for exploration and provide them with professional experiences different from their major. For example, introducing project-based curriculum evaluation into course assessment, transforming students' final assessment into process assessment, which can give play to students' personalized strengths to a certain extent and further improve their enthusiasm and initiative in professional learning. Effective curriculum evaluation can be divided into two parts: one is the course assessment of the optional courses they take, and the other is the assessment of their ability to comprehensively apply the optional courses. The comprehensive application of optional courses can be reflected in various ways, such as research papers, career plans, resumes, and even scripts, original music or stage performances. Students can independently choose authoritative experts in the industry to conduct peer review on these works and provide consultation and suggestions for their works. For the works that finally pass the review, teachers need to give an explanation on the achievement of students' training objectives. By enabling students to understand, master and apply knowledge in non-engineering fields, they can deeply understand the inherent relationship between technology and humanity, and achieve the internal unity of technical education and humanistic quality shaping.

Nowadays, the rapid development of China's economy not only requires technical talents but also needs comprehensive talents with high humanistic literacy [11]. Therefore, the shaping of humanistic quality based on ideological and political education should be integrated into the entire process of applied talent cultivation during the university period. By strengthening college students' patriotic education, mental health education, and professional ethics education, adhering to the combination of instrumental rationality and communicative rationality, and the combination of theoretical teaching and practical guidance, and creating an environment of practical education and online education, we can lay a foundation for the character cultivation of applied talents, and ultimately cultivate comprehensive and applied talents integrated with knowledge, intelligence and humanity that are needed by future industries.

5 Conclusion

Facing the needs of future industrial transformation and socio-economic development, the cultivation of applied talents in universities must achieve three key transformations: shifting from single university-led talent training to multi-stakeholder collaborative governance, from discipline-oriented training to social demand-oriented training, and from pure professional skill training to the integration of moral and technical cultivation. Based on the sociology of higher education and governance theory, and by systematically learning from the experience of applied talent cultivation in European and American universities, this study constructs a social path framework for applied talent cultivation from four dimensions: teaching quality evaluation, curriculum system optimization, collaborative practice education, and humanistic value shaping. The contribution of this research lies in breaking through the traditional perspective of applied talent cultivation in universities, examining talent training within the context of social systems and governance structures, and revealing the deep-seated institutional contradictions and social logic behind it. This provides an operable governance path for improving the quality of talent cultivation, resolving the mismatch between talent supply and demand, and constructing a modern applied talent training system. In the future, research can further focus on the regional differences in applied talent cultivation, and closely align with the industrial transformation and upgrading driven by intelligent technologies and the digital economy. In this way, the localization, institutionalization, and socialization of applied talent cultivation can be continuously promoted in a more targeted manner that better matches the talent demands of regional industries.

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References

1. J. McGhee, and S. Weinstein, “Innovations in staffing and service delivery structures and modalities in small institutions,” New Dir. Stud. Serv. New York, vol. 188, pp. 111-123, October 2024.
2. W. Gao, “A Strategic Framework for Building Regional Industry–Education Integration Communities via Government–University–Enterprise Synergy,” Econ. Dev. Stud. Changchun, vol. 1, pp. 12-19, July 2025.
3. MyCOS Institute, 2025 China College Student Employment Report. Beijing: Social Sciences Academic Press, 2025.
4. E. Siregar, D. Aswan, and M. Adning, “ Correlation Between Experiential Learning and Micro-Learning Approaches in Enhancing Learning Quality,” J. Teknodik. Ciputat, vol. 28, pp. 147-157, Desember 2024.

5. J. Fendos,“US experiences with STEM education reform and implications for Asia,” Int. J. Comp. Educ. Dev. Crete, vol. 20, pp. 51-66, Desember 2017.
6. F.Kassam, K. F. Damji, and D.Kiage, “The Sandwich fellowship: a subspecialty training model for the developing world,” Acad. Med. Philadelphia, vol. 84, pp. 1152-1160, August 2009.
7. F. Jiajing, Y. Zhiwei, and D. Qin, “Reform and practice of the interdisciplinary competency cultivation model based on the German economic engineering talent training,” Cogent Educ. Oxfordshire, vol. 12, pp. 2580073, Oct 2025.
8. J. Li, K. Wiemann, W. Shi, Y. Wang, and M. Pilz. “Vocational education and training in Chinese and German companies in China: a ‘home international’comparison,” Int. J. Train. Dev. Hoboken, vol. 23, pp. 153-168, June 2019.
9. V.Kumar, “Integrating Multidisciplinary Approaches in Education: Enhancing Learning Across Disciplines,” Innov. J. Adv. Educ. Sci. Commer. Multidiscip. Learn. Madhya Pradesh, vol. 1, pp. 1-17, March 2025.
10. E. Fromm, “The changing engineering educational paradigm,” J. Eng. Educ. Washington, vol.92, pp. 113-121, April 2003.
11. H. Yang, O.Volodko, “Methodology of Cultivating Humanistic Quality Education in Vocational Colleges,” Norw. J. Dev. Int. Sci. Oslo, vol. 1, pp. 113-118, Desember 2025.