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Innovation and Practice Competency Development for Electronics Undergraduates in Inner Mongolian Universities

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Abstract

With the increasing enrollment scale of electronic information majors, cultivating undergraduates' innovative and practical abilities has become crucial in higher education. This study takes the School of Electronic Information Engineering at Inner Mongolia University as a case study, addressing key challenges in the current training system based on regional industrial characteristics and institutional realities. In terms of curriculum and practical teaching systems, the study restructures the course framework, aligns with industry advancements, and optimizes a competency-oriented teaching model. For collaborative education mechanisms, it deepens industry-academia integration by establishing a cooperative system featuring "government guidance, university-enterprise collaboration, demand-supply alignment, and resource sharing". Regarding academic competitions, the study implements a "competition-embedded curriculum" reform, encouraging full student participation and effectively linking competitions with innovation and practical skill development. Additionally, a diversified evaluation system is introduced, incorporating comprehensive, multi-dimensional quality monitoring and feedback throughout the learning process. The results demonstrate that this training model significantly enhances students' innovation and practical abilities, offering valuable insights for similar institutions in electronic information talent cultivation.

Keywords

Electronic Information Majors, Innovative and Practical Abilities, Collaborative Education, Academic Competitions, Diversified Evaluation

1. Introduction

In China's higher education system and social development, undergraduate education has always played a fundamental and strategic core role. With higher education entering the massification stage, its developmental focus has shifted from merely pursuing scale expansion to comprehensively improving education quality.

As foundational disciplines in the digital era, undergraduate programs in electronic information (encompassing electronic information engineering, communications engineering, electronic science and technology, microelectronics science and engineering, etc.) bear dual missions: On one hand, they provide students with systematic engineering education to build solid professional foundations and develop core competencies in solving complex engineering problems; on the other hand, they directly address the nation's critical strategic needs in key technological fields (MyCOS Institute, 2024). Currently, graduates from electronic information programs have become the backbone force driving industrial technological innovation and breaking through engineering bottlenecks, playing an irreplaceable role in China's pursuit of scientific and technological self-reliance.

In recent years, with the advancement of IoT technologies, the rapid evolution from 5G to 6G in the communications industry, and the robust rise of the semiconductor sector, the cultivation of undergraduates in electronic information fields has undergone a transformative journey from "scale expansion" to "structural optimization" and finally to "quality enhancement". During 2019-2022, annual enrollment in electronic information programs across Chinese universities ranged between 320,000 to 350,000 students, with leading institutions proactively optimizing their program offerings and implementing a development strategy of "controlling scale while elevating quality". Projections indicate that by 2025, enrollment in these programs will reach 350,000 to 380,000, with training priorities increasingly focused on national strategic areas such as integrated circuits, quantum information, and next-generation communication technologies.

However, these disciplines are characterized by rapid technological iteration and interdisciplinary convergence, necessitating that undergraduate education place greater emphasis on cultivating students' engineering practical abilities and innovative thinking to meet the demands of fast-evolving industries (Zhang, Guo, & Xie, 2025). In response, the Chinese government and educational authorities have continuously strengthened policy support for fostering undergraduates' innovation and practical competencies, promoting the connotative development of higher education through top-level design and institutional innovation.

In September 2021, the General Office of the State Council issued the Guidelines on Further Supporting College Students' Innovation and Entrepreneurship, which systematically established a national framework for innovation and entrepreneurship education for the first time, emphasizing its deep integration throughout the entire talent cultivation process (General Office of the State Council of the People's Republic of China, 2021). In January 2025, the Central Committee of the Communist Party of China and the State Council released the Outline for Building a Leading Education Nation (2024-2035), proposing a "two-step" strategic goal:

achieving significant phased outcomes by 2027 and fully establishing China as a leading education nation by 2035, with particular emphasis on refining the system for cultivating innovative talent (Central Committee of the Communist Party of China & State Council of the People's Republic of China, 2025). The 2025 Government Work Report further prioritized the "in-depth implementation of the strategy to rejuvenate the country through science and education", calling for accelerated progress in building a leading education nation by optimizing academic program structures and innovating talent cultivation models (General Office of the State Council of China, 2025). Collectively, these policies are driving higher education's transition from scale expansion to connotative development, from singular training models to multi-stakeholder collaboration, and from traditional approaches to digital transformation. They provide both policy guidance and practical pathways for cultivating high-quality innovative talent capable of meeting national strategic needs and industrial development demands.

As a core discipline in the construction of emerging engineering education, the quality of undergraduate cultivation in electronic information majors directly impacts the development level of China's new engineering education. Currently, while significant progress has been made in cultivating innovative talents in China's electronic information undergraduate education, multiple challenges persist:

1) Uneven Resource Distribution: High-quality teaching resources and practical platforms remain overly concentrated in "Double First-Class" universities, leaving ordinary institutions with noticeable deficiencies.

2) Curriculum Lag: Course systems often fail to keep pace with rapid industry advancements, resulting in insufficient integration of cutting-edge knowledge into teaching frameworks.

3) Superficial Industry-Academia Collaboration: Most university-enterprise cooperation remains limited to internships, with deeper collaboration—such as joint R & D and co-developed curricula—still requiring substantial improvement.

Therefore, optimizing the cultivation model for electronic information undergraduates, establishing industry-education deeply integrated mechanisms, and strengthening students' engineering practical abilities and innovative competencies have become urgent issues for ordinary universities offering electronic information programs.

2. Analysis of Current Status

In recent years, driven by national policy guidance and industrial demands, electronic information majors have demonstrated distinct enrollment trends: traditional specialties (e.g., electronic information engineering and communications engineering) have stabilized in student numbers, while emerging and high-demand fields (e.g., microelectronics, integrated circuits, and artificial intelligence) have experienced rapid growth. Against this backdrop, universities across China have actively promoted reforms to enhance undergraduates' innovative and practical competencies. These reforms include restructuring practical teaching systems, optimizing laboratory course frameworks (reducing verification experiments while increasing comprehensive design projects), deepening industry-education integration through modern industrial colleges, and leveraging academic competitions (such as the "Challenge Cup" and "National Undergraduate Electronic Design Contest") as key initiatives. Additionally, institutions have implemented the "Undergraduate Research Mentorship System" to encourage student participation in faculty-led research projects. Through these measures, the reforms aim to cultivate high-level engineering and management talents who not only possess solid professional foundations but also demonstrate innovative thinking, engineering practical abilities, and interdisciplinary literacy—thereby meeting the evolving needs of contemporary industrial development.

Institutions of higher education in Inner Mongolia have attained considerable accomplishments regarding the cultivation of innovative and practical capabilities among electronic information majors, notwithstanding existing difficulties. The main challenges include:

1) Vague Training Programs. Some universities lack clear objectives and standards for cultivating electronic information majors, overemphasizing theoretical knowledge (with disproportionately high course loads) while neglecting practical skills and innovative thinking. This results in students' deficient independent thinking and problem-solving abilities, failing to meet societal and industrial demands.

2) Unbalanced Curriculum Structure. The current course systems excessively focus on theoretical knowledge transmission while lacking practical courses and innovation cultivation, preventing students from applying knowledge to real-world scenarios. Such imbalance hinders the development of students' practical competencies and innovative mindsets.

3) Outdated Teaching Approaches. The prevailing teacher-centered pedagogy fails to recognize students' central role in learning, providing insufficient cultivation of independent thinking and innovative mindsets. Consequently, students demonstrate limited initiative and creativity during the learning process, ultimately falling short of societal and industrial requirements.

4) Underdeveloped Industry-Education Collaboration. Several institutions exhibit deficiencies in practical teaching platform development, characterized by superficial university-enterprise cooperation. The limited number of jointly established practice bases with industries and research institutes, coupled with inefficient operational mechanisms, further constrain effective talent cultivation.

5) Low Participation in Academic Competitions. At the student level, there is a common cognitive bias regarding the value of subject competitions. From the perspective of school management, there are issues such as single publicity channels, insufficient promotion efforts, and the lack of effective incentive mechanisms. Additionally, some schools have insufficient professional teaching staff, causing some students to give up participating due to the lack of systematic guidance.

6) Deficient Evaluation System and Simplistic Evaluation Criteria. With most institutions relying mainly on examination scores and neglecting comprehensive evaluations of practical processes and innovative achievements. The structure of evaluation subjects is unbalanced, with teachers playing a dominant role, while industry experts, employers, and other social evaluation subjects are underrepresented. The evaluation methods lack a process-oriented approach. Key stages such as graduation projects rely solely on terminal evaluations like defenses, without establishing a dynamic tracking and assessment mechanism throughout the entire process.

3. Methods and Measures for Enhancing Innovation-Practice Capacity

Focusing on common challenges such as weak innovative capabilities among electronic information undergraduates in Inner Mongolian universities and the disconnection between practical training and industrial needs, this study takes the School of Electronic Information Engineering at Inner Mongolia University as a case study. By synthesizing advanced practices from domestic and international peer institutions and aligning with the autonomous region's digital economy and green computing power industry demands, we leverage the university's disciplinary and geographical advantages.

Through systematic exploration and practice across five key dimensions—training programs, practical teaching systems, industry-education integration mechanisms, universal participation in academic competitions, and innovation-practice competency evaluation—this research provides replicable models for cultivating electronic information talents with outstanding engineering practice and innovation capabilities. The findings hold particular demonstrative value for collaborative talent cultivation between borderland universities and regional industries.

3.1. Optimizing Training Programs and Restructuring Practical Teaching Systems

With the continuous deepening of China's higher education reform, the emergence of new quality productive forces has posed new requirements and challenges for engineering education. The electronic information specialty faces challenges including rapid industrial upgrading, constant technological innovation, and a shortage of high-quality innovative talents. Therefore, the optimization of training programs should be based on a profound understanding of these challenges, incorporating national policy orientations and cutting-edge industry demands to form scientific and systematic solutions.

To meet the composite talent demands of new quality productive forces in the electronic information field, Inner Mongolia University has implemented the "Grassland Eagle" Innovative Talent Development Program. Starting in the spring semester of freshman year, students are assigned to different research groups based on their interests and faculty research directions, allowing them to actively participate in faculty-led projects. This four-year continuous mentorship system is integrated into the revised undergraduate curriculum for electronic information disciplines, with an increased emphasis on practical courses. Innovative "theory-practice" spiral curriculum system (Zhang, Sun, Du et al., 2023). Following core theoretical courses (e.g., Circuit Analysis and Microcomputer Principles), students immediately engage in professional basic internships and course experiments, creating a virtuous cycle of "learning-by-doing and doing-with-learning". Promote a project-driven practical teaching model. Through a complete project process including circuit design, PCB production and work presentation, students can not only consolidate their theoretical foundation in real scenarios but also refine their engineering thinking and collaborative skills in teamwork, achieving a simultaneous leap in knowledge, ability and quality.

Based on the needs of the enterprises, comprehensively optimize and improve the curriculum system. By using the big data of enterprise job requirements as the guide, reverse-identify the core competence map of graduates majoring in electronic information, and accordingly, conduct a systematic reconfiguration of electronic, sensor, control, information processing, computer, artificial intelligence and degree courses in a "vertical integration and horizontal intersection" manner, highlighting systematicness, coherence, intersectionality and integration. Based on the development, innovation and interests of the students as well as the demands of enterprises, the experiments in the basic courses and elective courses of the major are reformed. The aim is to cultivate students' innovative and practical abilities. Verification experiments are reduced and engineering practice and application design experiments are increased. Through engineering practice and application design experiments, students' understanding of the working principles and performance can be deepened, effectively enhancing their abilities of autonomous learning, problem identification, problem-solving, and the ability to draw conclusions from specific examples. This lays a solid foundation of knowledge, methods and thinking for subsequent scientific research training and industrial innovation.

With the aim of enhancing innovation and practical abilities, the teaching methods of the courses are being reformed. Focusing on the dual goals of "innovation + practice", the teaching of the courses has fully shifted to a new paradigm of "problem-driven-immersive scenarios-outcome-oriented". The classroom takes real industrial faults or technological gaps as entry points, guiding students to independently explore through the research rhythm of "hypothesis-modeling-verification-iteration", while teachers continuously inspire multi-directional thinking through inquiries, counterexamples, and interdisciplinary transfer. Promote interaction and cooperation between teachers and students, encourage teachers to incorporate research results into teaching content, enhance the cutting-edge and professional nature of teaching materials, and establish a teaching case database that combines theory with practice. Implement the "flipped + discussion + practical" mixed model to facilitate teachers' continuous update of teaching concepts and methods, and improve teaching quality and effectiveness. Through these measures, schools can better output high-quality talents with innovative spirit, interdisciplinary knowledge, and international perspectives, providing a solid talent guarantee for the leap in new quality productive forces.

3.2. Deepening Industry-Education Integration for Collaborative Talent Cultivation

Deep integration of industry and education serves as a pivotal driver for promoting the "four-chain convergence" (education chain, talent chain, industrial chain, and innovation chain). It represents not only a strategic choice for optimizing the disciplinary and professional structure in higher education institutions, but more importantly, a breakthrough solution to address the current structural mismatch between the supply side of talent cultivation and the demand side of industrial needs. Particularly in the context of developing emerging engineering disciplines in electronic information fields, deepening industry-education integration serves not only as an effective approach to bridge the gap between education and industry, but more importantly, as a core pathway to cultivate high-quality engineering talents with innovative spirit and practical capabilities. This model holds significant practical and strategic value for: reconstructing talent cultivation systems, innovating collaborative education mechanisms, enhancing higher education quality, promoting graduate employment competitiveness, and accelerating digital transformation of traditional disciplines.

In advancing the industry-education integration mechanism for collaborative talent cultivation, the electronic information programs at Inner Mongolia University have developed innovative approaches tailored to regional industrial development needs: 1) Establishing university-enterprise collaborative education platforms through co-building specialized industry colleges (e.g., AI Institute, Intelligent Manufacturing Institute) with leading enterprises, where jointly developed training programs ensure precise alignment between disciplinary offerings and industrial demands. 2) Creating practical cooperation platforms featuring jointly constructed laboratories and training bases (including Huawei ICT Academy and Alibaba Cloud Big Data Lab) that combine corporate technological resources with institutional facilities and faculty expertise to deeply integrate educational and industrial chains. 3) Implementing modern apprenticeship (dual-mentorship) programs where corporate engineers and academic instructors co-supervise student internships, embedding authentic occupational skill development throughout the curriculum to enhance career adaptability.

To sustainably enhance the outcomes of industry-education collaborative talent cultivation, universities in Inner Mongolia are exploring the establishment of long-term cooperation mechanisms: 1) Leveraging university-enterprise co-built industry-academia-research bases and practical training platforms as incubators for student innovation and entrepreneurship. 2) Proactively engaging with industry associations to regularly compile white papers on talent demand, guiding institutions to adjust their cultivation approaches. 3) Institutionalizing events like industry-education integration summits and talent supply-demand matching forums to dynamically align educational offerings with industrial needs. Through systematically advancing a new industry-education integration model characterized by "government guidance, university-enterprise collaboration, demand-supply matching, and resource sharing", these efforts address the structural disconnect between talent cultivation and industry requirements. Drawing on the targeted cultivation experience of the "CATL Model" and the project-driven approach of Tencent's "Rhinoceros Bird Plan", the deepened industry-education collaboration mechanisms enhance students' practical abilities and innovative spirit, ultimately building a regionally distinctive industry-education ecosystem.

3.3. Encourage Students to Fully Participate in Academic Competitions

Against the backdrop of deepening higher education reform, academic competitions have emerged as a pivotal catalyst for cultivating innovative and practical competencies among electronics and information engineering students. However, most institutions still adhere to the "knowledge-transmission-over-capacity-building" teaching paradigm, with only sporadic student participation, resulting in insufficient overall innovation momentum (Xie, Fan, & Tang, 2023). To meet the talent demands of new quality productive forces in the electronics information sector, universities must reform existing cultivation systems to prioritize the development of innovative talents with robust practical skills and comprehensive literacy (Shen, Wang, & Lan, 2022). In this context, leveraging the unique advantages of electronics-related competitions—their numerous offerings and wide coverage—institutions should comprehensively restructure curricula and teaching content through the "competition-promoted education, learning, and reform" approach. By integrating authentic competition challenges into classroom projects, fostering team collaboration, and creating self-directed research atmospheres, this strategy can systematically unlock students' innovative potential, carrying significant strategic importance and practical value for cultivating high-quality, innovation-capable talent.

In advancing comprehensive student participation in academic competitions, the electronic information programs at Inner Mongolia University have implemented a series of reforms aligned with regional industrial needs: 1) Utilizing competitions as learning accelerators by embedding contest challenges from core events (e.g., mathematical modeling, electronic design, smart car races, robotics, and the "Challenge Cup") into coursework, enabling simultaneous advancement in professional knowledge mastery, application skills, and innovation capabilities; 2) Transforming competitions into teaching catalysts through the "Innovation Hub" platform, which converts faculty research projects and authentic corporate problems into competition tracks—achieving 100% undergraduate participation and year-on-year growth in research outputs via mentor-student matching, credit substitution, and process evaluation; 3) Harnessing competitions as innovation engines by hosting regional events like the Inner Mongolia "Challenge Cup", which provides premium resources for student R & D and innovation training programs, while establishing a dual-drive system between disciplinary contests and entrepreneurship initiatives to realize localized patenting of competition outcomes, productization of projects, and industrialization of applications—thereby thoroughly integrating the entire industry-academia-research-application chain.

Academic competitions, characterized by their project complexity and competitive nature, serve as a comprehensive platform to systematically evaluate and enhance students' multidimensional competencies—including applied professional knowledge, teamwork, problem-solving, presentation skills, stress resilience, and time management. Moreover, substantial competition experience functions as a catalytic engine for students' long-term development. Concurrently, through the "competition-embedded curriculum" teaching reform, these contests have been organically integrated into theoretical, experimental, and innovation-entrepreneurship courses, establishing a progressive cultivation pathway of "competition-guided learning-competition-refined skills-competition-driven innovation". This innovative pedagogical approach not only elevates classroom teaching quality but, more importantly, strengthens students' ability to integrate theory with practice.

3.4. Improving the Evaluation System for Innovation and Practical Competency Development

To comprehensively enhance the quality of undergraduate innovation and practical competency cultivation, it is essential to construct a tripartite "objective-institution-environment" cultivation system. First, the core objective of fostering innovation and practical abilities must be explicitly defined in professional talent cultivation programs, with detailed, quantifiable, and assessable graduation requirement indicators. Second, a supporting "four-in-one" institutional guarantee mechanism should be established, comprising: 1) an innovation practice credit recognition system, 2) a collaborative education practice management system, 3) a practical teaching quality monitoring system, and 4) an innovation achievement transformation incentive policy (Qin, Liu, & Zhao, 2024), ensuring the effective implementation of the cultivation pathway. Finally, an innovation-conducive ecosystem must be cultivated by improving practical platform infrastructure, optimizing evaluation and incentive mechanisms, and fostering an innovation-oriented cultural atmosphere (Qian, Zhou, & Yi, 2025), thereby providing students with multidimensional support. Through the integration of top-level design and grassroots implementation, this approach can effectively cultivate new-era talents equipped with innovative thinking, practical capabilities, and national devotion, providing robust support for implementing the innovation-driven development strategy.

In refining the evaluation system for innovation and practical competency development, the electronic information programs at Inner Mongolia University have established a comprehensive, multi-dimensional assessment mechanism tailored to regional industry needs. 1) Process-Oriented Standards Enhancement: Dynamic monitoring and evaluation of key elements—including teaching plans, practical modules, and assessment criteria—with focused metrics on students' verbal communication, hands-on operation, and engineering innovation capabilities. 2) Formative Assessment Reinforcement: Incorporating quantitative (e.g., participation frequency) and qualitative (e.g., project outcomes, skill progression) indicators of innovation activities, while incentivizing engagement in faculty research or self-proposed entrepreneurship projects (e.g., upgraded participation in premier competitions like the "Internet Plus" Innovation Contest). 3) Iterative Feedback Loops: Implementing semester/annual evaluations to create an "assessment-feedback-improvement" cycle, supplemented by employer surveys and graduate career tracking to inform curriculum optimization. 4) Capstone Project Substantiation: Transcending traditional thesis limitations through authentic project implementation, demonstrably enhancing students' engineering innovation capacities—pioneering a replicable model for cultivating regional industry-ready talents.

By systematically implementing comprehensive, multi-dimensional evaluation and feedback mechanisms, this approach has not only facilitated a paradigm shift from knowledge transmission to competency cultivation, but also provided sustained talent and intellectual support for the high-quality development of the regional digital economy. Furthermore, it has established a novel educational ecosystem that dynamically aligns academic supply with industrial demands, offering replicable practical experience for reforming talent cultivation models in electronic information disciplines across higher education institutions.

4. Outcomes of Enhanced Student Innovation and Practical Competencies

1) The teaching reform and curriculum development have achieved remarkable results. In recent years, the college has achieved breakthroughs at multiple levels. In terms of team building, it has been approved to establish the Automation Basic Course Teaching Team and the Electronic Information Technology Experimental Teaching Center. In innovation and entrepreneurship education, nearly 10 teaching reform projects have been initiated, including "Building the 'Grassland Eagle' Innovative Talent Training System and Creating the 'Innovation Home' Dual-Education Practical Platform" and "Research on Electronic Information Discipline Competitions and Innovative Talent Cultivation from the Perspective of AI and Large Models". Regarding curriculum development, six university-level pilot courses for teaching model reform have been introduced, such as Circuit Analysis and Signals and Systems, while six autonomous region-level elite courses—including Automatic Control Principles and Analog Circuits—have also been approved.

2) The construction of practical innovation platforms has been steadily advancing. In terms of research platform development, the college has established two

provincial/ministerial-level research platforms: the Inner Mongolia Autonomous Region Key Laboratory of Intelligent Communication Sensing & Signal Processing and the Inner Mongolia Autonomous Region Electronic Engineering Technology Research Center. In industry-education integration, it was approved to build the autonomous region-level Intelligent Manufacturing Modern Industry College. The operation of these platforms has created a "scientific innovation + industrial practice" dual-driven training model for undergraduate students in electronic information-related majors, significantly enhancing their engineering practical skills and innovative competencies.

3) The construction of the industry-education integration collaborative education mechanism has achieved initial success. The college has established a diversified collaborative practical teaching system. In terms of cooperation models, adhering to the philosophy of "complementary advantages, collaborative education, and mutual benefit", it has formed multi-dimensional industry-academia partnerships with leading enterprises, professional institutions, and industrial parks. Regarding base construction, the college has jointly built an off-campus internship base with Beijing Jiangcheng Education Technology Co., Ltd., and collaboratively developed the "Undergraduate Off-Campus Professional Practice Management Measures". Innovatively implementing a "dual-driven, interactive linkage" training mechanism, through structured annual employer engagement initiatives, the institution collects and analyzes stakeholder feedback from corporate partners and program alumni. This data-driven approach informs continuous improvement of practice-oriented course components within the curriculum framework. These initiatives not only provide students with high-quality engineering practice platforms but also ensure the quality of practical teaching through institutional innovation.

4) Notable achievements have been made in faculty team building and talent cultivation. The college has initially established a virtuous cycle of "faculty guidance-student innovation-achievement transformation". In faculty development, it has been approved as an Inner Mongolia Autonomous Region Education Department Scientific Research Innovation Team, providing an excellent platform for cultivating innovative talents. Regarding student innovation outcomes, statistical data from the college over the past three years show that more than 150 undergraduates annually participated in research activities. When analyzed by class cohort, the metrics demonstrate significant improvements in both the quality and depth of undergraduate involvement in faculty-led research projects, including publication over 30 academic papers, submission over 20 patents and registration over 50 software copyrights. In discipline competitions, students have won 50+ provincial-level awards including the National Bronze Medal in China International College Students' Innovation Competition and the Special Prize in Inner Mongolia Autonomous Region "Challenge Cup" competition, with an average annual growth rate of 5%. In terms of employment quality, the undergraduate initial employment rate has ranked among the top in the university for three consecutive

years, with an average further education rate of 30%. Graduates' professional competence and practical abilities have been highly praised by employers.

5. Conclusion

Currently, electronic information majors in China face multiple challenges, including accelerated industrial iteration, shortened technology innovation cycles, and insufficient supply of high-quality application-oriented talents. Against this backdrop, how to construct an undergraduate cultivation system that meets the requirements of emerging engineering education and achieves organic integration of engineering education, industrial needs, and innovative practical abilities has become an urgent issue for electronic information programs in regular universities.

This case study of Inner Mongolia University's School of Electronic Information Engineering systematically explores practical pathways for cultivating undergraduate innovation competencies, grounded in the Emerging Engineering Education framework while synthesizing global best practices in talent development. By leveraging distinctive regional industrial advantages and institutional characteristics, the research concentrates on four pivotal reform dimensions: 1) comprehensive optimization of training programs and practical teaching systems, 2) establishment of industry-education collaborative platforms through deep integration, 3) implementation of universal participation mechanisms for academic competitions, and 4) development of multidimensional innovation assessment frameworks. The sustained reform initiatives have yielded demonstrable success in nurturing innovative talents, with the accumulated experience offering a replicable model for peer institutions developing electronic information programs, particularly those serving regional economic development contexts.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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