Advances in Vocational and Technical Education (2026)
Clausius Scientific Press, Canada

DOI: 10.23977/avte.2026.080113
ISSN 2523-5834 Vol. 8 Num. 1

Empowering Industries and Disciplines in Synergy: Research on the Integration Path of the "College Chinese" Course into the Photovoltaic New Energy Major

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Keywords: Photovoltaic New Energy; College Chinese; Curriculum Integration; Disciplinary Synergy; Talent Cultivation

Abstract: Under the guidance of the "dual-carbon" goals, the photovoltaic (PV) new energy industry is experiencing a period of rapid development, which demands higher comprehensive competencies from professionals. Traditional "College Chinese" courses and the PV new energy major often exist with "disciplinary barriers," leading to a disconnection between language teaching and industry needs, and making it difficult for students' language application skills to meet career development requirements. This paper, considering the characteristics of the PV new energy industry—policy-driven, technology-intensive, frequent international cooperation, and prominent social responsibility—explores the organic integration path of the "College Chinese" course with the PV new energy major from four dimensions: restructuring teaching content, innovating teaching methods, focusing on competency objectives, and reforming assessment and evaluation. It aims to break down the boundaries between liberal arts and engineering disciplines, achieve a two-way educational effect of "language empowering the major, and the major enriching Chinese," thereby providing support for cultivating high-quality talent for the PV new energy sector.

1. Introduction

As a public foundational course in higher education, "College Chinese" undertakes the important mission of enhancing students' language and writing application skills, cultivating humanistic literacy, and fostering comprehensive thinking [1]. However, in the teaching practice for science and engineering majors, "College Chinese" is often regarded as a "marginal course." Its teaching content primarily focuses on traditional literary appreciation, which is disconnected from professional scenarios and misaligned with industry needs. This leads to students developing the cognitive bias of "Chinese language is useless," preventing the course's educational value from being fully realized [2].

The PV new energy industry, as a strategic emerging industry in China, has been expanding rapidly in recent years, driven by both policy support and technological innovation. It not only

requires professionals with core technical expertise but also demands versatile talents equipped with policy interpretation skills, technical communication skills, cross-cultural collaboration skills, and science popularization capabilities [3]. Currently, talent cultivation for the PV new energy major mostly focuses on technical skill training, neglecting the cultivation of foundational language application abilities. Consequently, some graduates, while proficient in professional technology, struggle to write standardized project reports, clear technical briefings, or effectively communicate PV knowledge to clients or the public, which limits their career development potential [4].

In this context, breaking down the disciplinary barriers between "College Chinese" and the PV new energy major and achieving organic curriculum integration is both a necessity for the innovation and reform of the "College Chinese" course itself and an inevitable choice to meet the talent demands of the PV new energy industry and improve the quality of professional talent cultivation.

2. Alignment between PV New Energy Industry Characteristics and "College Chinese" Course Integration

The unique development characteristics of the PV new energy industry provide a clear direction and rich resources for the integration of the "College Chinese" course. There is a natural alignment between the two in terms of talent cultivation objectives.

2.1 Alignment between Policy-Driven Characteristics and Policy Text Interpretation Skills

The development of the PV new energy industry heavily relies on the guidance and regulation of national energy policies, subsidy policies, and industry standards. Interpreting and applying policy documents is an essential skill for industry practitioners. The core competencies of "College Chinese," such as reading official documents, extracting key points, and logical analysis, are highly aligned with the needs of PV industry practitioners when interpreting policy documents like "PV Power Station Construction Standards" and the "14th Five-Year Plan for the Modern Energy System." This helps students accurately grasp industry development directions and ensure project compliance.

2.2 Alignment between Technology-Intensive Characteristics and Science Popularization Skills

The PV new energy industry experiences rapid technological iteration. Popularizing and disseminating professional knowledge like PV cell technology, energy storage technology, and distributed PV system design is crucial for industry promotion. The abilities in science popularization writing, simplifying technical terminology, and oral expression taught in "College Chinese" can help students bridge the gap between specialized technology and public understanding. This meets the needs of scenarios such as PV product promotion, residential PV project presentations, and showcasing technological achievements.

2.3 Alignment between International Cooperation Characteristics and Cross-Cultural Communication Skills

China's PV industry holds a leading position in the global market, making overseas market expansion, international technical cooperation, and cross-border equipment trade commonplace. Content in "College Chinese" such as business writing, specialized text translation, and cross-cultural communication etiquette aligns with the needs of PV industry practitioners for

writing English business emails, translating PV module manuals, and conducting international project negotiations. This enhances students' adaptability to international contexts.

2.4 Alignment between Social Responsibility Characteristics and Humanistic Literacy Cultivation

The PV new energy industry is not only a technological sector but also a responsible industry contributing to the "dual-carbon" goals, rural revitalization, and energy accessibility. The humanistic literacy cultivation function of "College Chinese," through industry case studies and the legacy of exemplary figures, can guide students to understand the social value of the PV industry. It fosters professionalism, innovation awareness, and a sense of responsibility, achieving the synergistic development of technical and humanistic literacy.

3. Practical Paths for Integrating "College Chinese" with the PV New Energy Major

3.1 Restructuring Teaching Content: Anchoring Industry Scenarios for Precise Alignment of "Chinese Knowledge + Professional Needs"

Abandon the traditional "College Chinese" content system centered solely on classic literary appreciation. We instead build a "four-dimensional integrated" teaching content framework around the core work scenarios of the PV new energy industry.

Policy and Industry Texts Module: Select authentic texts such as national energy policies, industry standards, and PV project feasibility reports. The instructional focus is on teaching skills for reading official documents, extracting key policy terms, and analyzing report logic, with the goal of enabling students to master the language skills needed to "understand industry rules." Practical tasks could include analyzing core clauses of regional PV subsidy policies and writing PV project compliance self-inspection reports.

Technical and Science Popularization Texts Module: Use materials like PV technical papers, product manuals, and industry popular science articles. It focuses on cultivating abilities in reading scientific literature, writing popular science articles, and expressing technical terms in accessible language. Practical tasks could include writing a home PV panel selection guide for general consumers based on new PV cell technology breakthroughs, or creating a script for a short popular science video on PV poverty alleviation projects.

Business and Cross-Cultural Texts Module: Incorporate materials like business letters, cross-border project bidding documents, and international energy policy analyses in line with the international cooperation needs of the PV industry. It teaches business writing, specialized text translation, and cross-cultural communication etiquette. Practical tasks could involve simulating a PV equipment export scenario by writing business negotiation emails, translating an English PV module manual, or analyzing cross-cultural communication points considering differences in national energy policies.

Humanities and Case Study Texts Module: Source materials like PV industry entrepreneurial stories, technological breakthrough cases, and profiles of exemplary figures to replace some traditional literary classics. It cultivates students' humanistic literacy and professional spirit through writing feature articles, case analysis, and thematic speeches. Practical tasks could include writing an interview article with a leading PV technology figure or delivering a thematic speech on "PV Contributing to Dual-Carbon Goals."

3.2 Innovating Teaching Methods: Utilizing Project-Driven Approaches for Organic Connection between "Classroom Teaching + Practical Work"

Given the strong practical nature of the PV new energy major, move beyond the traditional "teacher lectures + student listens" model. The program adopts teaching methods like "project-driven + scenario simulation + industry-academia collaboration" to integrate Chinese language learning into the entire professional practice process.

"Whole-Process PV Project" Task-Driven Teaching: Design a virtual "County-Level Distributed PV Power Station Construction Project." This teaching method deconstructs the course content into language task packages corresponding to the preliminary, mid-term, and final stages of the project, spanning the entire teaching period. In the preliminary stage, teachers require students to write a project feasibility analysis report, honing expository writing and data analysis skills. In the mid-term stage, have them compile a villager PV knowledge promotion manual and write project progress news releases, improving science popularization and news writing skills. In the final stage, tasks include writing a project acceptance report and creating presentation script content, strengthening summary writing and oral expression skills. This breakdown of tasks across a complete project cycle allows students to appreciate the practical value of Chinese language in professional work.

Industry-Academia Collaborative Teaching Scenarios: Partner with PV enterprises and new energy industrial parks to introduce real industry tasks and resources. We invite corporate engineers to bring authentic "problematic texts" like PV project bidding documents or technical briefs for students to analyze in groups and suggest improvements. We undertake real writing tasks from enterprises, such as popular science articles for official accounts or product promotional copy, having student work evaluated directly by industry professionals. We organize field trips to PV power stations and new energy enterprises for students to observe real work environments, then write industry research reports or news features based on their observations, achieving immersive "classroom-to-workplace" learning.

Interdisciplinary Practical Training: Coordinate with core PV major courses (e.g., "PV System Design," "New Energy Economics") to design cross-disciplinary practical tasks. For example, after completing a small-scale PV system design in the "PV System Design" course, the "College Chinese" course can simultaneously require students to write a presentation speech for the design and defend it before a non-specialist audience. Following an economic analysis of a PV project in the "New Energy Economics" course, students can be tasked with writing an investment value analysis report and creating a presentation PPT, achieving synergistic improvement of technical and language expression abilities.

3.3 Focusing on Competency Objectives: Aligning with Career Needs for Synergistic Cultivation of "Language Skills + Professional Literacy"

Based on typical graduate employment positions in the PV new energy major (e.g., PV Project Engineer, Technical Sales, Operations & Maintenance Specialist, Policy Researcher), define three core competency cultivation objectives for the "College Chinese" course to ensure precise alignment with career requirements.

Professional Text Reading and Writing Skills: Enable students to proficiently read professional texts like policy documents, technical manuals, and industry reports, accurately extracting key information. It also trains them to write standardized professional documents such as project proposals, work summaries, technical briefs, and bidding documents with clear logic, accurate expression, and proper formatting to meet basic written communication needs in the workplace.

Communication, Expression, and Science Popularization Skills: Equip students with clear oral

expression skills to explain PV product advantages and project significance to non-specialist groups like clients or villagers, facilitating effective technical communication and knowledge dissemination. It also enables them to accurately convey professional information through speeches, presentations, and popular science copy, enhancing social recognition of PV technology and products.

Cross-Cultural and Business Communication Skills: Ensure students master basic business writing skills for composing cross-border business texts like emails and negotiation letters. The curriculum also develops professional text translation abilities for tasks like translating PV module manuals or project bidding documents between Chinese and English. The curriculum fosters an understanding of cultural differences and communication etiquette in different countries to meet the professional demands of the PV industry's international development.

3.4 Reforming Assessment and Evaluation: Moving Beyond Single Models for a Diverse Assessment System of "Process Evaluation + Industry Standards"

Discard the traditional single assessment model of "final closed-book exam + regular homework." Instead, we construct a diverse assessment and evaluation system characterized by "competency-orientation, process emphasis, and industry involvement" to comprehensively reflect students' Chinese language application skills and professional adaptability.

Formative Assessment (70%): Focus on the quality of completion of the "Whole-Process PV Project Task Packages," covering aspects like copywriting, presentation delivery, simulated negotiations, and group collaboration. This assessment involves corporate mentors in scoring, providing feedback and grades on student work from a practical industry application perspective. The formative assessment system establishes self-assessment and peer-assessment mechanisms to cultivate students' reflective and critical thinking skills. Formative assessment prioritizes learning attitude, competency improvement, and practical performance, avoiding reliance on a single high-stakes exam.

Summative Assessment (30%): Adopt an "industry scenario practical operation" format, simulating real work tasks. For example, the assessment provides an English bidding document for an overseas PV project, requiring students to translate key clauses within a time limit and draft a Chinese bidding response outline. Alternatively, it provides a preliminary technical proposal for a PV project, asking students to revise and improve the explanatory section and create a presentation PPT for an oral defense. Summative assessment primarily tests students' Chinese language application skills in authentic industry scenarios, ensuring assessment results are highly aligned with professional competency requirements.

4. Safeguard Mechanisms for Curriculum Integration

4.1 Faculty Team Development: Building a Composite Teaching Team of "Chinese Language Teachers + Professional Major Teachers + Industry Mentors"

Enhance the industry literacy of "College Chinese" teachers by organizing visits and learning sessions at PV enterprises to understand industry trends and job requirements. We invite PV major teachers to participate in the instructional design of the Chinese course, providing professional knowledge support. Additionally, we appoint technical experts and marketing specialists from PV enterprises as external mentors to participate fully in teaching guidance and assessment evaluation, forming a "tripartite collaborative" teaching team to ensure the professionalism and practicality of the integrated course.

4.2 Teaching Resource Development: Constructing a Resource System of "Industry Texts + Real Projects + Digital Platforms"

Collect and organize authentic texts like PV industry policy documents, technical manuals, and project cases to build a dedicated course material database. We collaborate with PV enterprises to co-construct a teaching resource platform, sharing high-quality resources like internal training materials and real project cases. Furthermore, we develop digital teaching tools, such as an online practical training system for PV project language tasks or a cross-cultural communication simulation platform, to enhance teaching engagement and interactivity.

4.3 Industry-Academia Collaboration Mechanism: Establishing a Cooperation Model of "Joint Talent Cultivation + Resource Sharing + Mutual Recognition of Outcomes"

Sign industry-academia cooperation agreements with PV enterprises, clarifying the responsibilities of both parties in curriculum design, teaching implementation, practical training, and assessment evaluation. The partners co-establish off-campus training bases to provide students with authentic practice environments. They also create a mechanism for aligning student work with enterprise needs, incorporating outstanding student work like popular science articles and business documents into corporate resource libraries, enabling the effective translation of teaching outcomes to meet industry demands.

5. Conclusion

The organic integration of "College Chinese" with the PV new energy major is not a simple superimposition of "Chinese knowledge + professional content." Rather, it is a deep reform guided by industry needs, centered on competency cultivation, and pursued through disciplinary synergy. By restructuring teaching content, innovating teaching methods, focusing on competency objectives, and reforming assessment and evaluation, it is possible to break down the barriers between liberal arts and engineering disciplines. This transforms "College Chinese" from a "marginal course" into an "empowering course," allowing it to fulfill its role in cultivating humanistic literacy while enhancing students' professional language application skills, thereby achieving the synergistic development of "technical literacy + humanistic literacy + professional competence."

This integration model not only provides new ideas for reforming the "College Chinese" curriculum within science and engineering majors but also offers a new path for cultivating high-quality, versatile talent for the PV new energy industry. In the future, further efforts are needed to deepen industry-academia cooperation, improve resource systems, optimize integration pathways, and continuously enhance the effectiveness of curriculum integration, providing solid talent support for the high-quality development of the PV new energy industry.

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