

Exploring Pathways to Improve the Pass Rate of English Proficiency in Open Education for Chemical Engineering and Technology Bachelor's Degrees: A Case Study of Yunnan Open University

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Abstract: This study takes the Chemical Engineering and Technology program at Yunnan Open University as the research object and addresses the persistent problem of a low pass rate in the degree English examination among students in this program. Through systematic investigation and attribution analysis, the study explores the influencing factors in depth and proposes corresponding improvement strategies. The results indicate that the causes of the low pass rate are mainly distributed across four dimensions. At the student level, prominent issues include conflicts between work and study, weak English foundations, and insufficient learning motivation. At the teaching level, the alignment between course content and the discipline is inadequate, and teaching methods lack targeted effectiveness. At the support level, learning resources are not precisely matched to students' needs, and process-oriented support mechanisms are underdeveloped. At the assessment level, evaluation methods are relatively singular, with limited incentive and supervisory functions. To effectively address the degree English examination as a critical bottleneck in the degree-awarding process and to overcome the "last mile" challenge, this paper proposes multidimensional improvement pathways. These include optimizing the curriculum system and teaching models to strengthen the integration of English with chemical engineering content; enhancing learning process support and services through the establishment of personalized tutoring mechanisms; developing precise and modularized degree English learning resources; improving incentive, assessment, and supervision systems to stimulate students' learning initiative; strengthening guidance and goal management to raise students' awareness of the importance of degree English; promoting personalized learning services supported by information technology; and implementing diversified, process-oriented evaluation systems. Through these comprehensive measures, the study aims to effectively enhance students' degree English examination competence and pass rates, thereby promoting continuous improvement and sustainable development in the quality of talent cultivation in chemical engineering programs within open education.

Keywords: Open Education; Degree English; Pass Rates; Teaching Reform; Improvement Pathways

1. Introduction

Since the launch of the "1+5" pilot initiative within the Open University of China system in 2012^[1], China's distance and open education have entered a new stage of institutional and mechanism innovation^[2]. Yunnan Open University was officially established in December 2012, and its Chemical Engineering and Technology program was approved by the Ministry of Education, becoming one of the key undergraduate programs for cultivating chemical engineering professionals within Yunnan Province's open education system. The program completed its development and began student enrollment in 2014 and was granted the authority to confer bachelor's degrees in 2017. As of 2022, a total of 853 students had been enrolled, with 172 graduates. However, the data indicate that only a very small proportion of graduates obtained a bachelor's degree, with failure to pass the degree English examination being the primary barrier. Against the backdrop of the Ministry of Education's

comprehensive promotion of the transformation and development of open universities and its emphasis on strengthening the quality of talent cultivation, effectively improving students' degree attainment rates and graduation quality has become an urgent task for the connotative development of open education.

The degree-level English exam is a key standard for measuring the English proficiency of undergraduate graduates in adult higher education, and its pass rate directly affects students' degree acquisition and subsequent career development. Students majoring in chemical engineering at Yunnan Open University are mostly working professionals with generally weak English foundations and face significant work-study conflicts, resulting in a persistently low pass rate for the degree-level English exam. This has become a significant weakness restricting the quality of professional talent training. How to transform this weakness into a support point for students' career development and academic advancement is a crucial issue that open education urgently needs to address.

Under the demands of high-quality development, open education faces the profound challenge of improving quality and efficiency. As a crucial component of undergraduate talent cultivation, the pass rate of the degree-level English exam directly impacts students' degree acquisition and career development. However, for students majoring in science and engineering such as Chemical Engineering and Technology at Yunnan Open University, their English proficiency is generally weak, leading to a significant conflict between their studies and their work, making the degree-level English pass rate a long-standing bottleneck restricting the quality of talent cultivation. How to transform this bottleneck into a springboard for students' career development and academic advancement is one of the core issues that urgently needs to be addressed in the current connotative development of open education.

According to the relevant regulations of Yunnan Open University, students who pass the degree English exam and the relevant professional exam after two and a half years of study can not only obtain a graduation certificate recognized by the Ministry of Education, but also a bachelor's degree certificate in their relevant major. Therefore, the degree English exam is quite important. As an important component of building a lifelong learning education system for all citizens, open education requires undergraduate students to pass a degree-level English exam to obtain a bachelor's degree. This exam is a crucial standard for assessing whether students have met the English proficiency requirements for adult higher education undergraduate graduates, and it possesses its own unique characteristics and challenges.

Yunnan Open University, as a higher education institution offering open education to adults, primarily attracts working professionals with diverse learning backgrounds. The Chemical Engineering and Technology major is highly practical and specialized, leading students to often focus on enhancing their professional knowledge and skills while neglecting or investing insufficient time in general education courses such as English. This results in a persistently low pass rate for the degree-level English exam. This not only directly affects students' eligibility to apply for degrees but also hinders the improvement of the overall quality of professional training. Therefore, in-depth exploration of the underlying causes and the proposal of practical solutions are of significant practical importance.

Based on the above, this study takes Yunnan Open University as an example to deeply analyze the reasons for the low pass rate of degree English among students majoring in Chemical Engineering and Technology. Combining the characteristics of open education students, it explores improvement paths from multiple dimensions such as teaching, learning, management, and evaluation, in order to provide a reference for similar majors to overcome the bottleneck of degree English.

2. Group characteristics of open education students

Open education students are primarily adult learners, and their learning behaviors have distinct characteristics:

2.1 Fragmented learning time

Students face a work-study conflict, with most juggling work, family, and academics, making it difficult to concentrate on studying and resulting in fragmented study time. Students need to strike a balance between work, family, and study, and this fragmented study time makes it difficult to engage in systematic and continuous learning and exam preparation.

2.2 English proficiency is generally weak

Most undergraduate students majoring in Chemical Engineering and Technology are working adults with significant differences in age, occupation, prior English proficiency, and educational background, resulting in a wide range of English levels. In particular, their listening and speaking skills are often weak, and due to a lack of systematic review over a long period, their language skills have noticeably deteriorated.

2.3 Learning motivation is primarily pragmatic

Students show a high level of attention to content that is directly related to their future occupations, while courses such as English, which are perceived as “gatekeeping subjects,” tend to induce feelings of difficulty, anxiety, and avoidance. Learning motivation reflects a combination of intrinsic aspirations for self-improvement and extrinsic pressure to obtain a degree, with some students exhibiting a strong examination-oriented tendency.

2.4 Reliance on online and self-directed learning

The learning process heavily relies on digital resources such as online learning platforms, pre-recorded courses, and online tutoring, resulting in a quasi-separation between teachers and students. Students' learning outcomes largely depend on their self-planning, self-monitoring, and self-motivation abilities, requiring a high level of metacognitive strategies. However, the lack of sustained learning supervision and an interactive environment negatively impacts learning sustainability and effectiveness.

2.5 Inconsistency in examination formats

At present, there is no unified national degree English examination. In practice, examination design, administration, and score cut-offs are typically organized independently by provincial (municipal) education examination authorities or by open universities themselves (e.g., the Open University of China). As a result, substantial regional variations exist in examination difficulty, test formats, and pass rates.

3. Analysis of the Causes of Low Degree English Pass Rates

Based on the above characteristics, open education undergraduate degree English faces severe challenges in multiple aspects, including teaching, learning, testing, and management. Combining student characteristics, teaching practice, and literature review, the main reasons for the low pass rate can be summarized as follows:

3.1 Student-level factors

First, the students' English proficiency varies greatly, and their learning persistence is insufficient. Many students have poor English proficiency^[3], insufficient vocabulary, and a chaotic grammar system. They have long-term psychological barriers and fear or apprehension towards learning English^[4-6]. They are accustomed to the passive acceptance of exam-oriented education and lack effective methods suitable for adult self-study^[7], such as time management, vocabulary memorization strategies, and reading skills. Second, they do not pay enough attention to degree English and lack exam preparation strategies. Third, the conflict between work and study is prominent^[8], and it is difficult to guarantee effective study time.

3.2 Instructional factors

First, the integration between English teaching content and disciplinary knowledge is insufficient, which limits students' interest and engagement in learning^[9-10]. Second, teaching approaches remain predominantly traditional and are not well adapted to the characteristics of adult learners. Many learning resources are essentially replications of conventional classroom instruction and fail to adequately address adult learning traits and fragmented learning needs, resulting in limited attractiveness and relevance. In addition, tutoring and training lack sufficient targeting, particularly in terms of pre-examination intensive support. Online tutoring often struggles to achieve timely and

in-depth interaction, making it difficult for instructors to promptly grasp students' learning progress and challenges and to provide personalized guidance [11-12].

3.3 Support-level factors

First, there is insufficient supply and a lack of targeted support [6-7]. Personalized learning resources are inadequate, and there is a lack of tiered and modular English learning pathways. Second, online learning communities have low activity levels, and peer support and teacher Q&A mechanisms are incomplete. Third, a systematic learning support service, from pre-exam proficiency testing and learning pathway planning to pre-exam psychological counseling, has not yet been fully established.

3.4 Examination and assessment factors

First, students often lack a clear understanding of the format, difficulty, and requirements of the degree English examination, and there is insufficient provision of mock tests and guidance on examination strategies. Second, a uniform written examination format is unable to comprehensively and fairly assess students' actual language proficiency—particularly for those with stronger listening and speaking skills—resulting in a single-dimensional evaluation that overlooks learning processes, effort, and the development of comprehensive language competence [7-9]. Third, teaching and learning activities are prone to being reduced to “learning for the exam,” neglecting the cultivation of practical language application skills and deviating from the original intent of establishing the degree English requirement. Fourth, disparities in examination difficulty and pass rates across different regions objectively lead to unequal opportunities for students to obtain a degree.

In summary, degree English teaching in open education is generally confronted with problems such as low pass rates, traditional teaching approaches, weak student foundations, and insufficient learning support. Scholars have proposed various countermeasures from perspectives including grammar instruction [13], pass-rate analysis, blended learning models [14-15], systematic teaching reforms, and vocabulary instruction. These studies emphasize the need to enhance teaching relevance, strengthen contextualized and comprehension-based instruction, promote alignment between teaching and assessment, develop integrated online and offline learning resources, and implement personalized tutoring and blended learning approaches [11]. However, existing research remains largely focused on localized problem analysis and experiential summaries, with a lack of large-scale, long-term empirical teaching studies. Although the proposed strategies are diverse, coordinated implementation mechanisms across regions and disciplines have yet to be fully established. Moreover, pathways for the deep integration of information technology and teaching require further expansion, particularly with respect to the application of artificial intelligence and big data in learning analytics, resource recommendation, and personalized assessment. In particular, further exploration is urgently needed to better accommodate the characteristics of adult learners and to enhance their self-directed learning capacity.

4. Strategies for Improving Degree English Pass Rates

4.1 Enhancing Curriculum Design and Instructional Approaches

To address the issues of English courses being disconnected from students' professional backgrounds and the relatively monotonous teaching methods, this study proposes a systematic teaching reform plan based on "demand-oriented, professionally supported, and blended learning," aiming to effectively enhance the relevance and attractiveness of learning through curriculum content restructuring and teaching model innovation.

4.1.1 Restructuring of Course Content

Construct a professionally oriented and practical English curriculum system. First, conduct an in-depth analysis of students' learning situations and needs to clarify the actual requirements of the chemical industry for English proficiency (such as reading technical documents, writing experimental reports, and communicating process flows). Based on this, the core initiative is to develop and introduce a series of thematic teaching cases closely integrated with chemical engineering and technology. For example, teaching content is designed around real-world workplace tasks such as "Safety Specifications for Chemical Unit Operations," "Writing English Abstracts for Catalyst Research," and "Interpreting Safety Data Sheets (SDS) for Chemicals," placing general English

instruction within specific professional contexts. This approach aims to significantly enhance the practicality and relevance of the learning content, enabling students to directly perceive its value to their professional studies and career development while mastering language skills, thereby stimulating their intrinsic learning motivation.

4.1.2 Innovation in Teaching Models

Implementing a flexible and efficient blended learning approach. To adapt to the prominent characteristics of adult students in open education—"in-service learning, limited time and space, and a focus on efficiency"—this study designed and implemented a structured blended learning model. This model is based on online self-study, supported by live interactive teaching, and deepened by collaborative inquiry-based learning. Online self-study provides systematic micro-lessons on core knowledge points, a professional case library, and accompanying exercises, supporting students in utilizing fragmented time to complete the learning and mastery of basic content. First, we conduct live interactive teaching, regularly holding live lectures and Q&A sessions based on key points, difficulties, and real-world cases. This emphasizes training students' language application skills in complex scenarios while maintaining real-time interaction and emotional connection between teachers and students. Second, we promote collaborative learning in small groups. Under the guidance of teachers, students collaborate online on comprehensive professional tasks (such as collaboratively creating an English presentation for a virtual project), cultivating their teamwork skills and comprehensive ability to solve professional problems in English.

To ensure the effectiveness of the reform, a course resource package (including case studies, micro-lessons, task manuals, etc.) matching the new model will be developed simultaneously, and specialized training will be provided to instructors to ensure they possess the ability to implement professional English case-based teaching and blended classroom organization. Through this dual-drive approach of "content reconstruction" and "methodological innovation," this strategy aims to transform the degree English course from an isolated foundational course into an applied and integrated course that supports professional development and aligns with adult learning patterns, laying a solid foundation for fundamentally improving learning outcomes and exam pass rates.

4.2 Enhancing Support for the Learning Process

Establish a special English tutoring class for degree students, providing phased planning from basic improvement to pre-exam sprint; form online learning groups, and assign teachers or outstanding students to provide supervision and answer questions.

An entry-level diagnostic and tiered approach should be adopted. At the beginning of the semester, students' foundational proficiency and core weaknesses can be accurately identified through standardized diagnostic tests and learning-status questionnaires, allowing learners to be categorized into different levels such as "foundation reinforcement," "competency enhancement," and "pre-examination intensive preparation." Based on students' English proficiency levels, personalized learning pathways should be designed by establishing clearly defined phased learning objectives, core content modules, and time schedules for each level, thereby forming a progressive learning scheme that advances from "grammar and vocabulary remediation", through "targeted skill training (reading, writing, and translation)", and ultimately to "mock examinations and strategy enhancement". This ensures that learning pathways are well structured and that learning goals are achievable.

Simultaneously, specialized class management is implemented. Dedicated class teachers are assigned to track learning progress and supervise academic studies, and regular live-streamed tutoring classes are organized for each level, focusing on common problems at that stage for intensive explanation and training, forming a closed-loop management system.

4.3 Building Targeted and Differentiated Learning Resources

Based on the exam syllabus, we have compiled a list of frequently tested points and built modular resource databases for vocabulary, reading, and writing. We also provide analysis of past exam questions and a mock test platform to help students familiarize themselves with the exam format.

The primary principle of resource development is to closely align with the official exam syllabus. Through big data analysis of past exam papers, we systematically identified frequently tested points, core vocabulary, commonly tested grammar points, and writing themes. Based on this, we constructed a clearly structured modular resource library, specifically including:

(1) High-frequency vocabulary sub-database. It not only includes general high-frequency words, but also focuses on selecting and annotating subject-specific vocabulary related to chemical engineering and scientific literature, providing contextualized example sentences.

(2) Skills enhancement modules are categorized by question type. Specialized training resource packages have been developed for different question types, such as reading, writing, and translation. For example, the reading module provides micro-lessons on "Analysis Diagrams of Long and Complex Sentences" and "Main Idea Extraction Techniques"; the writing module offers templates and sample essays for different question types, such as "Flowchart Description" and "Argumentation of Viewpoints."

(3) Structured knowledge graphs connect scattered test points into a networked knowledge system, helping students build a systematic language knowledge framework rather than relying on fragmented memorization. Secondly, an integrated "analysis-practice-diagnosis" practical training platform is created. To enable students to effectively transform knowledge into test-taking skills, a dedicated online platform integrating real exam question analysis and mock tests has been built.

4.4 Enhancing Incentive and Monitoring Mechanisms

Preparation for degree-level English will be included in the evaluation of the learning process, and progress rewards will be established; departments and class advisors will work together to track students' learning progress and provide timely intervention and encouragement. Together, these measures constitute a coordinated assessment–incentive–monitoring framework, as outlined below:

(1) This study aims to transform traditional summative assessment, which focuses solely on the final exam, into a process-oriented management mechanism that spans the entire learning cycle. The core of this mechanism lies in visualizing and recognizing learning efforts through institutional design, coupled with proactive management intervention, thereby stimulating and maintaining students' learning motivation.

(2) This system links learning progress with academic performance. Data such as students' mock test scores on the precision learning platform, their completion of phased assessments in tutoring classes, and their contributions to online groups are scientifically calculated and incorporated into their daily grades, directly linking daily effort with academic evaluation.

(3) Establish a regular communication and encouragement mechanism: create a positive and enterprising learning atmosphere by regularly sending learning progress reports, publishing the "Learning Star" list, and holding online experience sharing sessions, and continuously provide students with emotional support and goal reminders.

In summary, this mechanism, through a dual-track approach of "evaluation and incentives" and "management and supervision," aims to create a support framework that covers the entire learning process and is both guiding and binding. It not only focuses on the final output of learning but also emphasizes the continuous shaping and maintenance of learning behaviors, thereby providing a solid institutional guarantee for improving students' academic persistence and final pass rate.

4.5 Enhancing Communication, Guidance, and Goal Management

Through opening guidance and themed class meetings, the importance of degree English for career development and academic advancement is emphasized, guiding students to plan early and invest continuously.

During the orientation phase, a special lecture on "Degree Acquisition and Career Competitiveness" is offered. By showcasing specific cases of previous graduates who benefited from obtaining their degrees in terms of professional title evaluation, job promotion, or opportunities for further study, the lecture concretely illustrates the value chain of degree English and helps students establish a clear understanding of the connection between "degree English - bachelor's degree - career development".

Throughout the semester, students receive continuous, subtle guidance in themed class meetings and professional orientation courses. Program leaders, industry mentors, and outstanding alumni are invited to repeatedly emphasize the practical applications of English proficiency in the chemical engineering field, focusing on industry needs, technical reading, and international exchange, thereby reinforcing students' learning motivation.

4.6 Advancing Technology-Enabled Support and Personalized Services

First, modular micro-course resources aligned with adult cognitive characteristics should be systematically developed. In view of adult learners' fragmented study time and limited attention spans, thematic micro-courses with durations of 5 to 15 minutes should be carefully designed and produced. These micro-courses strictly adhere to the principle of "one topic, one core focus" and involve the refined segmentation and reorganization of key degree English components, including grammatical difficulties, reading strategies, writing templates, and translation skills. Each micro-course incorporates clearly defined learning objectives, concise instructional demonstrations, immediate practice activities, and key-point summaries, ensuring that learners can effectively master a complete knowledge unit or skill within a short, focused learning session. This design accommodates flexible and self-directed learning arrangements and enhances learning efficiency for adult learners.

Secondly, fully utilize the data tracking function of the learning platform to construct a digital learning profile. This approach enables the platform to automatically record key learning behavior data, such as student login frequency, micro-lesson completion rate, module exercise duration and accuracy, and simulated test performance. By aggregating and analyzing this multi-dimensional data, the system can automatically generate visualized individual and group learning reports. This not only provides teachers with objective and accurate evidence for implementing differentiated guidance and formative assessment, but also provides students with intuitive feedback on their own learning efforts and progress, strengthening self-monitoring of learning.

Finally, the educational application of artificial intelligence technologies should be proactively explored to achieve service upgrading. Building upon foundational data-driven support, lightweight AI technologies can be introduced to provide timely and personalized intelligent assistance at key learning stages. In the writing training component, AI-based essay evaluation tools can be employed to conduct grammatical error correction, lexical suggestions, and structural scoring for students' submissions, delivering near-instant feedback and addressing the time lag inherent in traditional manual grading. In the question-answering and practice components, intelligent tutoring chatbots can be deployed to provide 24/7 automated responses to frequently asked questions and to recommend related practice exercises based on knowledge graphs. At the learning pathway planning level, systems can leverage students' historical learning data and identified knowledge gaps to preliminarily recommend personalized sequences of learning content and review priorities, thereby enabling data-driven, learner-specific optimization of learning pathways.

4.7 Adopting a Diversified and Process-Based Evaluation System

4.7.1 Promoting diversified formative assessment to shift the learning focus toward continuous, day-to-day accumulation

The core of the reform lies in significantly increasing the evaluation weight of the learning process. Specifically, it involves systematically incorporating process-related evidence such as the quality of students' online assignments, records of thematic micro-lessons, results of group collaborative projects, and personal learning portfolios (such as vocabulary notes and revised essays) into the overall course grade according to a scientific ratio. This move directly reduces the weight of the final degree English exam in the overall score, aiming to send a clear message to students that a continuous and solid learning process is just as important as the final exam performance. This not only effectively alleviates students' pre-exam anxiety but also motivates them to distribute their learning activities evenly throughout the semester, achieving gradual internalization of knowledge and steady improvement of abilities.

4.7.2 Optimizing summative examination design to strengthen the assessment of comprehensive language application ability.

In optimizing the final written exam itself, efforts will be made to improve its validity and discrimination. While maintaining the assessment of necessary basic knowledge, more comprehensive and output-oriented question types, such as "translation of chemical engineering literature paragraphs" and "writing of technical process summaries," will be added. This type of question directly simulates real-world language application in professional scenarios, requiring students to integrate and apply multiple skills such as reading, analysis, summarization, and written expression. This more effectively identifies whether students truly possess the comprehensive English application ability required for the degree, rather than just test-taking skills.

In summary, this evaluation system reform, through the synergy of "formative evaluation emphasizing the process" and "summative examination optimizing comprehensive abilities," aims to construct a new, multi-dimensional evaluation paradigm that considers both learning input and ability output, and is based on school-based reform while also taking into account overall development. This provides institutional guarantees for improving the quality of degree English teaching and the scientific nature of talent evaluation.

5. Conclusions

Improving the pass rate of the degree-level English exam for chemical engineering students in open education is a systematic project involving multiple aspects such as teaching, management, and support services. Only by closely focusing on the characteristics of adult learning, deeply analyzing the root causes of the problems, and implementing precise teaching interventions and comprehensive learning support can we effectively break down language barriers in degree acquisition, truly smooth the "last mile," and thus promote the intrinsic development and quality improvement of chemical engineering and technology majors in open education, cultivating more application-oriented talents with professional abilities and comprehensive qualities.

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