

STUDENT NEEDS ANALYSIS FOR COLLEGE ENGLISH ELECTIVES IN AGRICULTURAL UNIVERSITIES: A QFD-HOQ-AHP APPROACH TO CURRICULUM OPTIMIZATION

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Abstract: This study addresses the misalignment between non-English-majored undergraduates' evolving needs and current College English (CE) elective curricula in Chinese higher education, where traditional Needs Analysis (NA) fails to systematically translate subjective student voices into actionable design priorities. Integrating Quality Function Deployment (QFD) Phase 1 House of Quality (HoQ) with Analytic Hierarchy Process (AHP), we quantify and prioritize student demands. Survey/interview data from Non-English-Majored students reveal top priorities: interactive teaching methods, qualified instructors (cross-cultural competence/experience), and career-aligned course types. AHP weights highlight teaching methods and teacher qualifications as critical. The HoQ maps these to curriculum actions, ranking teaching innovation and instructor training highest. Results provide a data-driven Road-map for optimizing resource allocation and course redesign, bridging NA gaps to align CE electives with student expectations for practical and personalized learning. This QFD-HoQ-AHP approach enables targeted quality improvement in higher education curricula.

Keywords: Quality Function Deployment (QFD); House of Quality (HoQ); College English electives; Curriculum development; Needs analysis

1 INTRODUCTION

1.1 The Evolving Landscape of College English in Chinese Higher Education

The role of College English(CE) in Chinese higher education has evolved in response to globalization and shifting labor market demands. Traditionally viewed as a mandatory, grammar-focused foundational course, CE is increasingly pressured to provide individualized and differentiated learning experiences, particularly within the curriculum structure. This transformation is essential given the high expectations placed upon undergraduates in a globalized economy, requiring not only linguistic proficiency but also diverse capacities to meet contemporary challenges.

However, despite several rounds of pedagogical reform, significant dissatisfaction persists among non-English majors regarding the efficacy of current English for General Purpose(EGP) courses. Students frequently report deficiencies in practical communication skills, critical thinking, and the ability to apply English in real-world scenarios or in professional contexts. This persistent disconnect between institutional offerings and student outcomes underscores an urgent need for a systematic overhaul of curriculum design.

1.2 The Imperative for Customer-Centred Quality Management in Higher Education

Higher Education(HE) institutions, particularly those coping for resources and students, must adopt quality assurance models. Quality in this service sector is defined by the degree to which the educational output (curriculum and student capabilities) meets the expectations of its stakeholders, primarily the students themselves, who function as the primary customers. Traditional Needs Analysis(NA) methods often succeed in identifying skills gaps as well generalized demands, yet they frequently fall short of providing a systematic, quantitative framework necessary to translate these subjective 'voices of customers' into concrete, prioritized design actions.

The inherent complexity in satisfying a diverse student body, which exhibits strong instrumental motivation and simultaneous demands for specialized content and authentic practice, necessitate a structure approach capable of resolving internal conflicts and optimizing limited resources. Without such a methodology, institutions risk diluting effort by attempting to moderately satisfy all needs, rather than concentrating investment where the strategic impact is greatest.

1.3 Quality Function Deployment(QFD) as a Strategic Planning Tool

Quality Function Deployment(QFD) is a robust, structured methodology that originated in the Japanese manufacturing sector but has been successfully migrated to service industries, including education. QFD serves as a holistic model for quality assurance that compounds market, social, and management dimensions, positioning it as a tool superior to many

fragmented assessment models. Its core objective is to translate the implicit "Voice of the Customer"(VoC) into explicit, actionable "Technical Requirements"(Voice of the Designer).

QFD operates on the principle of preventing deficiencies by incorporating customer requirements early in the design process, thereby ensuring the final product or service aligns with user expectations. The central mechanism for this translation is the House of Quality(HoQ), which systematically correlates customer demands with organizational capabilities. The application of QFD to the CE curriculum moves the field beyond descriptive needs analysis into prescriptive quality management, providing a structured mechanism for assessing and prioritizing areas for quality improvement within existing process.

1.4 Research Objectives

This study aims to deploy the Phases 1 House of Quality (HoQ) matrix, the foundational element of the QFD framework, to systematically analyze and prioritize the curriculum needs of undergraduate students concerning general elective CE courses. The current research seeks to achieve two objectives: 1) Identify and quantify the most critical student need (the 'WHATs') regarding the CE English electives; 2) Define measurable curriculum attributes and instructional element (the 'HOWs') that address these needs; 3) Calculate the Technical Importance Scores(TIS) for each 'HOW' to provide a clear, data driven road-map for resource allocation and course restructuring, ensuring optimal institutional response to quantified student demands.

2 LITERATURE REVIEW

2.1 Theoretical Foundations of Quality Function Deployment (QFD)

Quality Function Deployment (QFD), a systematic quality management methodology, emerged in 1960s Japanese industry and was formalized by Yoji Akao in *Hinshitsu Tenkai*[1]. It translates customer requirements (CR)—explicit and implicit user needs—into technical quality characteristics, using the House of Quality (HOQ) to bridge stakeholder “Voices” with organizational action. This proactive, user-centered approach prioritizes integrating VOC into design, distinguishing it from reactive quality control[1].

QFD evolved into three dominant frameworks: (1) the Japanese Comprehensive Model for end-to-end life-cycle deployment[2]; (2) the American Supplier Institute's Four-Stage Model (planning, design, process planning, control)[3]; and (3) the GOAL/QPC Model in 1989 emphasizing cross-functional collaboration[4]. Complementary approaches like Enhanced QFD (EQFD) in 1991[5] and Dynamic QFD (DQFD)(1994) later addressed QFD's rigidity in dynamic markets.[6]

QFD thrived in manufacturing: Mitsubishi's Kobe Shipyard in 1970s standardized quality processes, while Toyota reduced new product costs by 61% using it[7]. By the 1980s, U.S. firms including Ford adopted it, cementing its industrial relevance[8].

In education, QFD aligned pedagogy with learner expectations: Huang mapped vocational training needs to curricula via HOQ[9]; Zeng optimized industrial design courses using i-course requirements to teaching processes[10]. In 2019, Yang extended QFD to online courses, using student VOC to redefine teaching characteristics (e.g., interactivity)[11]. These studies demonstrate QFD's utility in translating stakeholder needs into actionable curriculum design.

The complete QFD process involves four phases: 1) Product Planning, which establishes the customer's needs and translates them into technical requirements using the HoQ; 2) Product Design, focusing on critical part characteristics; 3) Process Planning, identifying key operations; 4) Production Planning, establishing control and maintenance plans. This study focuses on Phases One, namely, the HoQ.

The HoQ is a framework that links six matrices (Figure 1):

- 1) Stakeholder Requirements (WHATs): A structured list of needs, representing the 'Voice of the customers'(VoC).
- 2) Operation Requirements (HOWs): Measurable, solution-independent ways the institution can meet the WHATs, representing the Voice of the Designer.
- 3) Relationship Matrix (WHATs vs HOWs): Quantifying the correlation strength (weak, medium, strong) between each WHAT and each HOW.
- 4) Correlation Matrix (HOWs vs HOWs): Mapping inter-dependencies (supportive or contradictory) among the HOWs.
- 5) Competitive assessment (WHYs): Containing quantitative market data, including customer importance ratings and competitive benchmarking.
- 6) Operational Priorities (HOW MUCH): Calculating the technical priorities based on the relationships and importance weights.

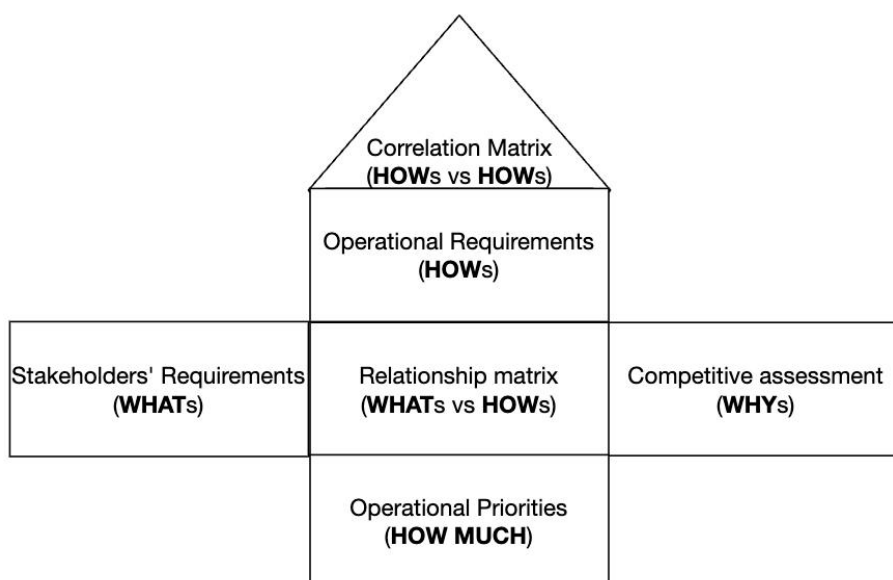


Figure 1 House of Quality

2.2 Needs Analysis (NA)

Needs Analysis (NA) is a cornerstone of English for Specific Purposes (ESP) design, originating with Richterich's communicative needs model[12]. NA systematically identifies gaps between current and desired learner capabilities, guiding contextually relevant curriculum development. Scholarship on NA advances key frameworks: Definitions distinguish product-oriented/outcome-focused and process-oriented perspectives[13-14]. Categorizations include target needs (future skills) vs. learning needs (acquisition pathways)[15]. Methods feature Munby's Target Situational Analysis (TSA) in 1978[16], Allwright's Present Situational Analysis (PSA)[17], Hutchinson & Waters' Needs-Based Framework in 1987[18], and Dudley-Evans & St. John's Integrated Model in 1998 (synthesizing context, target, and learning needs)[19]. In education, NA guides ESP design: Tsai redesigned accounting curricula using market feedback to boost employability[20]. Huang linked vocational ESP to regional industry needs in 2022[21-24]. Scholars also highlight non-intellectual factors: Zheng advocated balancing motivation with learning goals in 2006, while Wu tied student satisfaction to NA-informed design accounting for learner initiative[14-15]. These studies reinforce NA's role in creating learner-centred EGP electives.

2.3 Research Gap: From Needs Analysis to Quality Improvement

Despite progress, QFD-NA integration in agricultural college English electives remains unexplored. Most QFD studies focus on institutional quality, neglecting learners' diversity: Agricultural students' varied backgrounds (rural/urban, career goals) are rarely centered, limiting personalized instruction[11, 16]. Disciplinary specificity: English skills for agricultural contexts (e.g., scientific writing, global collaboration) lack tailored QFD-NA integration, leaving a gap in preparing globally competent professionals.

This paper fills this crucial gap by employing the HoQ to provide a quantitative, prioritized road-map for CE electives reformation. By combining QFD and NA, the study ensures that scarce resources are pinpointed precisely to the technical requirements that will yield the maximum return on student satisfaction and educational quality.

3 RESEARCH METHODOLOGY

This study adopts a mixed-methods sequential explanatory design introduced by Creswell and Clark[25], integrating quantitative surveys (to quantify patterns) with qualitative interviews. The approach was tailored to address two core objectives: mapping English learning needs among college students and evaluating satisfaction with college English electives—with a focus on grade-level variability.

3.1 Participants

The sample comprised non-English-majored undergraduates in SCAU(2020–2024 cohorts). A stratified sampling strategy ensured proportional representation across grades (freshman to senior), capturing developmental shifts in English proficiency and learning goals. Of 100 distributed questionnaires, 98 were returned (98% response rate); 19 invalid responses (inconsistent answers or incompleteness) were excluded, yielding a final valid sample of 79 students (79% post-validation rate).

3.2 Data Collection and Analysis

3.2.1 Quantitative questionnaire

A structured survey grounded in Dudley-Evans and St. John's (1998) needs analysis framework was adapted from validated tools[13]. It included four thematic dimensions:

- Demographics: 6 items (gender, grade, English certificates, study duration, career goals).
- Learning Context: 35 items assessing attitudes, challenges, and skill proficiency.
- Learning Needs: 54 items exploring elective course goals, desired skill improvements, and expectations for materials/instructors.
- Course Satisfaction: 61 items evaluating textbooks, teaching, and assessment.

A 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree) was used, with higher scores indicating stronger agreement. Grade-level adjustments ensured relevance: freshmen/sophomores completed Sections 1-3 (no elective experience), while juniors/seniors completed all four sections.

3.2.2 Qualitative interviews

Semi-structured interviews (30-45 minutes, telephone/video conference) supplemented surveys, enabling in-depth exploration of lived experiences. Eight participants (Two per grade, purposely sampled) followed a guide aligned with questionnaire themes but tailored to grade:

- Freshmen/Sophomores: Perceived English proficiency, impacts of prior courses, and elective goals.
- Juniors/Seniors: Elective selection, goal attainment, and improvement suggestions. Interviews were recorded (consented) and transcribed verbatim for analysis.

3.3 Data Collection

Questionnaires were disseminated via wjx.cn with reminders to boost engagement. Valid data were cleaned in Excel and analyzed using descriptive statistics (frequencies, means) to summarize demographics, needs, and satisfaction.

Transcripts underwent thematic analysis[26]: initial deductive codes (from questionnaire themes) and inductive codes (emergent patterns, e.g., “desire for industry-aligned content”) were grouped into coherent categories. This ensured alignment with research objectives while capturing unanticipated insights.

Survey (quantitative patterns) and interview (qualitative depth) findings were integrated to validate conclusions. For example, low survey satisfaction with elective relevance was corroborated by interview quotes about misalignment with career aspirations—strengthening result trustworthiness. This methodology balances rigor (validated instruments, stratified sampling) with flexibility (semi-structured interviews), addressing both generalizability and context. Mixed methods mitigate single-method limitations, providing a holistic understanding of students' English learning needs and course effectiveness—critical for evidence-based program improvement.

4 RESULTS AND DISCUSSION

This section presents a data-driven analysis of student needs, learning behaviors, and satisfaction, followed by a prioritization of demands using the Analytic Hierarchy Process (AHP) and translation of these needs into curriculum actions via a House of Quality (HOQ).

4.1 Student Need Analysis for English Electives

QFD begins with capturing the Voice of the Customer(VOC)—i.e. student needs, preferences, and satisfaction. We structured this analysis around demographic profiling, learning behaviors/skill gaps, explicit needs, and post-enrollment satisfaction to build a foundation for curriculum optimization.

4.1.1 Demographic profile of participants

We collected demographic/academic data (region, gender, grade, English proficiency, employment goals) to contextualize needs.

- Region: 78% from Guangdong, China.
- Gender: Male-to-female ratio of 2:1.
- Grade: Freshmen (30.4%), Sophomores (31.6%), Juniors (19.0%), Seniors (19.0%).
- English Proficiency: Over 50% held CET-4/CET-6 certificates; 25% of freshmen had not yet taken these exams (introducing a minor bias in proficiency assessment).
- Employment Goals: 45% prioritized multinational corporations/foreign enterprises; 30% aimed for government positions.

Two cohorts emerged: (1) juniors/seniors (post-elective) with clear career goals; (2) freshmen/sophomores (pre-elective) focused on exam preparation.

4.1.2 Learning behaviors and skill gaps

To explore learning patterns, we analyzed attitudes, satisfaction, and self-rated skills (6 questions + Figure 2). Results revealed a disconnect between interest and action: 42 students (22.0%) reported high interest in English, but only 16 (8.5%) engaged regularly in extracurricular activities; 41 (22.0%) rarely did. Curriculum satisfaction was low: 23 (12.2%) positive, 25 (13.3%) neutral, 31 (16.5%) dissatisfied. Students perceived the curriculum as failing to meet needs despite subjective motivation—interest rarely translated to consistent effort.

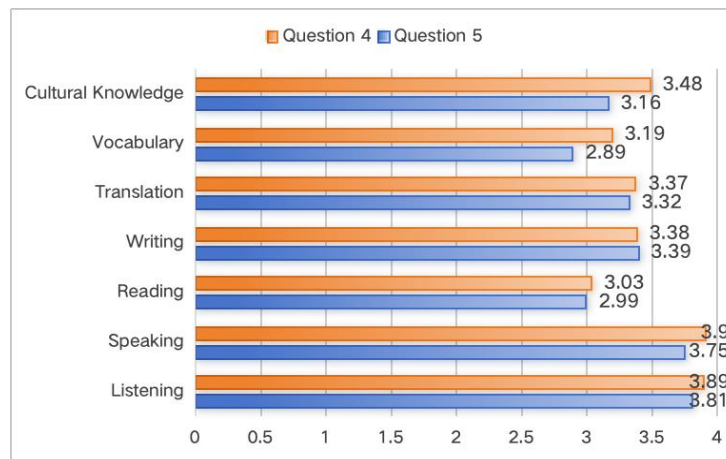


Figure 2 Line Chart Depicting Trends in Students' Self-Perceived English Learning Difficulties

Note: Question 4: I think this English skill is the most lacking in my English learning.

Question 5: I think this English skill is the most difficult to learn in my English learning

Table 1 Students' Self-Perceived Mastery of English Listening, Speaking, Reading, Writing, and Interpreting Skills

Question	Survey items	Response Percentages(%)					Mean	Most Frequent Response
		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree		
After the current stage of College English learning, what is your mastery of English skills?	Item 01	3.80%	7.69%	36.71%	43.04%	8.86%	3.46	4
	Item 02	5.06%	26.58%	35.44%	24.05%	8.86%	3.05	3
	Item 03	15.43%	26.58%	24.07%	19.75%	0.00%	2.05	2
	Item 04	10.13%	40.74%	36.71%	26.58%	3.80%	2.91	3
	Item 05	11.39%	22.78%	49.37%	16.46%	2.53%	2.78	3
	Item 06	31.65%	20.25%	20.25%	12.66%	0.00%	2.14	2
	Item 07	7.59%	20.25%	31.65%	35.44%	5.06%	3.10	4
	Item 08	16.46%	25.04%	40.51%	18.99%	0.00%	2.62	3
	Item 09	25.32%	35.44%	27.85%	10.13%	1.27%	2.27	2
	Item 10	12.66%	21.52%	35.44%	29.11%	1.27%	2.85	3
	Item 11	16.46%	27.85%	40.51%	15.19%	0.00%	2.54	3
	Item 12	25.32%	35.44%	27.85%	10.13%	1.27%	2.27	2
	Item 13	12.66%	17.72%	31.65%	31.65%	6.33%	3.01	3
	Item 14	16.46%	29.11%	32.91%	20.25%	1.27%	2.61	3
	Item 15	30.38%	29.11%	29.11%	8.86%	2.53%	2.24	1

Note: Likert scale 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree.

Item 1: I can understand simple listening materials related to learning, daily communication, etc.

Item 2: I can understand language communication materials with broad content and normal speed

Item 3: I can understand speeches and discussions at professional academic lectures and conferences

Item 4: I can effectively communicate orally about daily life and learning

Item 5: I can communicate naturally on a wide range of topics

Item 6: I can communicate effectively on academic and practical issues

Item 7: I can read articles with similar difficulty to English textbooks and familiar content

Item 8: I can conduct in-depth reading on a wide range of humanities, social sciences, and other content

Item 9: I can read, study, and research relevant books and literature on the original profession

Item 10: I can write short articles on general topics or common application documents

Item 11: I can write short articles with rich content and clear structure on some related topics

Item 12: I can effectively write about relevant issues in the field of professional or cross-cultural communication

Item 13: I can translate brief materials in English textbooks or related application styles

Item 14: I can translate relevant social hot issues or related professional materials

Item 15: I can translate a wide range of design cultural exchanges or professional literature with a certain difficulty

Skill Gaps: Figure 1 (self-perceived difficulty) and Table 1 (self-rated mastery) show that 1) Top deficiencies include Listening (36.7% rated “difficult”) and speaking (49.4% rated “difficult”). Relative strengths: Reading (mean=3.10) and vocabulary (mean=2.61), attributed to test-oriented education (prioritizing these skills) and time for reflection; 2) Contradiction: Students rated reading/vocabulary as “easy” but struggled with listening/speaking—highlighting a gap between self-perception and practical ability. Interviews deepened this: Listening suffers from test-focused vs. workplace demands; speaking is hindered by grammar-translation pedagogy (fear of error); writing/translation lag due to insufficient practice.

4.1.3 Explicit and contextualized needs: freshman vs. senior perspectives

We assessed explicit needs via 13 questions (learning purposes, course preferences, textbook/teacher demands) across grades. **Learning Purposes:** Table 2 shows Fulfilling credit requirements (mean=4.24) was top, followed by Passing CET-4/6 (3.70) and Preparing for employment (3.46). **Desired skills (Table 3)** aligned: basic skills (3.85) and practical daily communication skills (3.81) were priorities. A paradox emerged: job seeking was 3rd in purpose but 6th in skill demand—because job readiness requires holistic skills (core, communication, culture).

Table 2 Categories of Students' English Learning Purposes

Purpose	Mean	StD
Fulfilling credit requirements	4.24	0.82
Passing standardized English proficiency exams (e.g. CET-4, CET-6, IELTS, TOEFL)	3.70	1.08
Preparing for employment	3.46	1.08
Exercising critical thinking skills and enhancing general literacy	3.39	1.04
Broadening cultural awareness and understanding diverse cultures	3.29	1.04
Preparing for academic research	3.25	1.14
Preparing for postgraduate studies or international study	3.00	1.24
Preparing to promote China's global communication in English	2.99	1.08

Table 3 Ranking of Students' Expected English Language Skills to Improve in Selective Programs

Skill area	Mean	StD
Improving basic skills (listening, speaking, reading, writing and translation)	3.85	0.907
Enhance practical daily communication skills	3.81	0.988
Enhancing your humanistic competence and intercultural communication skills	3.66	0.959
Improve academic English proficiency	3.59	0.913
Enhancing job-hunting preparedness	3.56	1.047

For Course Preferences, Freshmen (pre-elective) favored exam-prep/electives (Figure 3), while sophomores (post-elective) prioritized listening/speaking and instructor quality (Figure 4).

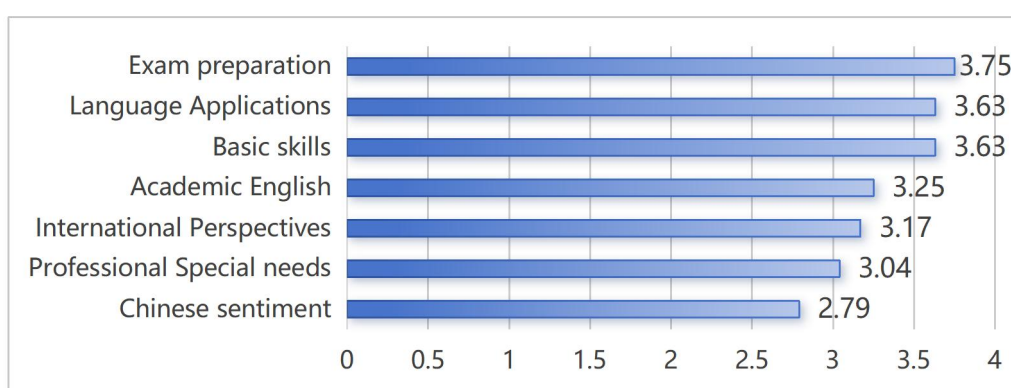


Figure 3 Elective Course Types Freshmen Expect to Take

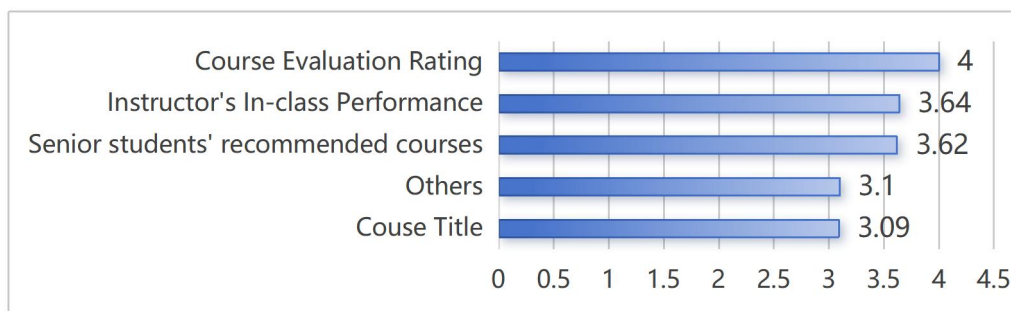


Figure 4 Motivations for Sophomore Students' Elective Course Choices

For Textbook/Teacher Needs (Table 4), Freshmen preferred foreign-authored textbooks (mean=3.55) and teachers who focused on key points (mean=3.39). Seniors (post-elective) shifted to Chinese textbooks (mean=3.46).

Table 4 Students' Perceived Textbook Needs: First- vs. Second-Year

Category	Items	Mean	Std
Preferred Textbook Sources	Original textbooks authored by foreign experts	3.55	0.980
	Textbooks authored by Chinese scholars	3.39	0.885
	Textbooks compiled by school teachers	3.06	1.144
Preferred Textbook Usage	Teachers cover the entire textbook with detailed instruction	3.18	1.014
	Teachers focus on key difficult points, with the rest for self-study	3.39	0.931
	Primarily self-study, with teachers addressing questions	3.20	1.000
	Teacher minimize textbook time and supplement with extracurricular content	3.33	1.008

For teachers, seniors valued humor (mean=4.22) and cross-cultural knowledge (mean=4.06). This aligns with freshmen but differing in textbook use. Students favor English-major teachers, then general college English/foreign instructors, prioritizing humor, cross-cultural knowledge, and experience. Interviews link classroom atmosphere to efficiency—low interaction harms motivation. Most current instructors are general; few foreign/major teachers. Suggest training. Freshmen/sophomores similarly prefer English-professional integrated content, driven by career uncertainty or major focus (Table 5).

Table 5 First- and Second-Year Students' Needs Regarding Teachers

Category	Item	Mean	StD
Preferred Teacher Types	English-major teacher	3.9	0.963
	College English teacher	3.76	0.947
	Teachers with subject-matter expertise	3.29	1.080
	Native English-speaking teachers	3.78	1.066
	Engaging and humorous teaching style	4.22	0.823
Preferred Teacher Qualifications	Extensive intercultural knowledge	4.06	0.988
	Extensive experience in English language teaching	3.98	0.946
	Overseas teaching experience	3.53	1.157

For the Teaching Modes (Table 6), Blended (online+classroom, Mean=3.92) tops teaching mode preferences, followed by traditional lectures (3.59) and special-topic ones (3.43). It meets students' need for flexibility-expanding resources, enabling self-paced learning, and balancing traditional interaction with online autonomy—boosting practical English skills.

Table 6 First- and Second-Year Students' Needs for Teaching Modes

Category	Item	Mean.	StD
Preferred Teaching Modes	Blended learning(Combination of classroom lectures and online self-study)	3.92	0.886
	In-person classroom lectures	3.59	0.934
	Specialized topic lectures	3.43	1.155

For the Course Evaluation Methods (Table 7), students overwhelmingly prefer open-book exams. Interviews link assessment criteria to course choice—they seek alignment with goals and less anxiety. Freshmen/sophomores, fresh

from rigid General English, favor open-book/peer assessment to avoid high pressure. Course papers are least desired due to time and writing worries.

Table 7 First- and Second-Year Students' Needs for Course Evaluation Methods

Category	Evaluation Methods	Mean	StD
Preferred Methods	Closed-book examinations	2.96	1.384
	Open-book examinations	3.76	1.164
	Course-based Dissertations	2.8	1.323
	Peer Assessment	3.06	1.42
	Portfolio Assessment	2.82	1.219

4.1.4 Post-enrollment satisfaction: upperclassmen feedback

To identify gaps in current curriculum, we surveyed juniors and seniors who had completed their electives. Overall, 56.7% were “relatively satisfied,” 3.33% neutral, and 6.7% dissatisfied (Figure 5).

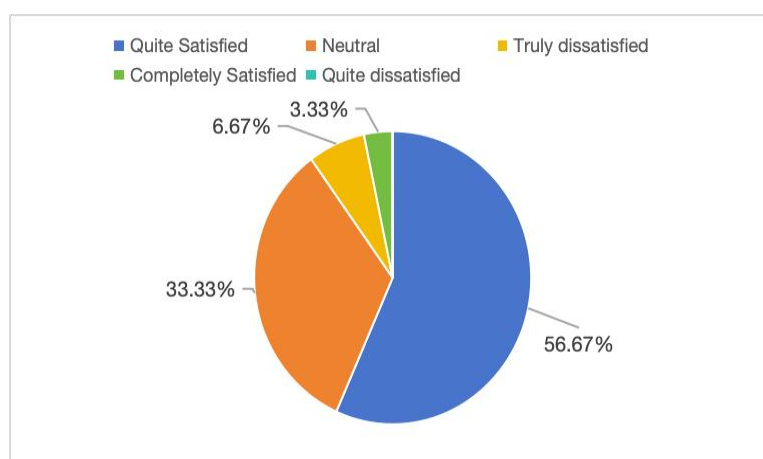


Figure 5 Third- and Fourth-Year Students' Overall Satisfaction with College English Elective Courses

Mean satisfaction scores across six dimensions (teachers, assessment, scheduling, types, modes, materials) revealed a clear hierarchy: teachers (3.83) > assessment (3.77) > scheduling (3.70) > types (3.63) > modes (3.53) > materials (3.37) (Figure 6).

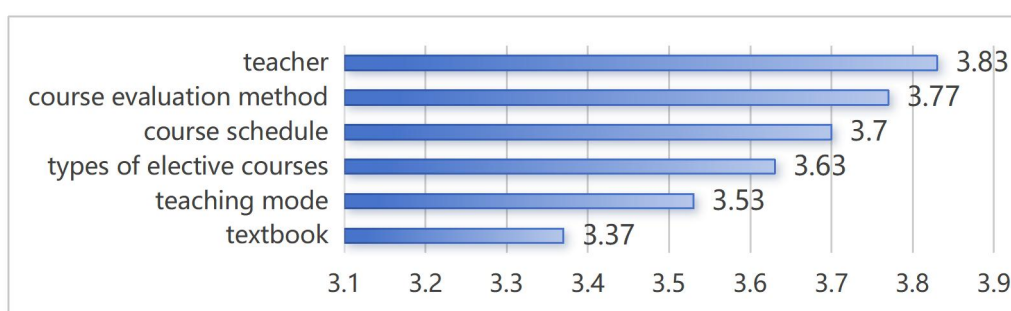


Figure 6 Third- and Fourth-Year Students' Satisfaction with Elective Course Dimensions

Textbook issues dominated complaints: “lack of practicality” was the top critique (Table 8), with third and forth-year students preferring Chinese texts and supplementary content (Table 9).

Table 8 Third- and Fourth-Year Students' Feedback on Textbook Use

Feedback Theme	Mean	StD
Lack of practical relevance	3.69	0.85
Overly specialized content	2.85	0.99
High linguistics complexity	3.08	0.86
Insufficient interactive exercises	3.54	1.05

Table 9 Third- and Fourth-Year Students' Textbook Needs

Category	Item	Mean	StD
Preferred textbook Sources	Original textbooks authored by foreigner experts	3.31	0.751
	Textbooks authored by Chinese scholars	3.46	0.811
	Textbooks compiled by school teachers	2.54	0.66
Preferred Textbook Integration	Teachers cover the entire textbook with detailed instruction	2.69	1.032
	Teacher focus on key difficult points, with the rest for self-study	2.62	0.961
	Primarily self-study, with teachers addressing questions	2.46	1.127
	Teachers minimize textbook time and supplement with extracurricular content	3.38	1.121

Lower-Year/Upper-Year students show significant satisfaction gaps in teacher-related areas (Figure 7)—highest for qualifications, then attitudes/interaction/methods (descending), with Methods scoring lowest (Figure 8).

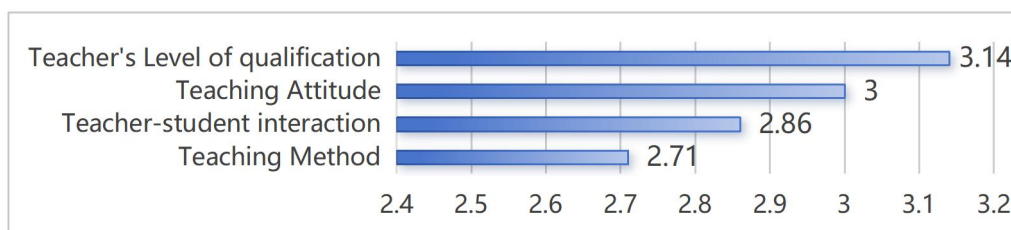


Figure 7 Satisfaction Levels of Lower-Year and Upper-Year Students with Electives Instructors Across Multiple Dimensions

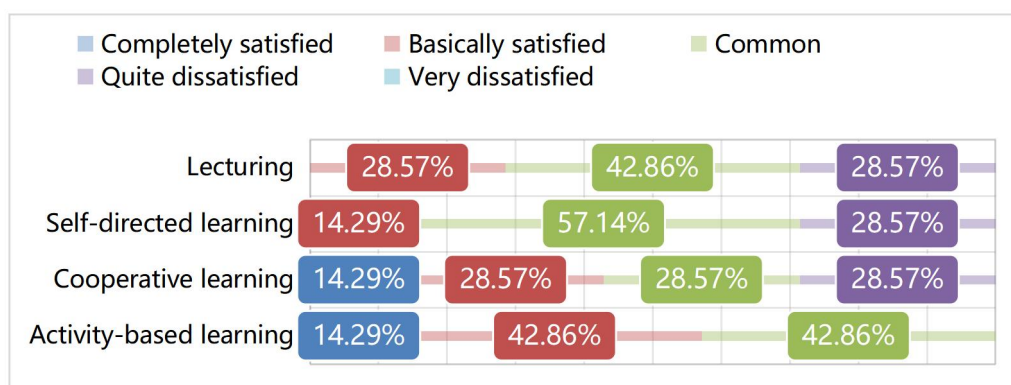


Figure 8 Demand for Elective Course Teaching Methods Among Lower-Year and Upper-Year Students

Notes: Lecturing: Teacher-centered oral delivery of content.

Self-directed Learning: Students independently learn using resources and prompts.

Cooperative Learning: Small-group learning via mutual support, collaboration, and competition.

Activity-based Learning: Uses activities (e.g., group discussions, role-playing) for active knowledge acquisition.

Students prioritized elective teaching methods: Activity-based > Cooperative Learning > Self-directed > Lecture. While activity/cooperative methods boosted engagement, dissatisfaction arose from teacher-dominated lectures (poor interaction) or rapid, slide-reliant delivery (hindered note-taking). Preferred interactions: Role-playing > Q&A > Group Discussion > Games (role-playing enhanced creativity; Q&A stressed weaker speakers). Teachers received favorable evaluations for multimedia proficiency, clear explanations, and accessible e-materials, aligning with underclassmen views favoring English-major/foreign instructors. Notably, juniors/seniors diverged from freshmen/sophomores in course satisfaction (types, teaching, assessment), driven by career focus. They sought courses integrating professional/humanistic skills (basic skills, language application, "Chinese sentiments"), prioritizing job readiness: foreign firms valued English proficiency; governments required ideological grounding. Teaching modes: Juniors/seniors preferred in-person lectures over online/hybrid, citing efficiency and reduced laziness. Assessments: Seniors favored papers (enhancing research/course reflection) and open-book exams (emphasizing application over memorization). Grade-level differences (exam prep vs. career focus) shaped preferences. All sought basic English/communication skills; freshmen prioritized CET-4/6 preparation; seniors advocated Chinese sentiment courses for government roles. Course designers should guide goals, diversify outcomes, and adapt content/methods to student needs.

4.2 Prioritization of Students' Demands

Based on the needs analysis, we categorized student course needs into five dimensions: course management, teaching materials, instructors, teaching modes, and assessment methods. This yielded a hierarchical framework of student

demand indicators for college English electives (Table 10). Specific needs produced a discipline-specific analysis table of student requirements for college English electives in this major.

Table 10 Hierarchical Framework of Student Need Indicators in College English Elective Courses

Main Category	Demand Classification	Demands Indicators
Student Needs Indicators for Course Design	Course Management	Types of Courses
		Course Scheduling
	Teaching Material	Textbook Content
		Textbook Utilization
	Teacher quality	Teacher Qualifications
		Teaching Attitude
		Teaching Method
	Teaching Modes	Classroom Atmosphere
		Diverse Learning Modes
	Course Assessment	Academic Evaluation Method
		Comprehensive Evaluation Method

Table 11 Analysis of Student Needs for College English Elective Courses

Need Domain	Demand Classification	Demands Indicators	Specific Student Need
Total Course Design Needs	Course Management	Types of Course	Offer electives aligned with distinct thematic modules
		Course Scheduling	Integrate English language skills with professional knowledge and humanistic education
	Teaching Material	Textbook Content	Use language appropriate for target learners
			Include basic English skill training and cultural knowledge
		Textbook Utilization	Ensure effective textbook integration into instruction
			Possess extensive cross-cultural knowledge and English teaching experience
	Teacher quality	Teacher Qualifications	Humorous and interesting teaching style
			High-quality instructors: English-majored teachers or native English-speaking experts
		Teaching Attitude	Prepare thoroughly for classes
			Pay attention to students during class
			Actively tutor students after class
	Teaching Modes	Teaching Methods	Prioritize student engagement and in-class interaction
			Foster interactive dynamics to boost learning motivation
		Diverse Learning Formats	Blend online-autonomous-learning with in-class instruction
			Use open-book examinations and course-based dissertations
	Course Assessment	Academic Assessment	Combine course participation and final grades for comprehensive assessment
		Holistic Evaluation	

Building on the demand indicator hierarchy table, we employ the Analytic Hierarchy Process (AHP) to scientifically evaluate indicators and determine their relative importance.

4.2.1 Prioritization of demands via Analytic Hierarchy Process (AHP)

Thomas L. Saaty, a leading U.S. operations research scholar, pioneered the Analytic Hierarchy Process (AHP) in the early 1970s. AHP, integrating qualitative and quantitative analysis, decomposes complex decisions into hierarchical levels (objectives, criteria, alternatives). Using pairwise comparisons, judgment matrix construction, and weight/consistency ratio calculations, it enables objective evaluation and selection of alternatives. In Quality Function Deployment (QFD), AHP excels: it fragments QFD issues into manageable sub-components, streamlining the decision process. It also structures the quantification of subjective judgments for prioritizing customer needs, enhancing objectivity. By mitigating subjectivity-induced inconsistencies between predicted and actual weights, AHP improves result scientificity, decision quality, and process manageability/comprehensibility.

4.2.2 Establishment of the evaluation

We decomposed and recombined student needs to establish a recursive hierarchy. Drawing on the hierarchical structure table of student demand indicators for college English elective courses, we defined core model elements, structuring

them into: (1) *a target layer* (overall student curriculum demands); (2) *a criterion layer* (six sub-needs, e.g., course types, scheduling, derived from total demand classification); and (3) *a third layer* (specific demands under each sub-need category). Figure 9 visualizes this framework.

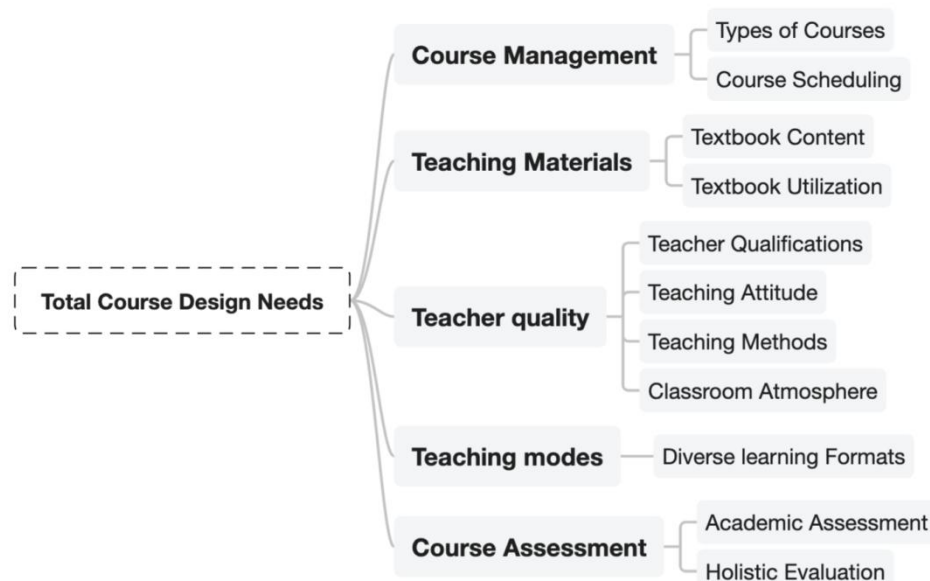


Figure 9 Hierarchical Structure of Students' Needs Indicators for College English Electives

4.2.3 Constructing the comparative judgment matrix

Within this evaluation framework, elements at each hierarchical level are compared against those from the preceding level (evaluation criteria). To simplify the process, pairwise comparisons are typically used: when a higher-level factor serves as the criterion, the relative importance of the i^{th} and j^{th} elements in a level is quantified by a pairwise comparison value (a_{ij}). By convention, a_{ij} takes positive integers (1-9) or their reciprocals, forming a pairwise comparison judgment matrix. Here, 1 denotes equal importance; 9 indicates one criterion is substantially more important than the other. If criterion i outranks j , then $a_{ij} > 1$ and $a_{ji} = 1/a_{ij}$, reflecting the scale's reciprocal nature.

4.2.4 Weight calculation and consistency testing

In AHP, constructing a judgment matrix requires pairwise comparisons of elements and assignment of relative importance scores. Given inherent subjectivity in human judgment, consistency testing is critical: inconsistent matrices indicate logical contradictions in pairwise evaluations, necessitating score readjustment. Factor weights derive from the matrix's maximum eigenvalue ($\lambda_{\max}$) and corresponding eigenvectors. Consistency is validated using the Consistency Index(CI) and Ratio(CR); a $CR < 0.1$ indicates acceptable consistency. The calculation formula is:

$$CR = \frac{CI}{RI} \quad (1)$$

$$CI = \frac{\lambda_{\max} - n}{n - 1} \quad (2)$$

Here, $\lambda_{\max}$ denotes the maximum eigenvalue and n is the judgment matrix order (number of criteria or alternatives). The matrix satisfied consistency testing, with results summarized in Table 12.

Table 12 Student Needs Classification and Their Importance Ratings for College English Elective Courses

Primary Need Categories	Primary Category Weight	Secondary Need Indicators	Secondary Indicator Weight	Composite Weight (Primary*Secondary)
Course Management	0.23	Types of Course	0.83	0.1909
		Course Scheduling	0.17	0.0391
Teaching Materials	0.05	Textbook Content	0.75	0.0375
		Textbook Utilization	0.25	0.0125
Teacher quality	0.54	Teacher Qualifications	0.23	0.1242
		Teaching Attitude	0.12	0.0648

		Teaching Method	0.60	0.3240
		Classroom Atmosphere	0.06	0.0324
Teaching Modes	0.12	Diversity Learning Mode	0.12	0.1200
		Academic Assessment	0.50	0.0250
Course Assessment	0.05	Holistic Evaluation	0.50	0.0250

Table 13 shows that teaching methods, level qualifications, course types, and teaching modes are top priorities for students' university English elective choices--conflicting with participants' initial assumptions about these needs. Today, students' demands stem from both subjective learning initiative and objective school-related factors (e.g., teacher quality, course design), which they explicitly prioritize as essential for elective selection.

4.3 Constructing the House of Quality (HOQ)

Building on classified needs and their importance, we developed a correlation matrix linking student needs to specific measures. HOQ translates student needs into actionable curriculum quality measures, categorized into: course management, teaching materials, faculty, teaching modes, and assessment.

Specific measures			Course Management		Teaching Materials		Teacher Quality								Teaching Modes	Course Assessment	
			Types of Courses	Course Scheduling	Textbook Content	Textbook Utilization	Teacher Qualifications			Teaching Attitude			Teaching Methods	Classroom Atmosphere	Diverse Learning Formats	Academic Assessment	Holistic Evaluation
			Offer electives aligned with distinct thematic modules	Integrate English language skills with professional knowledge and humanistic education	Include basic English skill training and cultural knowledge	Use language appropriate for target learners	Ensure effective textbook integration into instruction	Possess extensive cross-cultural knowledge and English teaching experience	Humorous and interesting teaching style	High-quality instructors: English-major teachers or native English-speaking experts	Prepare thoroughly for classes	Pay attention to students during class	Actively tutor students after class	Prioritize student engagement and in-class interaction	Foster interactive dynamics to boost learning motivation	Blend online-autonomous-learning with in-class instruction	Use open-book examinations and course-based dissertations
Students' Needs and priorities																	
Course Management	Types of Courses	0.1909	9	7			3		5					3			
	Course Scheduling	0.0391	7	9	5		3	1		1				3		1	
Teaching Materials	Textbook Content	0.0375		5	9	9	7	1		1	1			1	1	5	3
	Textbook Utilization	0.0125		3	5	3	9	5	1	7	1	3	1	1	1	3	1
Teacherquality	Teacher Qualifications	0.1242	5		3	5	7	9	7	9	5	5	5	5	5	3	1
	Teaching Attitude	0.0648					3	5	3	1	9	9	9	3	3	1	3
	Teaching Methods	0.324	3		3	1	3	5	7	7	3	5	3	9	3	5	3
	Teaching Style	0.0324			1		3	3	7	3	1	7	1	7	9	1	
Teaching Modes	Diversity Learning Method	0.12	3		3	1	5	5		1	1	1	5	1	9	1	1
Course Assessment	Academic Assessment	0.025			5	3	1	3		3			1	1		1	9
	Holistic Evaluation	0.025			3	3	1	5		3		5	5	3	5	1	9
Index of Absolute Importance			3.94	2.43	2.53	1.59	3.28	4.67	3.57	4.82	2.38	3.33	2.49	5.28	2.4	4.06	2.18
Index of Relative Importance			7.85%	4.84%	5.04%	3.17%	6.52%	9.30%	7.11%	9.59%	4.74%	6.64%	4.96%	10.51%	4.78%	8.08%	4.35%

Table 13 House of Quality of Student Needs Analysis and curriculum-specific measures

Table 13 highlights top curriculum improvement priorities: teaching methods (10.51%, ranked 1st), followed by teacher qualifications—specifically professional/foreign instructors (9.59%, 2nd) and cross-cultural/teaching experience (9.30%, 3rd). Teaching mode, course type, and style are second-tier, while academic evaluation and textbook sources are least important.

Student needs conflict with the current state of English electives. To enhance learning outcomes, the school and the instructors should refine curriculum design and boost student satisfaction. Critical actions include: (1) prioritizing

teachers (their performance directly impacts learning); (2) involving students in teaching; and (3) diversifying elective modules per course type with qualified instructors to expand choice.

5 MAJOR FINDINGS, LIMITATIONS AND DISCUSSION

This study, centered on Non-English-majored undergraduates at SCAU, employed questionnaires and QFD methodology to investigate their needs and satisfaction with university English-electives. Key findings reveal grade-specific demands: freshmen/sophomores prioritize holistic development (basic English + humanistic skills), while juniors/seniors focus on job-oriented practical abilities, with listening/speaking consistently identified as the most challenging skills. Seniors expressed higher satisfaction with teaching staff but lower satisfaction with course materials. Core drivers for course selection—teaching methods, teacher qualifications, course types, and modes—directly correlated with prioritized needs, underscoring the efficacy of flexible, qualified instruction and diverse, blended learning models. Implications emphasize dynamic curriculum updates, enhanced material practicality, faculty training (cross-cultural competence, blended pedagogy), and holistic assessment (formative+summative). Limitations include a small sample size, incomplete needs categorization, and minor QFD application inconsistencies. Future research could expand sampling, refine demand analysis, and optimize QFD integration to strengthen generalizability. This work provides actionable insights for aligning elective courses with student needs, fostering improved learning outcomes.

COMPETING INTERESTS

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