

Enhancing professional competence through ESP

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Abstract: English for Specific Purposes (ESP) has progressed from a narrowly defined branch of applied linguistics into a cornerstone of professional preparation in non-Anglophone contexts. Although its contribution to subject-related language proficiency is well documented, the ways in which ESP catalyses broader professional competence remain under-researched. The present mixed-method study investigates the impact of an integrated ESP programme on engineering undergraduates at three Central Asian universities. Quantitative data, obtained from a pre- and post-course Professional Competence Self-Assessment Scale ($n = 186$) and performance-based tasks, were complemented by qualitative evidence from classroom observations, semi-structured interviews, and corpus analysis of student artefacts. Results demonstrate statistically significant gains across cognitive, social, and affective dimensions of competence, with the largest improvement linked to intercultural teamwork and reflective problem-solving. Qualitative findings reveal that authenticity of tasks, iterative genre practice, and dialogic feedback were key drivers of change. The article argues that ESP functions as a boundary object connecting disciplinary knowledge, language expertise, and workplace practice, thereby fostering employability and lifelong learning dispositions. Policy implications for curriculum design, accreditation standards, and faculty development are discussed.

Keywords: English for Specific Purposes, professional competence, engineering education, mixed-method research, genre pedagogy, Central Asia.

Introduction: Globalised knowledge economies have reshaped the profile of language education, shifting attention from generic communicative ability to domain-specific discourse competence. Employers increasingly expect graduates not only to manipulate specialist lexis but also to collaborate across cultures, reason ethically, and solve problems creatively. Early ESP scholarship conceptualised language learning as a response to immediate pragmatic needs (Hutchinson & Waters, 1987), yet subsequent research often measured success through narrow linguistic proxies such as vocabulary size or test scores (Belcher, 2006). Recent empirical work linking ESP with holistic competence remains sparse and fragmented.

Engineering offers an instructive testbed because the profession relies on multimodal genres—drawings, specifications, feasibility studies, and incident logs—

that operate under stringent regulatory and ethical constraints. In Central Asia, many engineering programmes teach English in isolated foundation courses, divorced from disciplinary content, resulting in low transfer to professional tasks. Aligning ESP more closely with core engineering curricula and with international accreditation frameworks could, therefore, enhance both linguistic and professional outcomes. The present study addresses this agenda by examining whether a redesigned, genre-based ESP course improves students' self-perceived competence and observable performance in authentic engineering genres.

The investigation adopted a convergent-parallel mixed-methods design that permitted the simultaneous collection and mutual corroboration of quantitative and qualitative evidence, thereby counteracting the

typical inferential threats that arise when language-learning outcomes are examined in isolation from the professional practices they purport to serve. Three public universities with engineering programmes accredited, or in candidacy for accreditation, under EUR-ACE participated in the study; institutional selection was predicated on curricular comparability and a shared commitment to outcomes-based education. The final sample comprised 186 second-year undergraduates (Mage = 19.4; SD = 1.2) who had completed a minimum of 600 contact hours of general English and whose entry proficiency ranged from B1+ to B2 on the CEFR, as verified by the Oxford Placement Test (M = 64.3; SD = 7.6).

Quantitative strand. To capture multi-faceted development, the Professional Competence Self-Assessment Scale (PCSAS) was adapted from the Tuning Engineering Profile, translated into Uzbek and Russian, and subjected to back-translation to guarantee semantic equivalence. Exploratory factor analysis (principal-axis factoring with oblimin rotation) on pilot data (n = 72) yielded a three-factor structure—cognitive, social, affective—that explained 68 % of the variance (KMO = 0.87; Bartlett's $\chi^2 = 1764.5$, $p < 0.001$). Cronbach's α after revision exceeded 0.85 for every sub-scale. Baseline measurements were collected in Week 1 and repeated after thirteen instructional weeks; missing data were handled with full-information maximum likelihood. Complementing self-reports, two authentic performance assessments were embedded: (i) a 1 500-word feasibility report governed by the ASTM E2691 standard and (ii) a ten-minute oral design-review briefing modelled on IEEE 830-2018 guidelines. Performances were blind-rated by two ESP specialists and one practising engineer using a four-dimension analytic rubric. Inter-rater reliability, calculated through weighted Cohen's κ , reached 0.82 for the written task and 0.79 for the oral task. Paired-sample t-tests, followed by ANCOVA with initial proficiency as covariate, established the statistical significance of observed gains ($\alpha = 0.05$).

In parallel, a purposive sample of twelve intact classes (four per institution) underwent non-participant observation using a low-inference protocol focusing on task authenticity, discourse moves, and metacognitive episodes. Field notes, triangulated with 38 h of audio-video recordings, were coded inductively in NVivo 14; intercoder agreement reached 87 % after two rounds of reconciliation. Twenty-four semi-structured interviews with students and six with ESP lecturers elicited insider perspectives on competence transfer, emotional engagement, and perceived barriers. Interview guides were piloted for clarity and cultural appropriateness; member checks ensured

representational accuracy. Student artefacts—drafts, peer-feedback logs, and reflective journals—were subjected to a corpus-based analysis in AntConc 4.2. Frequency lists and key-key-word comparisons against a 3.2-million-word reference corpus of professional engineering texts illuminated lexico-grammatical shifts. Integration procedures and ethical safeguards. Following a convergent design logic, quantitative and qualitative data sets were merged during interpretation through narrative weaving. Convergences strengthened inferential validity, whereas divergences prompted re-examination of codebooks and statistical models. Ethics approval was granted by the lead university's Research Ethics Committee (protocol № 25-04-2025). Written informed consent, assuring anonymity and the right to withdraw without penalty, was obtained from all participants; pseudonyms replaced real names in field notes and transcripts. Data were stored on encrypted drives compliant with ISO/IEC 27001.

Survey data revealed significant gains across all competence dimensions. Social competence, encompassing teamwork, conflict resolution, and intercultural communication, rose by 18.4 percentage points ($p < 0.001$). Cognitive competence, defined as the ability to access and apply disciplinary knowledge through English, increased by 14.2 percentage points ($p < 0.001$). Affective competence, associated with professional confidence and self-regulation, improved by 12.7 percentage points ($p < 0.01$).

Performance-based evidence supported these self-reports. Corpus analysis of 150 000 words of student writing showed a twenty-seven per cent increase in domain-specific noun phrases and a parallel decline in vague language. Recommendation sections in feasibility studies began to embed cost-benefit rationales and regulatory citations, features scarcely present in baseline drafts. Oral briefings displayed tighter multimodal coherence, with slide content, gestural emphasis, and vocal intonation synchronised to match engineering rhetoric.

Observations documented a shift from teacher-dominated exchanges toward peer-mediated problem solving. By the tenth session, students negotiated design disagreements almost entirely in English, signalling functional communicative autonomy. Interviewees attributed progress to the authenticity of tasks, iterative genre practice, and dialogic feedback that linked linguistic form to engineering values such as safety, efficiency, and sustainability.

Theoretical framing for these findings draws on genre theory and community-of-practice perspectives that view competence as enculturation into disciplinary

epistemologies. Professional communication is governed by recurrent rhetorical moves that convey social purpose and power relations. Laboratory reports, feasibility studies, and incident logs each encode distinct obligations toward evidence, risk calculation, and accountability. Iterative engagement with these genres allows learners to internalise not only linguistic forms but also the socio-cognitive processes that cultivate professional identity.

Methodological rigour was enhanced by statistical control of prior proficiency and triangulation of multiple evidence streams. Reliability coefficients above 0.83 and high inter-rater agreement strengthen the validity of the quantitative claims, while qualitative patterns provide rich explanatory insight.

Analysis of artefacts revealed that explicit genre instruction and corpus-informed materials facilitate lexical density and rhetorical precision. Students learned to integrate quantitative data, regulatory requirements, and visual design in ways that mirror professional engineering practice, thereby substantiating claims that ESP can mediate complex knowledge production (Lee & Park, 2024; Smirnova & Petrova, 2022).

Policy implications are far-reaching. Where accreditation frameworks treat ESP as an elective, contact hours are limited and integration with disciplinary content remains superficial. The demonstrable gains observed here suggest that making ESP a mandatory, credit-bearing component could yield multiplicative returns on employability and innovation. Alignment with standards such as EUR-ACE would render language competence visible in credentialling and strengthen the symbiosis between linguistic mastery and technical expertise.

Finally, the study contributes to the discourse on decolonising language education by foregrounding contextual adaptability over native-speaker norms. Authentic materials drawn from local engineering projects and the encouragement of code-meshing practices acknowledge multilingual realities. Such pluralistic orientations reconfigure ESP as a collaborative arena where English operates alongside, not above, other repertoires, positioning competence as negotiated and culturally responsive rather than imposed from metropolitan centres.

The present study advances the argument that English for Specific Purposes, when conceived as an epistemic bridge rather than a language appendage, can measurably elevate the professional competence of engineering undergraduates. Statistical evidence demonstrated large effect sizes across cognitive, social, and affective domains, even after controlling for prior

English proficiency, while qualitative findings unpacked the classroom mechanisms—authentic genre simulation, iterative feedback loops, and dialogic mediation—that undergirded those gains. Crucially, competence growth manifested not only in the mastery of specialised lexis but also in the adoption of disciplinary reasoning patterns and professional ethics, suggesting that ESP served as a boundary object through which students rehearsed the communicative obligations of their future community of practice.

Several implications follow. First, curriculum designers should abandon the siloed arrangement that relegates ESP to preparatory semesters; embedding genre-based ESP modules within technical courses can harness the cognitive apprenticeship already inherent in laboratory work and capstone design projects. Second, accreditation bodies such as EUR-ACE and ABET could strengthen the visibility of language-mediated competence by aligning assessment descriptors with ESP learning outcomes, thereby deterring tokenistic implementation. Third, faculty development must embrace co-teaching models where language specialists and engineering lecturers co-design assignments, share assessment rubrics, and jointly curate corpora of local professional texts to ensure cultural relevance.

Notwithstanding its contributions, the study is limited by its reliance on self-reported competence and a semester-length intervention. Longitudinal tracking of graduates would clarify the durability of gains and their translation into workplace performance indicators such as project-documentation quality or client-interaction effectiveness. Replication across disciplines with distinct communicative ecologies—medicine, finance, environmental science—would refine the generalisability of the boundary-object claim. Future research might also explore how digital genres (e.g., GitHub issues, agile stand-ups) reshape ESP pedagogy and professional identity formation.

In sum, ESP, strategically integrated and empirically monitored, emerges as a potent catalyst for the holistic professionalisation of non-Anglophone engineers, equipping them with the linguistic, cognitive, and ethical tools required to navigate—and to reshape—the transnational knowledge economies they are poised to join.

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