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PAPER

EXPLORING FOREIGN LANGUAGE ANXIETY IN TECHNICAL HIGHER EDUCATION: EVIDENCE FROM ENGINEERING STUDENTS

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Abstract

English has become the primary language of science, engineering, and technology, making proficiency in English essential for technical higher education students (Crystal, 2003; Jenkins, 2014). Despite formal instruction in English for Specific Purposes (ESP), many engineering students experience foreign language anxiety (FLA), which can impede participation, oral communication, and overall academic performance (Horwitz, Horwitz, & Cope, 1986; MacIntyre & Gardner, 1991). Understanding FLA in technical contexts is crucial for designing effective ESP curricula and instructional practices that support learners' professional and linguistic development.

This study investigates the nature, sources, and effects of FLA among first-year engineering students at Kokand State University. A mixed-methods design was employed, combining the Foreign Language Classroom Anxiety Scale (FLCAS) to quantify anxiety levels (Horwitz et al., 1986) with semi-structured interviews to explore students' perceptions and experiences. A total of 38 participants from multiple engineering specializations took part in the study.

Quantitative findings indicate moderate to high levels of FLA, with communication apprehension emerging as the most prominent component, followed by fear of negative evaluation and test anxiety. Qualitative analysis revealed key sources of anxiety, including limited prior communicative experience, concerns about peer judgment, challenges with technical vocabulary, and classroom instructional practices.

The study offers practical implications for ESP curriculum design, classroom activities, and assessment practices in technical higher education, emphasizing the importance of low-anxiety, collaborative, and scaffolded learning opportunities. These findings contribute to the growing literature on FLA in ESP contexts, particularly among technical students in Central Asia, and highlight the need for anxiety-sensitive pedagogical approaches.

Key words: foreign language anxiety, engineering students, ESP, technical education

INTRODUCTION

In today's globalized academic and professional environment, English functions as the primary language of science, technology, and engineering, serving as the medium for scholarly publications, international conferences, and cross-border collaboration (Crystal, 2003; Jenkins, 2014). Engineering graduates are increasingly expected not only to master technical knowledge but also to communicate effectively in English, both orally and in writing. This growing emphasis on communicative competence presents challenges for students in technical higher education, where English is often learned as a second language under English for Specific Purposes (ESP) programs.

Despite the centrality of English in technical education, many engineering students encounter persistent communicative difficulties. These difficulties include limited oral participation, hesitation in presentations, and challenges in understanding and producing discipline-specific terminology (Basturkmen, 2010). While traditional ESP instruction often prioritizes technical accuracy and reading comprehension, affective factors—particularly foreign language anxiety—are frequently overlooked, leaving learners insufficiently supported in their communicative development (Young, 1991). Recent research in the Uzbek higher education context further confirms that foreign language anxiety significantly influences students' classroom engagement and communicative confidence in non-linguistic majors. Islomov (2025a) notes that engineering and technical students often experience heightened anxiety due to limited communicative practice and strong academic performance expectations, reinforcing the importance of affective variables in ESP programs.

Foreign language anxiety (FLA) is a well-documented affective variable that refers to the tension and apprehension experienced when learning or using a second language (Horwitz, Horwitz, & Cope, 1986). FLA can negatively affect classroom participation, reduce willingness to communicate, lower self-confidence, and impede academic performance, particularly in oral and interactive tasks (MacIntyre & Gardner, 1991; Al-Hoorie, 2017). In technical higher education contexts, FLA may be further compounded by discipline-specific expectations, such as the need for accurate technical vocabulary and formal presentation skills.

Most FLA research to date has focused on language-major students, with limited attention to learners in technical and engineering disciplines (Al-Hoorie, 2017). Furthermore, there is a noticeable research gap in Central Asia, where cultural, pedagogical, and institutional factors may uniquely shape students' experiences of anxiety. Understanding FLA among engineering students in this region is therefore essential to inform both theory and practice in ESP pedagogy.

Accordingly, this study aims to: (1) identify the level and components of FLA among first-year engineering students at Kokand State University, (2) explore students' perceived sources of anxiety, and (3) derive pedagogical implications for ESP instruction in technical higher education. The findings are expected to make a theoretical contribution by extending FLA research to underrepresented learner populations and to provide practical relevance by informing the design of anxiety-sensitive ESP curricula, classroom practices, and assessment strategies for technical students.

LITERATURE REVIEW

Conceptual Framework of Foreign Language Anxiety

Foreign language anxiety (FLA) has been widely recognized as a multifaceted affective construct that significantly influences language learning outcomes (Horwitz, Horwitz, & Cope, 1986). Horwitz et al.'s framework identifies three interrelated components. Communication apprehension refers to learners' nervousness when speaking in a foreign language, particularly in public or evaluative settings. Fear of negative evaluation describes concerns about being

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judged by peers or instructors, which can lead to avoidance behaviors. Test anxiety reflects the stress associated with language assessments. Together, these dimensions provide a robust conceptual foundation for examining the nature and impact of FLA in specific educational contexts, including technical higher education. Empirical evidence from regional university settings further validates this multidimensional structure. Islomov (2025b) confirms that communication apprehension, fear of negative evaluation, and test anxiety jointly shape learners' emotional responses, with particularly strong effects observed among students in technical and engineering disciplines.

Cognitive and Affective Effects of FLA

High levels of foreign language anxiety (FLA) can negatively influence both cognitive processing and affective engagement in language learning. Anxiety reduces processing efficiency, making it more difficult for learners to comprehend input, retrieve vocabulary, and construct grammatically accurate sentences in real time (MacIntyre & Gardner, 1991). Affective consequences include reduced willingness to communicate, lower participation in classroom interactions, and diminished self-confidence (Al-Hoorie, 2017). Stress-related variables further amplify these cognitive and affective effects. Hasanov (2024) demonstrates that elevated stress disrupts speech intonation and fluency, which can intensify communication apprehension and negatively affect oral performance in foreign language classrooms. Collectively, these interacting factors impair academic performance, particularly in tasks requiring oral production, such as presentations, discussions, or technical report writing (Young, 1991).

FLA in Higher Education

FLA is especially pronounced among first-year university students, who face challenges associated with the transition from secondary education to autonomous, higher-level learning environments (Horwitz et al., 1986; Suleimenova, 2013). Unfamiliar academic expectations, increased exposure to peer evaluation, and greater responsibility for self-directed learning exacerbate anxiety during this critical period. Elevated FLA can hinder participation, reduce confidence, and negatively affect both language development and broader academic integration.

FLA in ESP and Technical Contexts

In English for Specific Purposes (ESP) programs, particularly within engineering education, foreign language anxiety (FLA) manifests in discipline-specific ways. Engineering students often perceive themselves primarily as future professionals rather than language learners, which can increase apprehension in communicative settings (Basturkmen, 2010). The demands of technical vocabulary and specialized discourse further exacerbate anxiety, especially in oral and presentation tasks where accuracy is critical (Suleimenova, 2013). Lexical complexity thus represents a significant anxiety-inducing factor in ESP instruction. Research on professional and business terminology demonstrates that unfamiliar domain-specific vocabulary increases cognitive load and learner stress during oral communication (Odiljonovich, 2022). Moreover, insufficient time allocation for systematic vocabulary training in ESP classrooms has been associated with higher levels of speaking-related anxiety (Ortikov, 2023). As a result, speaking-related anxiety emerges as a dominant concern in technical ESP contexts, shaped by both professional identity expectations and instructional constraints.

Instructional and Contextual Factors

Classroom environment, instructional practices, and technological contexts jointly play a significant role in shaping foreign language anxiety (FLA). Teacher-centered approaches that limit interaction tend to reinforce passive learning and heighten anxiety, whereas learner-centered strategies offer scaffolded, low-stakes opportunities for communication that can reduce learners' apprehension (Young, 1991; Al-Hoorie, 2017). Assessment-related pressure, particularly arising from high-stakes oral evaluations, further amplifies fear of failure and intensifies overall anxiety. Instructional methodology therefore functions as a mediating factor in anxiety development. Ortikov (2024) argues that well-structured grammar instruction based on the Presentation–Practice–Production (PPP) model can mitigate learner uncertainty by providing clear learning

stages, predictable task sequencing, and explicit expectations, thereby contributing to lower anxiety levels in the language classroom.

At the same time, technological and digital learning environments influence how students process and engage with language. Komilov (2024) highlights the crucial role of information technology in shaping the interpretation and use of graphic signs, emphasizing that digital tools transform how meaning is encoded, transmitted, and understood. In technical higher education, where learning increasingly occurs through digital platforms, multimodal resources, and technology-mediated instruction, these shifts may affect students' cognitive processing and expectations. When ESP instruction does not adequately align linguistic demands with students' digitally shaped learning experiences, increased cognitive load and uncertainty may indirectly contribute to heightened foreign language anxiety.

Summary and Conceptual Positioning

Existing research demonstrates that FLA is situational, multidimensional, and context-sensitive, influenced by cognitive, affective, and environmental factors. While the majority of studies focus on language-major students, technical learners—especially first-year engineering students—remain underrepresented, particularly in Central Asia. This study addresses these gaps by investigating FLA in an ESP context for technical students, combining quantitative and qualitative approaches to explore anxiety levels, sources, and pedagogical implications. By situating FLA within discipline-specific learning environments, the study extends existing theory and provides insights relevant to curriculum design, classroom practice, and assessment in technical higher education.

METHODOLOGY

Research Design

This study employed a mixed-methods research design, combining quantitative and qualitative approaches to obtain a comprehensive understanding of foreign language anxiety (FLA) among engineering students (Creswell Plano Clark, 2018). The quantitative component measured overall anxiety levels and subcomponents using a standardized scale, while the qualitative component explored students' lived experiences and perceived sources of anxiety through interviews. This design was selected to ensure triangulation of data and to capture both measurable patterns and contextualized insights (Tashakkori & Teddlie, 2010).

Research Context

The research was conducted at Kokand State University, Uzbekistan, across several engineering departments, including mechanical, electrical, and information technology. Participants were enrolled in English for Specific Purposes (ESP) courses, which focus on technical vocabulary, reading comprehension, and professional communication relevant to engineering disciplines. The ESP curriculum emphasizes oral tasks such as presentations, group discussions, and report writing, providing a suitable context for examining FLA.

Participants

A total of 38 first-year engineering students participated, representing a balanced mix of genders and engineering specializations. All participants had completed secondary education with varying levels of prior English exposure. Participation was voluntary, and all ethical considerations, including informed consent and confidentiality, were strictly observed.

Instruments

Foreign Language Classroom Anxiety Scale (FLCAS): The FLCAS (Horwitz, Horwitz, & Cope, 1986) consists of 33 Likert-scale items measuring communication apprehension, fear of negative evaluation, and test anxiety. The scale has demonstrated strong validity and reliability in diverse contexts.

Semi-structured interviews: Interviews were conducted with a purposive subset of students to explore perceived sources of anxiety, particularly in speaking tasks. Guiding questions focused on classroom experiences, emotional responses, and challenges with technical vocabulary. Interviews were audio-recorded with consent and later transcribed for analysis. Data Collection Procedure

Quantitative data were collected during regular ESP classes over a two-week period. Interviews followed the completion of the FLCAS, allowing selection of participants with varied anxiety levels. Ethical approval was obtained, and participants could withdraw at any stage.

Data Analysis

Quantitative data were analyzed using descriptive statistics to determine mean anxiety levels and distributions across subcomponents. Qualitative data were analyzed thematically (Braun & Clarke, 2006), employing coding procedures to identify recurrent patterns and underlying causes of anxiety. Trustworthiness and Validity

Triangulation was achieved by integrating quantitative and qualitative data. Transparency was maintained in coding and analysis to enhance trustworthiness and interpretive validity of findings.

RESULTS Overall Foreign Language Anxiety Levels The quantitative analysis revealed that first-year engineering students experienced moderate to high levels of foreign language anxiety (FLA). The mean FLCAS score was 103.7 (SD = 13.9) on a 33–165 scale. Based on standard cut-off points, 26% of students exhibited low anxiety, 53% moderate anxiety, and 21% high anxiety, indicating that the majority experienced some degree of anxiety.

Table 1. Distribution of FLA Levels (N = 38)

Anxiety Level	Frequency	Percentage (%)
Low	10	26
Moderate	20	53
High	8	21

FLA Components

Analysis of the FLCAS subscales revealed that communication apprehension was the most prominent component (M = 40.2, SD = 6.1), followed by fear of negative evaluation (M = 35.1, SD = 5.9) and test anxiety (M = 28.4, SD = 5.3). This pattern indicates that students were particularly anxious about speaking in front of peers and instructors.

Table 2. FLA Component Scores (N = 38)

Component	Mean	SD
Communication Apprehension	40.2	6.1
Fear of Negative Evaluation	35.1	5.9
Test Anxiety	28.4	5.3

Speaking-Related Anxiety

Item-level analysis highlighted that spontaneous speaking activities elicited higher anxiety than prepared presentations (M = 4.0 vs 3.3 on a 5-point scale). Many participants reported nervousness when required to respond without prior preparation, reflecting the strong influence of communication apprehension on oral performance.

Group Comparisons

Preliminary analyses revealed no statistically significant gender differences in overall FLA ($t(36) = 0.94$, $p > .05$). Differences across engineering specializations were minimal, though mechanical engineering students exhibited slightly higher communication apprehension compared to IT and electrical engineering students, consistent with previous studies in ESP contexts (Basturkmen, 2010).

Qualitative Findings

Thematic analysis of semi-structured interviews identified four primary sources of anxiety:

Limited prior communicative experience – participants had minimal exposure to English conversation before university.

Fear of peer evaluation – students expressed concern about being judged by classmates for mistakes.

Technical vocabulary challenges – difficulty in using discipline-specific terminology increased stress during presentations.

Instructional practices – teacher-centered approaches and high-stakes oral assessments amplified anxiety.

Integration of Quantitative and Qualitative Data

The quantitative and qualitative results converge in highlighting communication apprehension as the dominant component of FLA. Qualitative

themes contextualize these patterns, explaining why limited experience, classroom structure, and technical demands contribute to elevated anxiety. The integration of both datasets underscores the situational and multidimensional nature of FLA in ESP for engineering students, providing a nuanced understanding of its causes and implications.

DISCUSSION

The present study found that communication apprehension is the most prominent component of foreign language anxiety (FLA) among first-year engineering students at Kokand State University. This dominance reflects students' heightened nervousness when required to speak English spontaneously, particularly in front of peers or instructors. Item-level analysis showed that unprepared, spontaneous speaking tasks elicited the greatest anxiety, whereas structured, prepared presentations were perceived as less stressful. These findings suggest that limited prior communicative experience and fear of immediate evaluation amplify the salience of communication apprehension in this context (Horwitz, Horwitz, & Cope, 1986).

Comparisons with previous research indicate strong alignment with established FLA theory. Horwitz et al. (1986) originally identified communication apprehension as a core dimension of FLA, while MacIntyre and Gardner (1991) highlighted its impact on processing efficiency, willingness to communicate, and overall academic performance. Similarly, studies in ESP and technical education contexts emphasize that discipline-specific vocabulary demands, professional identity formation, and presentation-oriented tasks exacerbate oral communication anxiety (Basturkmen, 2010; Suleimenova, 2013).

Recent regional research further supports these interpretations. Islomov (2025) reports that communication apprehension constitutes the most persistent anxiety component among university students in non-linguistic majors and demonstrates that anxiety-reduction strategies—such as collaborative speaking activities, gradual exposure to oral tasks, and formative feedback—significantly enhance communicative confidence. These findings reinforce the relevance of the present results and offer practical directions for ESP instruction in technical higher education.

Several contextual and educational factors further explain these outcomes. The transition from secondary school to university introduces first-year students to increased autonomy, intensified peer evaluation, and higher expectations for oral participation, all of which contribute to elevated anxiety levels (Young, 1991). In addition, teaching traditions in technical education—often characterized by teacher-centered instruction and high-stakes assessment—limit opportunities for low-pressure communication and collaborative practice, thereby intensifying apprehension during oral tasks.

Changes in communication practices in the digital age further contextualize these findings. Ugli (2024) notes that contemporary digital communication relies heavily on graphic signs, symbols, and abbreviated multimodal forms, which differ substantially from formal academic discourse. For engineering students accustomed to digital communication environments, the transition to formal spoken and written English in ESP classrooms may generate additional pressure and uncertainty. This discrepancy between everyday digital communication practices and academic language expectations can intensify communication apprehension, particularly in oral tasks requiring precision, formality, and immediate linguistic control.

From a theoretical perspective, the findings underscore the situational and multidimensional nature of FLA, particularly in ESP programs for technical students. While general-language learners may experience relatively balanced anxiety across subcomponents, engineering students tend to exhibit an ESP-specific anxiety profile dominated by communication apprehension, closely linked to technical vocabulary demands, professional identity concerns, and communicative norms shaped by digital environments. This profile suggests that effective interventions should prioritize scaffolded oral communication in discipline-specific contexts, systematic vocabulary support, and anxiety-reducing instructional strategies tailored to the technical domain.

In summary, this study contributes to the literature by demonstrating that FLA in technical higher education is shaped by interacting cognitive, affective, contextual, and communicative factors,

with communication apprehension emerging as the central concern. These insights inform both theory and practice, emphasizing the importance of discipline-sensitive and anxiety-aware ESP pedagogy that responds to both academic and digitally mediated communication realities faced by engineering students.

Limitations of the Study

While this study provides valuable insights into foreign language anxiety (FLA) among engineering students, several limitations should be acknowledged. First, the research was conducted at a single institution, Kokand State University, which may limit the generalizability of the findings to other technical higher education contexts, both within Uzbekistan and internationally. Second, the study relied heavily on self-report measures, including the Foreign Language Classroom Anxiety Scale (FLCAS) and semi-structured interviews. Although these instruments provide important subjective perspectives, they are susceptible to response bias, social desirability effects, and potential inaccuracies in participants' self-perception of anxiety (Horwitz, Horwitz, & Cope, 1986). Third, the study utilized a cross-sectional design, capturing data at a single point in time. As a result, it cannot account for changes in FLA levels across different stages of students' academic progression or in response to targeted pedagogical interventions. Future research could address these limitations by adopting longitudinal, multi-institutional designs and incorporating behavioral or observational measures of anxiety.

CONCLUSION

This study explored foreign language anxiety (FLA) among first-year engineering students in technical higher education, focusing on the nature, sources, and instructional implications of anxiety in ESP contexts. Quantitative findings indicated moderate to high overall FLA, with communication apprehension emerging as the dominant component, followed by fear of negative evaluation and test anxiety. Qualitative analysis revealed key contributing factors, including limited prior communicative experience, peer evaluation concerns, challenges with technical vocabulary, and teacher-centered instructional practices. The integration of quantitative and qualitative data highlighted the situational and multidimensional nature of FLA in technical education.

The study contributes to the literature by extending FLA research beyond language-major students to a previously underrepresented group of technical learners in Central Asia, providing empirical evidence of an ESP-specific anxiety profile characterized by heightened speaking-related anxiety. These findings underscore the need for anxiety-sensitive pedagogical practices, including scaffolded communicative activities, gradual vocabulary development, and formative assessment strategies that reduce evaluative pressure.

Future research should adopt longitudinal and multi-institutional designs to examine the evolution of FLA across academic years and in response to targeted interventions. Additionally, incorporating behavioral and observational measures alongside self-report instruments could enhance understanding of students' real-time responses to anxiety-provoking tasks. By addressing these directions, scholars and practitioners can develop more effective ESP curricula and classroom strategies that foster confident, competent communicators in technical higher education.

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