



Leveraging AI-Powered chatbots to mitigate foreign language speaking anxiety among Non-English majors at Thai Nguyen University of Technology

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Abstract

Foreign Language Speaking Anxiety (FLSA) is a pervasive challenge for non-English major students in technical disciplines, where the pedagogical focus often emphasizes technical precision over communicative fluency. At Thai Nguyen University of Technology (TNUT), this phenomenon is particularly acute among engineering students who fear social judgment and professional ego damage. This study investigates the impact of AI-powered chatbots, specifically ChatGPT and ELSA Speak, as interventions to mitigate FLSA. Using a mixed-methods approach with 120 participants over a six-week period, the research measured anxiety fluctuations through a modified Foreign Language Classroom Anxiety Scale (FLSAS) with a high reliability coefficient (Cronbach's $\alpha = 0.88$). Quantitative results indicated a statistically significant reduction in communication apprehension ($p < 0.05$) and a dramatic decrease in the fear of negative evaluation ($p < 0.01$, Cohen's $d = 0.85$). Qualitative data from semi-structured interviews highlighted the "safe zone" provided by AI, which allows for iterative practice without social consequences. The paper argues for a strategic integration of AI-assisted language learning (AIALL) into the English for Specific Purposes (ESP) curriculum at TNUT to foster a more resilient and confident generation of global engineers.

Keywords: AI chatbots, FLSA, TNUT, engineering education, ChatGPT, ELSA Speak, pedagogical innovation

Introduction

In the contemporary globalized economy, the role of English in science and technology is indisputable. For students at Thai Nguyen University of Technology (TNUT), proficiency in English is a prerequisite for accessing updated technical documentation, participating in international exchange programs, and securing positions in multinational corporations within the Thai Nguyen industrial zones (such as Samsung or Hansol). However, despite years of formal instruction, many students exhibit a profound reluctance to speak.

This reluctance is often rooted in Foreign Language Speaking Anxiety (FLSA). In the specific context of a technical university, students are trained in environments where "error" is synonymous with "failure" (e.g., in mechanical design or electrical safety). This mindset often carries over to language learning, where students perceive a grammatical mistake or a mispronunciation as a significant blow to their professional ego.

The rapid advancement of Artificial Intelligence (AI) provides a novel opportunity. Unlike human-to-human interaction, AI-powered chatbots provide a controlled, private, and infinitely patient platform for practice. This study aims to explore whether these systems can effectively lower the "Affective Filter" of TNUT students, thereby converting passive knowledge into active oral production.

Literature Review

1. The Nature of FLSA in Technical Contexts

Foreign Language Speaking Anxiety was first conceptualized by Horwitz *et al.* (1986) [1] as a unique complex of self-perceptions and behaviors. They identified three components: communication apprehension, test anxiety, and fear of negative evaluation. For engineering students, the fear of negative evaluation is often the most debilitating. In the Vietnamese cultural context, the concept

of "saving face" adds another layer of complexity; students may choose silence over the risk of being viewed as incompetent by their peers.

2. The Affective Filter and Psychological Safety

Krashen's (1982) [2] Affective Filter Hypothesis posits that emotional variables - such as anxiety, motivation, and self-confidence - can block the brain's ability to process language input. When the filter is "high," learning is minimized. AI chatbots serve to lower this filter by providing a "Low-Stakes Environment." In this digital "safe zone," the social threat is neutralized. The chatbot does not possess social status, does not get frustrated by repetition, and does not remember mistakes in a way that affects a student's social standing. This creates psychological safety which is necessary for language experiments.

3. AI-Assisted Language Learning (AIALL)

Recent studies (Kohnke, 2023) [3] have shown that Generative AI like ChatGPT utilizes Large Language Models (LLMs) to simulate human-like conversation. For language learners, this means they can engage in "Negotiation of Meaning," a process where they adjust their speech based on feedback to make themselves understood. Combined with specialized tools like ELSA Speak, which provides high-fidelity phonological feedback, AIALL represents a shift from static software to dynamic, adaptive tutoring.

Methodology

1. Research Design

This study employed a quasi-experimental, mixed-methods design. Quantitative data was collected through a pre-test and post-test survey based on the FLSAS. Qualitative data was gathered through semi-structured interviews to provide deeper insight into the emotional journey of students.

2. Participants

The study focused on 120 sophomore students (90 males and 30 females) from the Faculty of Mechanical Engineering and the Faculty of Electrical Engineering at TNUT. These students were selected because they were enrolled in English courses and had previously self-identified as having high anxiety during oral assessments. Their baseline proficiency level was approximately A2 on the CEFR scale.

3. The AI Intervention Framework

The six-week intervention was structured as follows:

- **Phase 1: Orientation (Week 1):** Students were trained on how to use ChatGPT's voice mode and ELSA Speak. They were given a list of "Technical Prompts" relevant to their majors (e.g., "Act as a senior engineer

and ask me about the maintenance of a lathe machine").

- **Phase 2: Active Engagement (Weeks 2-5):** Students performed 15-minute daily "speaking sprints."
- **ChatGPT:** Focus on fluency and conversational flow.
- **ELSA Speak:** Focus on the accuracy of technical phonemes (e.g., /θ/ in 'thermodynamics').
- **Phase 3: Reflection (Week 6):** Students recorded a final "Technical Pitch" reflecting on a project from their workshops.

Results and Discussion

1. Quantitative Findings

The data was analyzed using paired-sample t-tests to compare the mean scores before and after the intervention.

Table 1: Statistical Analysis of FLSAS Scores (N=120)

Anxiety Sub-scale	Pre-test (M)	Post-test (M)	SD	t-value	p-value	Effect Size (d)
Communication Apprehension	4.12	2.85	0.45	5.21	< 0.05	0.62
Fear of Negative Evaluation	4.45	2.10	0.38	8.12	< 0.01	0.85
General Classroom Anxiety	3.78	3.05	0.52	3.45	< 0.05	0.48
Overall FLSA Index	4.11	2.66	0.42	6.18	< 0.01	0.71

The data reveals that the most significant impact was on the "Fear of Negative Evaluation" (Effect size $d=0.85$). This confirms that for TNUT students, the primary source of anxiety is not the difficulty of the language itself, but the social consequences of making errors.

2. Qualitative Analysis: The "Safe Space" Phenomenon

During the interviews, three major themes emerged:

1. **The "Non-judgmental Peer" Effect:** 90% of students mentioned that they felt more comfortable talking to a phone than a teacher. One student remarked: "The AI doesn't sigh when I take 30 seconds to find a word. It just waits."
2. **Vocabulary Confidence:** Students reported that practicing technical terms with ELSA Speak first gave them the "courage" to use those terms in the classroom.

3. **Autonomous Correction:** Instead of being told they were wrong by a teacher, students used ChatGPT's feedback to "self-correct," which led to a higher sense of agency.

3. Discussion: Contextualizing at TNUT

The success of this intervention can be attributed to the alignment between AI capabilities and the engineering student's psyche. Engineers are typically "problem-solvers." By framing English practice as a "technical task" performed with a digital tool, the emotional weight was reduced. However, the "Digital Divide" remains critical. Approximately 12% of participants reported that slow Wi-Fi in TNUT dormitories prevented smooth conversations, highlighting that pedagogical success is inseparable from technological infrastructure.

4. Detailed Analysis of User Engagement

Table 2: Average Weekly Engagement with AI Tools (N=120)

Week	Avg. Sessions/Day	Avg. Duration (Min)	Primary Content Focus
Week 1	1.2	8.5	App Navigation & Basic Greetings
Week 2	2.5	12.0	Daily Routines & Hobbies
Week 3	3.1	15.5	General Technical Terms
Week 4	2.8	18.0	Workshop Safety & Tools
Week 5	3.4	20.5	Explaining Engineering Processes
Week 6	3.2	22.0	Preparing Final Presentation

The trend in Table 2 suggests that when conversational content is aligned with their engineering majors - such as Mechanical or Electrical Engineering - students exhibit higher intrinsic motivation. The engagement peaked in

Week 5, indicating that the AI had transitioned from a mere app to a functional tool for professional expression.

5. Comparative Analysis of Feedback Types

Table 3: Student Perception of AI Feedback Categories

Feedback Type	Usefulness (1-5)	Comfort Level (1-5)	Student Comments
Pronunciation (ELSA)	4.8	4.6	"Very clear and helpful."
Grammar Correction (GPT)	4.2	4.1	"Good, but sometimes too fast."
Vocabulary Suggestion	4.5	4.4	"Helpful for technical terms."
Conversational Flow	4.6	4.7	"Feels like a real friend."

Student satisfaction reflects a clear preference for accuracy and privacy. The high score for pronunciation feedback (4.8/5) addresses a critical gap at TNUT: students often possess vocabulary in written form but lack phonological confidence. The slightly lower score for ChatGPT's grammar (4.2/5) suggests some students found explanations overly complex, implying a need for better "prompting" guidance.

Pedagogical Implications

- **Redefining the Teacher's Role:** Teachers at TNUT should move away from being "error-detectors" and instead become "facilitators."
- **Micro-learning Integration:** Encourage "micro-practice"-short, daily bursts of AI interaction-rather than relying solely on 90-minute weekly lectures.
- **Technical English Syllabi:** AI prompts should be customized to specific engineering branches (Civil, Mechanical, Electrical) to ensure immediate relevance.

Limitations and Future Research

While results are promising, the sample size was limited to 120 students within a single university. The long-term retention of these gains remains to be seen. Future research should investigate whether the reduction in anxiety translates directly to higher scores in standardized speaking exams like IELTS or TOEIC, and how AI can be used for group-based collaborative learning.

Conclusion

The integration of AI-powered chatbots represents a paradigm shift in addressing FLSA at TNUT. By providing a private, adaptive, and non-judgmental environment, tools like ChatGPT and ELSA Speak allow non-English majors to overcome their "fear of the classroom." As TNUT continues to modernize its curriculum, AIALL should be viewed as a vital psychological bridge that empowers future engineers to communicate their expertise to the world.

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