



From guided input to professional output: The GLOBE model as a scaffolded bridge for computer science-oriented ESP courses

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ABSTRACT

This exploratory case study aims to examine a six-week, GLOBE-based English for Specific Purposes (ESP) sequence adapted for Computer Science at a private university in the Province of Buenos Aires, Argentina. Twenty-two third-year students completed an IT (information technology) communication project centered on requirements clarification and a technical solution brief. Using a mixed-methods design, data were gathered through a post-task questionnaire (17 Likert items plus open-ended questions), rubric-rated task products, three focus groups (n=9/7/6), and ESP-teacher implementation notes supported by a Computer Science instructor. Descriptive trends indicate overall positive perceptions of relevance and usefulness, with value placed on feedback and modeling, alongside variability linked to proficiency differences. Performance evidence showed mid-to-upper rubric means across clarity, organization, terminology, and teamwork. Qualitative themes highlighted authenticity, strategy use, and transferability, while also documenting challenges in interactive speaking and requests for additional controlled practice and formulaic language support. Findings extend prior GLOBE work by detailing implementation conditions, ESP-content collaboration, and tiered pedagogical adaptations for technology-oriented ESP contexts.

KEYWORDS

English for specific purposes, computer science education, GLOBE model, genre-based pedagogy, mixed-methods research

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INTRODUCTION

English for Specific Purposes (ESP) in higher education has increasingly been associated with the development of language practices situated in disciplinary and professional contexts rather than with decontextualized language instruction (Belcher, 2006; Dudley-Evans & St John, 1998; Hutchinson & Waters, 1987). From this perspective, ESP courses are expected to support students' participation in domain-specific genres, communicative routines, and interactional demands relevant to their academic and future professional trajectories (Hyland, 2006; Paltridge & Starfield, 2013).

In technology-oriented degree programs, these demands may include clarifying requirements, explaining technical decisions, documenting processes, and presenting solutions to audiences with different levels of expertise. Such communicative practices are

not only linguistic but also disciplinary, since they involve managing specialized terminology, structuring information appropriately, and adapting discourse to context and audience (Bhatia, 2004; Hyland, 2007; Swales, 1990, 2004). Accordingly, recent ESP pedagogy has emphasized instructional designs that align language learning with authentic professional tasks and the communicative practices of specific disciplinary contexts.

Borgnia and Luchini (2025) introduced the GLOBE model as a pedagogical framework for ESP and reported promising results in a prior implementation, while also highlighting the need for further research on how the model can be adapted, implemented, and evaluated in other disciplinary contexts through broader evidence sources and more systematic documentation of outcomes. Responding to this need, the present case study examines a discipline-sensitive adaptation of GLOBE in a Computer Science ESP course at a private university in the Province of Buenos Aires, Argentina, combining qualitative and descriptive quantitative evidence to document implementation, outcomes, and pedagogical conditions relevant to technology-oriented higher education.

RESEARCH QUESTIONS

This case study addresses the following research questions (RQ):

RQ1. How was the GLOBE model implemented in a six-week ESP sequence for third-year Computer Science students at a private university in the Province of Buenos Aires?

RQ2. What linguistic and professional communication outcomes did students demonstrate and perceive through the GLOBE-based IT (information technology) task sequence?

RQ3. What challenges and pedagogical adaptations emerged from this ESP implementation in Computer Science education?

THEORETICAL FRAMEWORK

ESP has been consistently framed as a domain of language education oriented to the communicative demands of specific disciplinary and professional communities (Dudley-Evans & St John, 1998; Hutchinson & Waters, 1987; Hyland, 2006). Rather than treating language as an isolated system, current ESP pedagogy typically emphasizes situated communication, genre awareness, and the relationship between linguistic choices and professional purposes (Bhatia, 2004; Paltridge & Starfield, 2013; Swales, 1990, 2004). Recent work continues to reaffirm that ESP is fundamentally concerned with learners' study- and work-related language needs and with specialized language use (Basturkmen, 2025). In higher education, this orientation is especially relevant in programs linked to technology and engineering, where students are expected to engage in

communicative practices such as explaining procedures, documenting decisions, presenting solutions, and adapting discourse to audiences with different levels of technical expertise. These communicative demands involve challenges such as coordinating complex technological systems, collaborating across disciplinary boundaries, and producing extensive technical documentation. Computer Science and IT professionals must therefore communicate clearly about system architectures, design choices, operational constraints, and project outcomes through genres such as technical reports, specifications, project documentation, and oral presentations.

Within the higher education broader tradition, genre-based pedagogy and Systemic Functional Linguistics (SFL) provide a strong foundation for ESP instruction because they conceptualize language as a meaning-making resource shaped by context, purpose, and audience (Christie & Derewianka, 2008; Halliday & Matthiessen, 2014; Martin & Rose, 2008). This perspective is particularly useful in professionally oriented programs, in which students must learn not only vocabulary and grammar, but also how to organize information, manage register, and construct texts that are recognizable and effective within disciplinary communities (Bhatia, 2004; Hyland, 2007; Paltridge & Starfield, 2013; Swales, 2004). In addition, Moyano's (2021) work on genre description within the SFL tradition is particularly relevant in Spanish-speaking educational contexts, as it systematizes genre analysis and helps support pedagogical applications of genre-based teaching in context-sensitive ways. In the GLOBE framework developed by Borgnia and Luchini (2025), this orientation is operationalized through a staged pedagogical sequence grounded in genre-based pedagogy and SFL, with language development treated as socially situated, scaffolded, and progressively linked to more complex communicative tasks. The authors also stress that structured input, text modeling, and sequenced support are central to helping learners move from comprehension to production in context-sensitive ways (Borgnia & Luchini, 2025; Ellis, 2003; Feez & Joyce, 1998; Moyano, 2021; Willis & Willis, 2007).

Beyond genre and scaffolding, a closely related concern in ESP is the integration of language and disciplinary content, particularly in higher education, where language courses are expected to support participation in disciplinary practices while often being taught by instructors whose primary training is in language pedagogy rather than in the target professional domain (Dudley-Evans & St John, 1998; Paltridge & Starfield, 2013). In this context, effective ESP implementation depends not only on linguistic expertise, but also on the extent to which language instruction is meaningfully associated with disciplinary knowledge, genres, and communicative routines (Bhatia, 2004; Hyland, 2006, 2007). Recent scholarship has increasingly emphasized collaboration between language and content specialists as a key mechanism for strengthening that alignment, especially in tertiary settings where disciplinary communication demands are complex and context-specific (Costa & Mastellotto, 2022; Supunya, 2023). In particular, Yu et al. (2025) argue that the quality of ESP provision is closely tied to how language and content knowledge are integrated in actual teaching practice, and their study shows how sustained collaboration and team teaching can support the development of such integration over time. This perspective is directly relevant

to the present case study, which was implemented in Computer Science education through collaboration between an ESP teacher and a disciplinary teacher.

This emphasis on disciplinary orientation and collaborative design also connects with a growing body of ESP research in engineering- and technology-related contexts that advocates pedagogies grounded in authentic, problem-based activity. Current ESP research in engineering- and technology-related contexts suggests that pedagogies linking communication development to authentic, problem-oriented activity may support students' disciplinary communication and engagement, particularly when tasks are associated with field-specific purposes (Bobkina & Domínguez Romero, 2025; Zulfa et al., 2025). For example, recent work in an ESP engineering context has shown the value of challenge-based approaches for fostering communication skills, soft skills, and students' perceptions of relevance, while also situating communication training within broader disciplinary learning (Bobkina & Domínguez Romero, 2025). Although the pedagogical model used in that study differs from GLOBE, the underlying rationale is closely aligned with the present project: communication learning becomes more meaningful when it is embedded in discipline-related tasks and when students are required to produce language for real or simulated professional purposes. Comparable findings have been reported in ESP work with IT students, in which project-based tasks have been linked to improvements in professional English communication and positive perceptions of task relevance and engagement (Zulfa et al., 2025). More broadly, research on engineering students' perceptions of ESP has continued to highlight the importance of combining language instruction with real-life academic and professional communication demands in internationalized higher education contexts (Arnó-Macià et al., 2020). This strand of research supports the use of discipline-linked, task-oriented ESP pedagogy in technology-related programs and provides a relevant basis for adapting GLOBE to Computer Science Education through IT communication practices rather than decontextualized language exercises.

At the same time, the literature also indicates that the pedagogical value of such innovations depends heavily on how they are scaffolded, documented, and evaluated in context. Innovation in ESP pedagogy should therefore be accompanied by careful scaffolding and clear methodological design (Basturkmen, 2025; Borgnia & Luchini, 2025). Reviews of ESP teaching in higher education continue to report positive outcomes for approaches that promote student participation, autonomy, and authentic communication, but they also emphasize variability in findings and the need to account for contextual constraints, including learners' proficiency profiles, disciplinary expectations, and institutional conditions (e.g., Nurlaily et al., 2026; Vaghela & Kaushal, 2025). Recent systematic reviews further note that ESP implementation and evaluation often vary considerably across contexts, which makes it difficult to draw uniform pedagogical conclusions without detailed classroom-level documentation and context-sensitive analysis (Nurlaily et al., 2026; Yan, 2025). This is particularly relevant here, as it frames GLOBE not as a fixed formula but as a pedagogical framework that requires contextual adaptation, explicit support mechanisms, and careful documentation of procedures and outcomes (Borgnia & Luchini, 2025).

The GLOBE model is particularly useful in this regard because it was originally conceived as a staged pedagogical framework, rather than as a single task or an isolated classroom intervention. In Borgnia and Luchini (2025), the model is presented as a five-stage sequence—comprehensible input, problem-solving, feedback and reflection, revision and refinement, and project-based production—designed to scaffold progressively more complex language use while incorporating intercultural and socially meaningful dimensions of communication. The model is also informed by genre-based pedagogy, SFL, and task-based learning principles, and it foregrounds metalinguistic awareness, feedback, and reflection as key mechanisms for supporting learners' movement from guided input to context-sensitive production (Borgnia & Luchini, 2025; Ellis, 2003; Halliday & Matthiessen, 2014; Martin & Rose, 2008; Willis & Willis, 2007). Importantly, the previous GLOBE study reported both pedagogical promise and areas requiring further development; specifically, Borgnia and Luchini (2025) noted the need for stronger scaffolding, more systematic feedback procedures, and broader sources of evidence to assess outcomes more comprehensively. These observations are especially pertinent here, as they provide both a conceptual point of departure and a methodological rationale for adopting a mixed-methods case study design in a new disciplinary setting.

An important consideration in adapting GLOBE to ESP contexts is that disciplinary classrooms may include learners with uneven levels of English proficiency. In such cases, the staged logic of the model can be complemented by tiered scaffolding, understood here as the planned adjustment of linguistic, cognitive, and interactional support while maintaining common disciplinary task goals. This does not require lowering the professional authenticity of the task; rather, it involves differentiating the degree of support learners receive as they move from guided input to problem-solving, feedback, revision, and production. In multilevel ESP settings, tiered scaffolding may include micro-scaffolding strategies such as formulaic language banks for clarification, confirmation, paraphrasing, summarizing, and professional politeness; short pre-task grammar primers targeting recurrent language needs such as tense consistency, question formation, and modality; guided templates for organizing problem–requirements–solution communication; controlled question–answer rehearsal before simulations; and differentiated revision checklists. For learners with greater linguistic control, scaffolding may be gradually reduced and redirected toward audience adaptation, technical precision, register, and professional tone. In this way, GLOBE can preserve its commitment to authentic disciplinary communication while offering flexible support for learners who require additional linguistic mediation.

Overall, this body of work supports the theoretical positioning of the present case study in three complementary ways. First, it reinforces the relevance of ESP as a site for developing disciplinary and professional communication in higher education (Basturkmen, 2025; Hyland, 2006; Paltridge & Starfield, 2013). Second, it supports the pedagogical value of genre-informed, task-oriented, and collaboratively designed instruction in technology-related programs (Bhatia, 2004; Bobkina & Domínguez Romero, 2025; Hyland, 2007; Yu et al., 2025). Third, it justifies the adaptation of GLOBE as a flexible framework that can be recontextualized for Computer Science Education, provided that its implementation is

documented with sufficient methodological rigor and attention to context (Borgnia & Luchini, 2025; Yan, 2025). Accordingly, the present case study extends prior GLOBE research by examining how a staged ESP pedagogy can be implemented in a new field through discipline-sensitive task design and triangulated evidence, while also documenting the pedagogical adaptations required in this context.

METHODOLOGY

1. Study design

This exploratory study adopted a mixed-methods case study design to examine the implementation of a GLOBE-based ESP sequence in a bounded higher education context. The case study approach was appropriate because it focused on a specific instructional intervention within a defined institutional and disciplinary setting. The mixed-methods design combined qualitative and descriptive quantitative evidence, allowing triangulation across data sources and a more robust interpretation of outcomes (Creswell & Plano Clark, 2018; Yin, 2018).

2. Context

This exploratory case study was conducted at a private university in the Province of Buenos Aires, Argentina (institution anonymized for reporting purposes), in an ESP course linked to undergraduate Computer Science programs. The ESP component is offered in the second year as a one-semester course. Students may either take the course if they do not meet the required English level or sit for a proficiency accreditation exam. The sample included students who chose the course rather than the exam. Although the course belongs to the second year, the intervention was implemented with third-year students, as they had already completed substantial disciplinary coursework and could draw on prior knowledge when engaging in English-mediated Computing and Computer Science communication tasks. The six-week intervention consisted of a discipline-sensitive adaptation of GLOBE, redesigned around IT-related professional communication, including interpreting technical prompts, clarifying requirements, discussing design decisions, and producing a technical solution brief, while retaining GLOBE's staged pedagogical logic (Borgnia & Luchini, 2025).

3. Participants

Participants were 22 students enrolled in the ESP course and included in the study dataset. The group showed a heterogeneous English proficiency profile, ranging from A1+ to B1 on the CEFR. This variation was pedagogically significant because it required a strongly scaffolded instructional sequence to support students with different levels of linguistic control in shared discipline-related tasks. This proficiency range made tiered scaffolding pedagogically relevant, as the same discipline-oriented task sequence needed to remain

accessible to lower-proficiency learners while still challenging students with greater linguistic control. All participants signed informed consent forms authorizing the use of their coursework and responses for research and dissemination. The collaborating instructors also consented to the use of implementation-related information. To preserve confidentiality, identifying information was removed and students were referred to through anonymized codes.

4. Data collection instruments

Data were collected through multiple instruments and evidence sources to support triangulation and provide a broader basis for interpreting the implementation. The evidentiary base combined student-reported perceptions, performance evidence, and teacher documentation to capture both outcome- and process-oriented dimensions of the intervention. First, students completed a post-task questionnaire on perceived gains in professional English communication, task relevance, confidence, and usefulness of scaffolding (Appendix A). It included 17 Likert-scale items and four open-ended questions.

Second, open-ended responses were analyzed for recurrent themes related to gains, challenges, suggestions, and communication strategies. Third, students' final performances/products were assessed through an analytic rubric developed for the task sequence (Appendix B), covering clarity of technical explanation, organization, terminology/register, interactional effectiveness, and linguistic control. Fourth, student reflections were gathered through three focus groups conducted outside class hours with the full cohort ($N = 22$; $FG1 = 9$, $FG2 = 7$, $FG3 = 6$) to elicit more detailed reflections on the task sequence, challenges, and disciplinary relevance (Appendix C). Finally, teacher implementation notes were produced throughout the six-week sequence to document decisions, difficulties, pedagogical adaptations, and ESP-Computer Science alignment, while the Computer Science instructor supervised the technical accuracy, plausibility, and disciplinary relevance of the project tasks (Appendix D). Students' task artifacts/final products constituted the primary performance evidence and supported both rubric-based assessment and qualitative interpretation (Appendix E). Table 1 summarizes the instruments, timing, and analytical contribution.

Table 1. Data collection instruments and their role in the study

<i>Instrument / Evidence Source</i>	<i>Purpose</i>	<i>Data Type</i>	<i>Timing</i>	<i>Main Focus / Contribution</i>
Post-task questionnaire	To collect students' perceptions of the ESP sequence, including perceived gains, task relevance, confidence, and usefulness of scaffolding	Mixed (Likert-scale items + open-ended responses)	End of the 6-week sequence	Student-reported evidence on perceived linguistic/professional communication development and overall evaluation of the intervention

<i>Instrument / Evidence Source</i>	<i>Purpose</i>	<i>Data Type</i>	<i>Timing</i>	<i>Main Focus / Contribution</i>
Analytic rubric (task performance assessment)	To assess students' final ESP performance/products in relation to the communicative demands of the Computer Science-oriented task	Quantitative (criterion-based scores)	Applied to final project-based output	Structured performance evidence on clarity of technical explanation, organization, terminology/register, interactional effectiveness (if applicable), and linguistic control
Teacher implementation notes	To document instructional decisions, observed challenges, scaffolding strategies, and adaptations during implementation	Qualitative (field notes / implementation records)	Throughout the 6-week sequence	Process-oriented evidence for interpreting how the intervention was enacted in context
Student focus group (3 groups; full cohort, N = 22)	To elicit in-depth reflections on the learning experience, perceived challenges, and disciplinary relevance of tasks	Qualitative (focus group transcript/notes)	After completion of the intervention	Explanatory evidence on student experience, perceived relevance, and views on task design and support
Task artifacts / final products	To examine students' written and/or oral outputs as evidence of applied ESP performance in a discipline-related task	Qualitative and quantitative (through rubric-based scoring and textual/performance interpretation)	Final phase of the sequence	Primary performance evidence; supports both assessment and qualitative interpretation

Note. Authors' own work

5. Instrument review and alignment

To strengthen methodological rigor, the instruments were reviewed before implementation. The post-task questionnaire and rubric were examined by the research team and discussed with the collaborating instructors to ensure content relevance and alignment with the objectives of the ESP sequence and the disciplinary context. In particular, the Computer Science instructor contributed to the disciplinary validity of task prompts and rubric descriptors, while the ESP teacher contributed to the clarity, feasibility, and pedagogical appropriateness of the language-related criteria. The questionnaire was also checked for wording clarity and item relevance prior to administration. Although the case study was

exploratory and based on a relatively small sample, these procedures were used to improve instrument quality and contextual appropriateness.

6. ESP–computer science collaboration protocol

To make the interdisciplinary design process explicit, the ESP teacher and the Computer Science instructor followed a shared expertise protocol during task and instrument development. The ESP teacher was responsible for aligning the sequence with language-learning objectives, genre-based scaffolding, formulaic language support, feedback procedures, and rubric criteria related to clarity, register, interactional effectiveness, and linguistic control. The Computer Science instructor contributed disciplinary expertise by reviewing the plausibility of the client scenario, the relevance of the technical requirements, the appropriacy of IT terminology, and the professional validity of the technical solution brief.

This collaboration directly influenced both the task design and the assessment instruments. The client requirements meeting was shaped as a simulated professional interaction in which students had to clarify needs, identify constraints, confirm understanding, and define the scope of a possible solution. The technical solution brief was designed as a concise professional genre requiring students to explain the problem, summarize requirements, propose a solution, and justify its relevance to the client’s needs. Similarly, the rubric descriptors were revised to assess not only linguistic accuracy, but also technical explanation, problem–solution organization, terminology accuracy, audience orientation, professional tone, and interactional effectiveness. Table 2 summarizes the distribution of expertise and its contribution to the instructional design and research instruments.

Table 2. Shared Expertise Map for ESP–Computer Science Collaboration

<i>Area of design</i>	<i>ESP teacher contribution</i>	<i>Computer Science instructor contribution</i>	<i>Influence on task/rubric design</i>
Scenario design	Ensured linguistic accessibility and staged task progression	Checked technical plausibility and relevance to IT communication	Scenario framed around client requirements, constraints, and solution design
Model texts and input	Selected language functions, discourse organization, and formulaic expressions	Reviewed technical terminology and disciplinary fit	Input materials combined ESP language support with IT-specific content
Rubric descriptors	Developed criteria for clarity, register, interaction, and linguistic control	Validated criteria related to technical explanation, terminology, and solution logic	Rubric assessed both language performance and disciplinary communication

<i>Area of design</i>	<i>ESP teacher contribution</i>	<i>Computer Science instructor contribution</i>	<i>Influence on task/rubric design</i>
Feedback procedures	Designed feedback cycles focused on language, genre, and professional tone	Suggested attention to technical accuracy and content-specific clarification	Feedback addressed both communicative effectiveness and technical appropriacy
Final output	Supported organization of the written/oral brief as an ESP genre	Confirmed relevance of the brief format for simulated IT communication	Final task reflected a recognizable professional communication genre

Note. Authors' own work

7. Procedure

The procedure followed the six-week instructional design and preserved the staged pedagogical logic of the GLOBE framework. In the initial phase, students worked with guided input and model materials related to Computer Science communication tasks, focusing on genre features, audience awareness, and technical explanation in English. In the second phase, they engaged in structured problem-solving activities involving scenario interpretation, identification of communication needs, and discussion of possible solutions. In the third phase, students received teacher and peer feedback and completed guided reflection activities on communication choices, clarity, and task effectiveness. In the fourth phase, they revised and refined their work. In the final phase, they completed the project-based output, which constituted the main performance evidence. In line with the tiered scaffolding principle described above, support was adjusted across the sequence through sentence starters, formulaic language banks, guided templates, controlled Q&A rehearsal, targeted grammar primers, and differentiated revision prompts. These supports were intensified during the input, problem-solving, and rehearsal stages and gradually reduced during revision and project-based production when students were expected to assume greater communicative responsibility. The post-task questionnaire was administered at the end of the sequence, and three focus groups were conducted after task completion to include the full cohort (N = 22) in groups of approximately 6–8 students. Table 3 summarizes the instructional procedure, weekly focus, outputs, and evidence collection points.

Table 3. Instructional procedure and evidence sources across the six-week GLOBE-based ESP sequence

<i>Week</i>	<i>GLOBE stage focus</i>	<i>Instructional focus (what students did)</i>	<i>Main outputs / products</i>	<i>Evidence collected (for analysis)</i>
1	Comprehensible input	Introduction to the Computer Science/IT scenario; guided work with model texts/examples; key language functions for technical communication (clarifying, defining scope, summarizing)	Guided practice notes; short controlled tasks	Teacher implementation notes
2	Comprehensible input → problem-solving	Work with simplified specs/prompts; genre and audience focus (technical vs non-technical); vocabulary building in context	Draft requirement questions; mini written explanations	Teacher implementation notes; task artifacts (drafts)
3	Problem-solving	Structured problem-solving tasks in teams: interpreting scenario, identifying needs, proposing options; rehearsal of interactional moves	Team planning sheet; rehearsal scripts/notes	Teacher implementation notes; task artifacts
4	Problem-solving (core task)	Client Requirements Meeting simulation (role-based); clarification and negotiation of requirements	Meeting performance (oral interaction) + requirement summary	Teacher implementation notes; task artifacts (<i>optional: recording/transcript if available</i>)
5	Feedback & reflection → revision	Feedback cycles (teacher + peer); guided reflection on clarity, terminology, audience adaptation; revision of solution plan	Revised plan; first draft of technical solution brief	Teacher implementation notes; task artifacts (drafts)
6	Project-based production	Finalization and delivery of Technical Solution Brief (written + oral, depending on format); closing reflection	Final brief (and oral explanation, if applicable)	Rubric scores; post-task questionnaire; teacher implementation notes; three student focus groups

Note. Authors' own work

8. Data analysis

Data analysis combined descriptive quantitative and qualitative thematic procedures (Braun & Clarke, 2006). Quantitative data from the questionnaire and rubric scores were analyzed descriptively through frequencies, percentages, means, and dispersion indicators to characterize student perceptions and performance patterns in this bounded sample.

Given the exploratory nature of the case study and the cohort size, the quantitative component was not intended for inferential generalization, but for documenting tendencies to be interpreted alongside qualitative evidence. Qualitative data from open-ended questionnaire responses, the three student focus groups, and teacher implementation notes were analyzed thematically through recursive coding, with categories developed both deductively and inductively. The analysis focused on three broad areas: perceived linguistic and professional communication development, challenges and supports during task implementation, and pedagogical adaptations for future applications. To enhance trustworthiness, the study relied on triangulation across student perceptions, performance evidence, and teacher documentation to identify context-sensitive conditions for adapting GLOBE to a new disciplinary field.

9. Ethical Considerations

Ethical procedures were followed throughout the case study. Participation was voluntary, and informed consent was obtained from both students and collaborating instructors. Data were anonymized prior to analysis, and all reporting was conducted using non-identifiable participant codes and an anonymized institutional description.

RESULTS

1. Post-task questionnaire results

Likert-scale results (Q01-Q17)

Quantitative questionnaire findings are reported descriptively, consistent with the exploratory case study design. Table 4 summarizes overall questionnaire descriptives across the 17 Likert-scale items (Q01–Q17). The overall mean was $M = 3.90$ with relatively limited dispersion ($SD = 0.33$), with individual mean scores ranging from 3.06 to 4.53.

Table 4. Overall questionnaire descriptives (Q01–Q17)

<i>N</i>	<i>Overall Mean (Mean_All)</i>	<i>SD (Mean_All)</i>	<i>Min Mean_All</i>	<i>Max Mean_All</i>
22	3.90	0.33	3.06	4.53

Note. Authors' own work

To visually summarize item-level response patterns, Figure 1 displays the mean score for each questionnaire item (Q01–Q17) with standard deviation bars, providing a concise overview of central tendencies and variability across items.

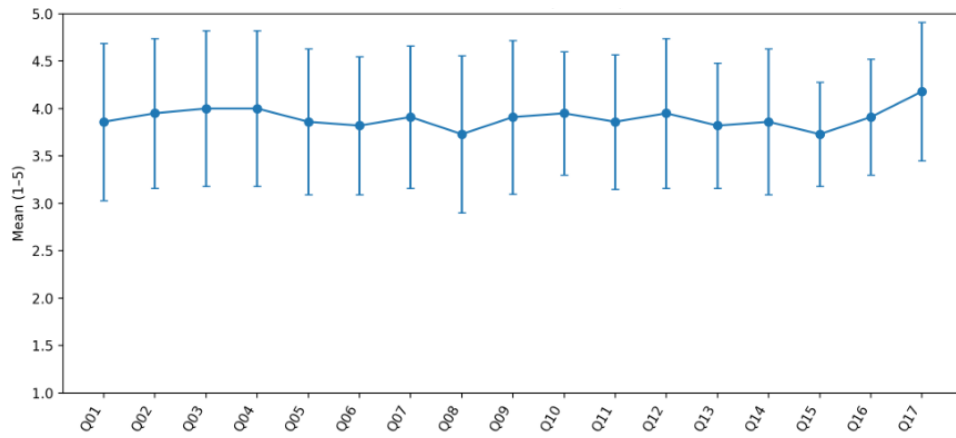


Figure 1. Item-level means (with SD)

Table 5 presents the mean scores by subscale. Across subscales, mean values were generally above the scale midpoint, with Linguistic ($M = 3.95$, $SD = 0.59$) and Relevance ($M = 3.91$, $SD = 0.52$) showing slightly higher central tendencies than Professional ($M = 3.83$, $SD = 0.53$) and Scaffolding ($M = 3.84$, $SD = 0.49$). The Difficulty subscale (Q16–Q17) showed a mean of $M = 4.05$ ($SD = 0.49$); as this subscale reflects perceived difficulty/need for support, higher values indicate greater perceived challenge.

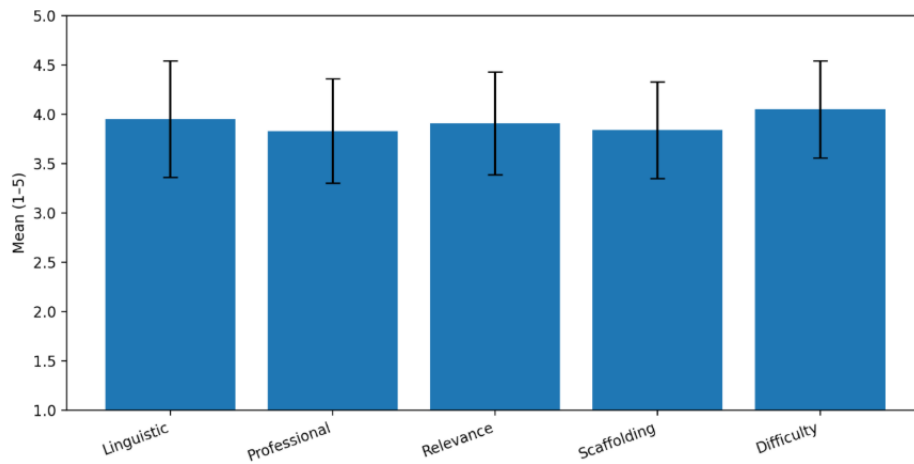
Table 5. Subscale descriptives (means across items)

Subscale	Items	Mean (<i>M</i>)	SD
Linguistic	Q01–Q04	3.95	0.59
Professional	Q05–Q08	3.83	0.53
Relevance	Q09–Q11	3.91	0.52
Scaffolding	Q12–Q15	3.84	0.49
Difficulty*	Q16–Q17	4.05	0.49

*Higher scores on Difficulty indicate greater perceived difficulty/need for support.

Note. Authors' own work

To complement the subscale descriptives reported in Table 5, Figure 2 presents subscale mean scores with standard deviation bars, offering a clear visual comparison of patterns across the five questionnaire subscales.



Figure

2. Questionnaire subscale means (with SD)

Item-level descriptives are reported in Table 6. Mean item values ranged from 3.73 (Q08 and Q15) to 4.18 (Q17). Standard deviations at the item level were generally moderate (approximately 0.55–0.83), indicating that responses tended to cluster around central values with some variability across specific items.

Table 6. Item-level descriptives (Q01–Q17)

Item	Mean (M)	SD
Q01	3.86	0.83
Q02	3.95	0.79
Q03	4.00	0.82
Q04	4.00	0.82
Q05	3.86	0.77
Q06	3.82	0.73
Q07	3.91	0.75
Q08	3.73	0.83
Q09	3.91	0.81
Q10	3.95	0.65
Q11	3.86	0.71
Q12	3.95	0.79
Q13	3.82	0.66
Q14	3.86	0.77
Q15	3.73	0.55

<i>Item</i>	<i>Mean (M)</i>	<i>SD</i>
Q16	3.91	0.61
Q17	4.18	0.73

Note. Authors' own work

The questionnaire results indicate generally stable response patterns across the 17 items, with mean values clustered above the scale midpoint and limited dispersion at both the overall and subscale levels. Item-level descriptives (Table 6) further detail the distribution of mean responses and variability across specific questionnaire statements.

Open-ended responses (Q18–Q21)

Open-ended responses (Q18–Q21) were analyzed thematically to identify recurrent patterns regarding perceived learning gains, task relevance, perceived challenges, suggestions for improvement, and reported communication strategies (Braun & Clarke, 2006). To preserve confidentiality, participants are referenced using anonymized IDs (S01–S22).

Theme 1: Perceived usefulness for Computer Science/IT communication and technical explanation.

Most respondents (n = 16) explicitly highlighted the usefulness of the sequence for communicating about IT topics, particularly in relation to explaining ideas more clearly and engaging in discipline-relevant communication. A smaller number of students reported weaker endorsement (n = 3), while two students expressed disagreement or limited perceived benefit (n = 2). These patterns are consistent with the generally high central tendencies observed in the questionnaire subscales related to linguistic and professional communication (Table 5), while also indicating that perceived gains were not uniformly distributed across the cohort.

Theme 2: Task authenticity and perceived alignment with the disciplinary field.

A large majority of students (n = 20) stated that the sequence and tasks were aligned with communication practices they associate with IT contexts. At the same time, a minority (n = 3) voiced partial doubts about authenticity or fit and suggested that this aspect could be strengthened in future iterations. This theme aligns with the relatively high Relevance subscale mean (Table 5), while also pointing to specific areas for refinement.

Theme 3: Feedback and scaffolding as key supports, alongside requests for additional language support.

Most students (n = 17) described feedback as particularly useful and productive for improving their performance. In addition, lower-proficiency students emphasized the need for stronger linguistic support to progress more confidently, specifically mentioning grammar (e.g., tense use), vocabulary development, and greater access to formulaic language/

ready-made structures. These students reported that such supports would facilitate fluency and reduce the communicative burden during task performance. This pattern is congruent with the Scaffolding and Difficulty subscale results reported in Table 5.

Theme 4: Need for additional controlled practice prior to complex communicative tasks.

Students—especially those with lower English proficiency—highlighted the value of increasing controlled practice opportunities (e.g., guided drills, structured question–answer rehearsal, and staged practice) before moving into more open-ended communicative tasks. Importantly, this was not limited to lower-level participants: three more advanced students also acknowledged the challenge posed by the most complex tasks. Overall, this theme complements the descriptive finding that perceived difficulty remained salient (Difficulty subscale; Table 5) and provides concrete suggestions for sequencing adjustments.

Theme 5 (merged): Reported communication strategies and perceived transferability to future professional contexts.

At least eight students reported learning and using communication strategies that they believed helped them complete the tasks successfully and could be transferable to future client interactions if English is required. These strategies included clarification requests, confirmation checks, paraphrasing, and other interactional moves used to manage break-downs and maintain communication. This theme provides qualitative evidence of strategy awareness and perceived applicability beyond the classroom.

These open-ended themes broadly align with the quantitative patterns in Q01–Q17, while they also highlight a small set of challenges and improvement needs that complement the descriptive trends.

2. Rubric-based task performance results

Rubric-based performance was analyzed descriptively to document students' task outcomes in the Computer Science ESP sequence. Table 7 reports criterion-level means and standard deviations (C1–C7), and Figure 3 provides a visual summary of these patterns across rubric dimensions.

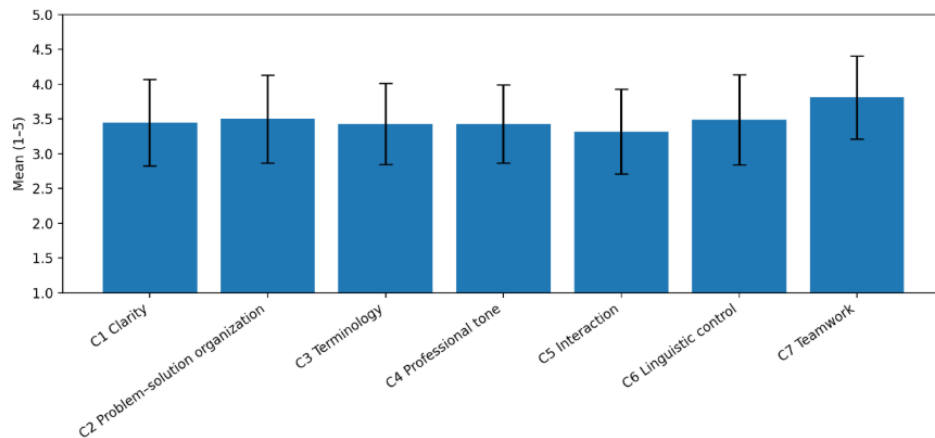
Table 7. Rubric criterion descriptives (C1–C7)

<i>Criterion</i>	<i>Mean (M)</i>	<i>SD</i>
C1 Clarity	3.45	0.62
C2 Problem–solution organization	3.50	0.63
C3 Terminology	3.43	0.58
C4 Professional tone	3.43	0.56
C5 Interaction	3.32	0.61

C6 Linguistic control	3.49	0.65
C7 Teamwork	3.81	0.60

Note. Authors' own work

To complement Table 7, Figure 3 displays criterion-level mean scores with standard deviation bars, offering a visual comparison of patterns across rubric dimensions.



Figure

3. Rubric criterion means (with SD)

Brief overall descriptives were also calculated by averaging criterion scores per student. Across the cohort ($N = 22$), the overall rubric mean was $M = 3.49$ ($SD = 0.47$), with individual student means ranging from 2.29 to 4.14. Overall, criterion means clustered around the mid-to-upper range of the scale, with moderate variability across both criteria and students.

3. Student Focus Group Results

Three focus groups were conducted in English with the full cohort ($N = 22$) and organized by group size (FG1: $n = 9$; FG2: $n = 7$; FG3: $n = 6$). The discussions were analyzed thematically (Braun & Clarke, 2006). To preserve confidentiality and comply with research ethics, participants are referenced using anonymized IDs (S01–S22).

Theme 1: Perceived usefulness for IT communication and technical explanation.

Participants frequently reported that the sequence helped them communicate more effectively about IT topics, particularly by improving clarity and supporting the organization of ideas into sentences. As S07 noted, the intervention supported a shift from isolated lexical production toward more structured expression: “*Before I did this activity I could only pronounce some words, now I also can organize some ideas in sentences*” (S07, FG1). Similarly, S18

emphasized the applied value of the tasks in relation to workplace-like communication: “*we could practice as in a real work: ask the clients, confirm, and then give a possible solution*” (S18, FG3). At the same time, a minority described limited perceived benefit due to low proficiency. For example, S03 stated: “*my English is very poor... so for me I can see a bit benefit*” (S03, FG2), and S11 similarly noted that the sequence helped “*some parts*” while highlighting the need for more basic practice to complete tasks “*with more easy*” (S11, FG1).

Theme 2: Task authenticity and disciplinary alignment.

A dominant theme across groups was the perceived authenticity of the scenario-based tasks and their fit with IT communication demands. Students emphasized that the tasks went beyond decontextualized language work and required interactional moves characteristic of professional settings. S15 explicitly contrasted this with grammar-only approaches: “*We need to ask questions, not only study grammar*” (S15, FG2). S20 also pointed to genre relevance, describing the brief as comparable to workplace documentation: “*It’s not totally perfect, but it’s close to what professionals do... in Computer Science*” (S20, FG3). However, a minority expressed reservations and suggested refinements. S04 commented that the scenario felt less realistic because the company context was underspecified, proposing that “*more details... can help*” (S04, FG1). Similarly, S09 agreed that the tasks were aligned but recommended greater disciplinary specificity through “*more technical data or problems*” (S09, FG2).

Theme 3: Feedback, scaffolding, and requests for stronger language support.

Participants repeatedly identified feedback and scaffolding as enabling supports during the sequence. S12 described feedback as particularly impactful: “*The feedback was the best part. After teacher comment, I can fix the message and be more professional*” (S12, FG1). S08 highlighted the usefulness of models as scaffolding tools, noting that analyzing examples provided a transferable structure: “*When I analyze an example, I can copy the format and then I change to use my information and it works*” (S08, FG2). At the same time, lower-proficiency learners foregrounded the need for additional language support. S01 emphasized the value of formulaic expressions for maintaining fluency in interaction: “*I need more phrases ready... because if not I stop and think, and then I get lost*” (S01, FG1). S05 similarly requested explicit practice with grammar and lexis: “*I need practice of tenses and vocabulary. When I speak, I think too much and I’m slow*” (S05, FG3).

Theme 4: Challenges in interactive speaking and the need for more controlled practice.

Interactive speaking moments were described as particularly demanding, especially for lower-level learners, who called for additional controlled practice prior to more open-ended communicative tasks. S02 noted anxiety during the meeting simulation and requested structured rehearsal: “*I need more practice with question making and answers before I have the real meeting*” (S02, FG2). S06 similarly recommended staged practice through shorter dialogues to ease learners into the larger task: “*Maybe we can do more short dialogues first... Then the big task will be easier*” (S06, FG3). Importantly, challenge was not limited to lower proficiency participants. More advanced students also recognized the cognitive demands of integra-

ting technical content with language control. S16 stated that the task was “*very demanding*” because it required technical vocabulary and grammar “*at same time*” (S16, FG1), while S19 noted that beyond language, the task required rapid decision-making about what to include and explain “*in the moment*” (S19, FG2).

Theme 5: Communication strategies and perceived transferability.

Participants reported using communication strategies to manage breakdowns and maintain interaction, and several framed these strategies as transferable to future professional communication. For example, S14 described paraphrasing as a practical strategy: “*When I don’t know a word, I paraphrase the idea... and the team can understand me*” (S14, FG3). S21 highlighted confirmation checks as useful interactional tools: “*I use phrases to confirm information: ‘So, you mean...?’ This is useful for future with clients*” (S21, FG1). Alongside these positive perceptions, one participant explicitly questioned the pacing of the sequence for lower-level learners: “*for low level it’s too fast, difficult... If we go slow with steps and have more guided practice, it is better*” (S10, FG2).

All focus-group themes documented broadly positive perceptions of task relevance, scaffolding, and perceived communication gains, while also recording specific challenges and improvement needs raised by lower-proficiency learners and a minority of participants.

4. Teacher implementation notes

Teacher implementation notes were analyzed descriptively to document process evidence across the six-week sequence, including observed strengths, recurrent challenges, and the scaffolding decisions introduced to support heterogeneous proficiency levels (A1+–B1). Table 8 summarizes the main observations and instructional adjustments recorded week by week.

Table 8. Weekly teacher implementation notes (summary of observations and adaptations across the six-week sequence)

<i>Week</i>	<i>Stage focus</i>	<i>Key observation (process evidence)</i>	<i>Scaffolding / adaptation introduced</i>
1	Comprehensible input	Students engaged with the scenario and model examples; lower-level learners struggled with functional language for clarification	Added sentence starters + mini-glossary of high-frequency IT terms
2	Input → guided problem-solving	Emerging audience awareness; some groups over-focused on vocabulary;	Introduced a problem–requirements–solution template + assigned group roles

<i>Week</i>	<i>Stage focus</i>	<i>Key observation (process evidence)</i>	<i>Scaffolding / adaptation introduced</i>
		uneven participation in mixed-proficiency teams	
3	Problem-solving (planning + rehearsal)	Increased use of confirmation checks; speaking spontaneity remained challenging; reliance on notes observed	Added controlled Q&A rehearsal (short dialogues) + extra practice cycles
4	Core task (requirements meeting)	Teams generally followed the meeting sequence; breakdowns during follow-up questions/reformulation; time pressure noted	Allowed brief “time-outs” + reinforced key clarification phrases during task
5	Feedback/reflection → revision	Strong feedback uptake; improved organization and tone; recurring tense consistency and lexical precision issues	Provided targeted micro-feedback + added short practice for tense + formulaic phrases
6	Project-based production	Final products showed clearer structure/terminology; some discomfort with oral components; requests for more revision time	Offered optional extra rehearsal + final submission checklist (content/language/audience)

Note. Authors’ own work

Across weeks, the notes indicate a pattern of progressive support: initial modeling and controlled resources were followed by structured problem-solving and rehearsal, with feedback and revision cycles used to consolidate performance. At the same time, recurrent process challenges were documented, particularly during interactive speaking moments and in relation to language accuracy demands (e.g., tense consistency and lexical precision), which prompted targeted scaffolding (sentence starters, guided templates, controlled Q&A practice, and micro-feedback).

DISCUSSION

This discussion integrates findings across the Likert-scale questionnaire (Q01–Q17), open-ended responses (Q18–Q21), rubric-based task performance, student focus groups, and teacher implementation notes. Following the analytic plan, results are interpreted in relation to the three research questions and discussed in light of the ESP and disciplinary-communication literature introduced in the theoretical framework.

RQ1. How was the GLOBE model implemented in a six-week ESP sequence for third-year Computer Science students?

Across instruments, the implementation of the GLOBE-based sequence can be characterized as a staged, scaffolded progression from guided exposure to task performance, consistent with the model's emphasis on sequenced support (Borgnia & Luchini, 2025) and with genre-based approaches that foreground modeling, guided practice, and gradual release of control (Feez & Joyce, 1998; Halliday & Matthiessen, 2014; Martin & Rose, 2008). Teacher implementation notes documented a week-by-week pattern of structured input, controlled rehearsal, feedback, and revision, culminating in project-based production. This suggests that GLOBE functioned less as a "single-task" innovation and more as an instructional pathway, in line with calls for classroom-level methodologies that make ESP pedagogy visible and replicable rather than implicit (Basturkmen, 2025; Yan, 2025).

The implementation also highlighted the importance of contextual adaptation. The sequence was redesigned around IT communication practices, particularly requirements clarification and solution briefings, which resonates with ESP principles emphasizing relevance to disciplinary and professional communities (Dudley-Evans & St John, 1998; Hutchinson & Waters, 1987; Hyland, 2006). Student perceptions of authenticity and alignment, emerging strongly in open-ended responses and focus groups, suggest that the disciplinary framing was meaningful for participants and support the argument that ESP effectiveness depends on situated task design and genre awareness rather than decontextualized language work (Bhatia, 2004; Paltridge & Starfield, 2013; Swales, 1990, 2004). The implementation further illustrates the value of collaboration between language and content specialists, since alignment between linguistic goals and disciplinary demands was necessary for task validity and plausibility (Costa & Mastellotto, 2022; Supunya, 2023; Yu et al., 2025).

RQ2. What linguistic and professional communication outcomes did students demonstrate and perceive?

Across data sources, evidence converged on broadly positive outcomes in perceived professional communication development and task relevance, alongside moderate variation across participants. Likert-scale results showed above-midpoint central tendencies across subscales, and open-ended responses indicated that most students perceived improvements in their ability to communicate about IT topics. Rubric-based performance descriptives reinforced this pattern by documenting mid-to-upper range criterion means across clarity, organization, terminology, professional tone, and teamwork. Taken together, these results suggest that the intervention supported the development of communication practices aligned with ESP objectives in disciplinary settings, namely, the ability to participate in recognizable professional genres and routines (Hyland, 2007; Swales, 1990, 2004).

Focus-group accounts add qualitative specificity: students did not merely report learning vocabulary, but referred to organizing ideas into sentences, structuring explanations, and managing interaction through clarification and confirmation moves. This is consistent with genre-based pedagogy and SFL, which frame learning as the development of meaning-making resources for context-appropriate communication (Christie & Derewianka, 2008; Halliday & Matthiessen, 2014; Martin & Rose, 2008), and with ESP

perspectives emphasizing the relationship between language choices, professional purposes, and audiences (Bhatia, 2004; Hyland, 2006). In addition, students' reported use of communicative strategies such as paraphrasing, confirmation checks, and clarification requests indicates emerging strategic competence relevant to professional practice, particularly in multilingual work contexts (Arnó-Macià et al., 2020).

At the same time, outcomes were not uniform. A minority of participants reported limited benefit, largely due to low English proficiency and difficulty participating comfortably in speaking-intensive tasks. This divergence is pedagogically informative and aligns with broader findings that ESP innovation effects vary across contexts and learner profiles, requiring careful documentation of who benefits and under what conditions (Nurlaily et al., 2026; Vaghela & Kaushal, 2025; Yan, 2025). Rather than weakening the model, this variability underlines the need for differentiated support in heterogeneous cohorts.

RQ3. What challenges and pedagogical adaptations emerged from the implementation?

Triangulated evidence points to two main implementation challenges: interactive speaking demands and linguistic resource constraints for lower-proficiency learners. Students repeatedly described spontaneous interaction, follow-up questioning, and reformulation as demanding, while open-ended responses emphasized the need for more controlled practice before complex communicative tasks. Teacher notes documented the same pattern and reported adaptations such as staged Q&A rehearsal, sentence starters, and additional controlled practice cycles. These convergences suggest that in low-to-mid proficiency cohorts, the communicative load of authentic tasks can exceed learners' available resources unless scaffolding is sustained across stages.

This finding is compatible with task-based and genre-based pedagogy, which emphasize that authentic tasks are most effective when supported by structured preparation, modeling, and feedback cycles (Ellis, 2003; Feez & Joyce, 1998; Willis & Willis, 2007). The case study therefore suggests that the authenticity principle in ESP must be balanced with proficiency-sensitive support mechanisms. A second adaptation concerns the role of feedback and revision. Students' strong appraisal of feedback and teacher-reported uptake indicate that feedback cycles functioned as a key mechanism for learning and refinement, consistent with the GLOBE emphasis on revision as a bridge between guided input and production (Borgnia & Luchini, 2025). At the same time, lower-level learners' requests for grammar, vocabulary, and formulaic structures suggest that feedback should be paired with micro-scaffolding so that it becomes actionable.

Finally, the focus on discipline-linked, problem-oriented pedagogy is consistent with recent ESP research in engineering and technology contexts supporting task designs anchored in authentic disciplinary problems and communication demands (Bobkina & Domínguez Romero, 2025; Zulfa et al., 2025). This case study extends that line of work by showing how an explicit staged model such as GLOBE can structure pedagogy in Computer Science Education while also revealing where scaffolding must be intensified.

PEDAGOGICAL IMPLICATIONS

A first pedagogical implication concerns the need to integrate tiered scaffolding into GLOBE-based ESP sequences implemented in multilevel classrooms. The findings suggest that discipline-linked authenticity is a strength of the model, but complex communicative tasks such as requirements clarification, client simulations, and technical briefings may place a heavy burden on lower-proficiency learners if support is not explicitly differentiated. Future implementations should therefore combine shared disciplinary goals with differentiated linguistic pathways. For lower-level learners, this may include mandatory formulaic language banks for clarification, confirmation checks, paraphrasing, summarizing, and polite professional interaction; short pre-task grammar primers focused on tense consistency, question formation, and modality; controlled Q&A rehearsal before simulations; guided problem–requirements–solution templates; and simplified revision checklists. For more proficient learners, support can be gradually reduced and redirected toward greater technical precision, audience adaptation, register control, and independent reformulation.

A second implication concerns the role of micro-scaffolding as a bridge between authenticity and accessibility. Rather than reducing the professional relevance of ESP tasks, micro-scaffolding can help learners participate more equitably in authentic communication by providing the linguistic resources needed to manage interaction, organize technical information, and revise output. In this sense, formulaic language, grammar primers, and guided rehearsal should not be viewed as a return to decontextualized language teaching, but as enabling conditions for meaningful task participation. This is particularly important in Computer Science-oriented ESP contexts, where students may understand the technical problem but lack the English resources to clarify requirements, explain decisions, or negotiate meaning in real time.

A third implication concerns feedback and revision as core learning mechanisms within GLOBE. Students highlighted feedback as productive, and revision-stage uptake was documented in the implementation notes. Impact could therefore be strengthened by sharing the analytic rubric early in the sequence as a learning tool, using peer-feedback prompts aligned with rubric criteria, and designing revision checklists that distinguish between language accuracy, technical clarity, audience awareness, and professional tone. Such procedures would make the staged movement from guided input to professional output more transparent and replicable for future ESP implementations.

LIMITATIONS AND FUTURE RESEARCH

This exploratory case study has some limitations. First, the research was conducted in a single institutional setting within a bounded instructional context, which limits the generalizability of the results to other Computer Science programs or ESP environments. Second, the cohort showed a heterogeneous English proficiency profile (A1+–B1), which likely influenced participation and task performance across stages. Although this

variability reflects many real tertiary ESP contexts, it complicates direct comparisons and underlines the need for differentiated scaffolding. Third, the study relied mainly on post-intervention evidence, including questionnaire responses, rubric-based performance, focus groups, and teacher notes. As no pre-/post-test design or longitudinal follow-up was used, the findings cannot support strong claims about development over time; rather, gains should be interpreted as perceived and task-specific. Finally, the six-week duration, while sufficient for implementation and documentation, may not capture longer-term changes in disciplinary communication practices. Future research should address these limitations by incorporating a delayed post-task assessment or a longitudinal follow-up, for example three months after the intervention, to examine whether the communication strategies reported by students are retained and transferred to new disciplinary communication tasks. This would be particularly important for strategies such as paraphrasing, confirmation checks, clarification requests, and audience-oriented reformulation, which students perceived as useful for future professional interaction. A delayed component would allow future studies to move beyond immediate post-task perceptions and task-specific performance, offering stronger evidence of the GLOBE model's potential to foster lasting professional communication competence. Further studies could also adopt pre-/post-test designs, explore proficiency-sensitive adaptations of the model, and replicate the study across multiple cohorts, institutions, and Computer Science specializations. In addition, future work should examine ESP-content teacher collaboration more explicitly to understand how language-content integration can be sustained across longer instructional cycles.

CONCLUSION

This case study explored the implementation of a six-week ESP sequence in Computer Science Education using the GLOBE framework and triangulated evidence from Likert-scale questionnaire trends, open-ended responses, rubric-based performance, focus groups, and teacher implementation notes. Beyond documenting generally positive perceptions and mid-to-upper performance patterns, the study shows how GLOBE can function as a structured pathway for ESP in technology-oriented programs, not as a one-off task, but as a sequenced pedagogy that moves learners from guided input to disciplined, audience-oriented production. A useful way to conceptualize this contribution is to view GLOBE as a scaffolded bridge between classroom English and IT professional communication. Learners move through supported stages—modeling, controlled rehearsal, problem-solving, feedback, revision, and production—so that authenticity is preserved without overwhelming their linguistic resources. In this study, that staged design appeared to support engagement with discipline-relevant genres and perceptions of alignment with professional communication demands, while also revealing where the bridge needs reinforcement. For heterogeneous cohorts (A1+–B1), interactive speaking and time-constrained decision-making remained pressure points, suggesting the need for proficiency-sensitive scaffolding. Overall, the study offers an empirically grounded account of a discipline-sensitive GLOBE adaptation and identifies concrete priorities for future ESP implementations in technology-oriented

higher education. Future longitudinal work, including delayed post-task assessments, will be needed to determine whether the communication strategies developed through GLOBE-based ESP sequences are retained over time and transferred to new academic or professional Computer Science communication contexts.

DISCLOSURE STATEMENT

The authors declare no conflict of interest. AI-assisted tools were used only for minor language polishing and proofreading. All content, analysis, interpretations, and final decisions are the authors' own.

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APPENDIX

Appendix A. Post-task questionnaire: ESP in computer science education (GLOBE-based sequence)

Title: Post-Task Questionnaire: ESP in Computer Science Education (GLOBE-based sequence)

Instructions (students): This questionnaire is anonymous. Please answer honestly.

The purpose is to understand your experience during the 6-week ESP sequence and how useful you found the tasks for Computer Science/IT communication. There are no right or wrong answers.

Section 1. Background (optional)

1. CEFR level (as indicated in the course): ☐ A1+ ☐ A2 ☐ B1
2. Program: ☐ Computer Science Engineering ☐ Bachelor's in Computer Science ☐ Other: _____
3. Previous experience using English in IT contexts (e.g., tutorials, documentation, work): ☐ None ☐ Limited ☐ Some ☐ Frequent

Section 2. Likert-scale items (1–5)

Please circle one option:

1 = Strongly disagree | 2 = Disagree | 3 = Neutral | 4 = Agree | 5 = Strongly agree

A. Perceived linguistic development (ESP)

1. I improved my ability to communicate in English about Computer Science/IT topics. 1 2 3 4 5
2. I can use more IT-related vocabulary accurately than before. 1 2 3 4 5
3. I can explain technical ideas more clearly in English. 1 2 3 4 5
4. I became more confident using English in a professional/academic Computer Science context. 1 2 3 4 5

B. Professional communication in IT contexts

- 5) The tasks helped me practice communication skills that are relevant for Computer Science/IT work. 1 2 3 4 5
- 6) I learned strategies to adapt my English to different audiences (e.g., technical vs. non-technical). 1 2 3 4 5
- 7) I improved my ability to ask and answer questions to clarify requirements. 1 2 3 4 5
- 8) I improved my ability to organize information (problem → solution) in English. 1 2 3 4 5

C. Task relevance and engagement

- 9) The tasks felt authentic (similar to what happens in real IT contexts). 1 2 3 4 5
10) The tasks were engaging and motivating. 1 2 3 4 5
11) I think this type of ESP work is important for my future professional development.
1 2 3 4 5

D. Scaffolding, support, and learning process

- 12) The sequence of steps helped me progress from guided practice to production. 1 2 3 4 5
13) The model texts/examples helped me understand what was expected. 1 2 3 4 5
14) Feedback (teacher/peers) helped me improve my performance. 1 2 3 4 5
15) Reflection activities helped me notice language and communication issues. 1 2 3 4 5

E. Difficulty (reverse focus; still 1–5)

- 16) The tasks were too difficult for my English level. 1 2 3 4 5
17) I needed more language support to complete the tasks successfully. 1 2 3 4 5

Section 3. Open-ended questions

- 18) What was the most useful thing you learned during this ESP sequence?
→ _____
- 19) What was the most difficult part of the tasks (language, technical content, teamwork, time, etc.)?
→ _____
- 20) What changes would you suggest to improve this ESP sequence for Computer Science students?
→ _____
- 21) Give one example of a phrase/strategy you used (or learned) to communicate better in English in this project.
→ _____

Appendix B. Analytic rubric for task performance

Task: Client Requirements Meeting + Technical Solution Brief (Computer Science/IT ESP)

Scale: 1–5 per criterion

- 5 = Excellent (highly effective and appropriate)
- 4 = Strong (effective with minor issues)
- 3 = Satisfactory (adequate but uneven)
- 2 = Developing (limited effectiveness; frequent problems)
- 1 = Beginning (minimal evidence; major problems)

Scoring note: Use the rubric for the final output(s): (a) meeting interaction (if assessed) and (b) technical solution brief (written and/or oral).

Criteria

C1. Clarity of technical explanation (audience-oriented)

- 5: Explains technical ideas clearly; anticipates misunderstandings; uses examples/analogies when needed.
- 4: Mostly clear; occasional ambiguity but message remains understandable.
- 3: Understandable overall; explanations sometimes incomplete or unclear.
- 2: Often unclear; key ideas missing; listener/reader struggles to follow.
- 1: Explanation largely incomprehensible or absent.

C2. Problem–solution organization

- 5: Excellent structure (problem, requirements, solution, justification); coherent progression.
- 4: Clear structure; minor gaps in sequencing.
- 3: Basic structure present; some disorganization/repetition.
- 2: Weak structure; ideas scattered; difficult to follow.
- 1: No clear organization.

C3. Use of Computer Science/IT terminology (accuracy and appropriacy)

- 5: Accurate and appropriate terminology; consistent use; supports meaning.
- 4: Mostly accurate; minor misuse does not impede meaning.
- 3: Some accurate use; noticeable inaccuracies or overgeneral terms.
- 2: Limited terminology; frequent misuse affects clarity.
- 1: Terminology largely absent or incorrect.

C4. Register and professional tone

- 5: Appropriate professional tone; polite, clear, and context-appropriate conventions.
- 4: Generally appropriate; occasional informal/awkward phrasing.
- 3: Mixed register; professional tone inconsistent.
- 2: Frequently inappropriate register for professional context.
- 1: No evidence of professional tone.

C5. Interactional effectiveness (for meeting / Q&A) *(use if meeting is assessed)*

- 5: Excellent turn-taking; asks relevant questions; clarifies effectively; responds appropriately.
- 4: Effective interaction; occasional missed opportunities for clarification.
- 3: Basic interaction; limited questioning/clarification strategies.
- 2: Interaction often breaks down; limited responsiveness.
- 1: Minimal interactional participation.

C6. Linguistic control (intelligibility, grammar, and lexis)

- 5: High control; errors rare and do not affect meaning.
- 4: Some errors; meaning remains clear.
- 3: Frequent errors; meaning generally recoverable.
- 2: Persistent errors often impede meaning.
- 1: Errors severely impede communication.

C7. Collaboration and teamwork (team performance)

- 5: Roles well-coordinated; equitable participation; smooth transitions.
- 4: Generally coordinated; minor imbalance in participation.
- 3: Some coordination; uneven participation noticeable.
- 2: Poor coordination; one/two members dominate; gaps evident.
- 1: No coordination; teamwork ineffective.

Total score (if all criteria used): ____ / 35

Assessor comments (strengths & priorities for improvement):

- Strengths: _____
- Priorities: _____

Appendix C. Focus group protocol (students)

This protocol was implemented with the full cohort (N = 22) through three focus groups, each comprising approximately 6–8 students, to facilitate participation and interaction.

Purpose: To explore students' perceptions of the GLOBE-based ESP sequence, its relevance for Computer Science/IT, perceived outcomes, and challenges.

Duration: 35–45 minutes

Participants: 6–8 students per group

Moderator script (opening)

Thank you for joining. This is not an exam. We want to understand your experience in the ESP project. There are no right or wrong answers. Please speak freely. Everything will be anonymized in the research report. You can skip any question.

Warm-up

1. In one sentence, how would you describe the ESP sequence you completed?

Core questions

2. Which part of the sequence was the most useful for you? Why?
3. Which part was the most difficult? (language, technical content, teamwork, time, instructions)
4. Did the tasks feel authentic for Computer Science/IT communication? Can you give an example?
5. What strategies did you use to communicate when you didn't know a word or structure in English?

6. How did feedback and revision help you (or not) during the sequence?
7. Do you feel more confident communicating technical ideas in English now?
Why/why not?
8. What changes would you recommend to improve the sequence for students at A1+/A2/B1 levels?

Closing

9. If you could keep only one element of this project for future cohorts, what would it be?
10. Any final comments?

Appendix D. Teacher implementation log (ESP + computer science collaboration)

Purpose: To document implementation decisions, scaffolding, observed challenges, and adaptations during the 6-week sequence.

Completed by: ESP teacher (primary) + Computer Science teacher (optional notes)

Session log template

- **Week / Date:** _____
- **Session focus (GLOBE stage):** ☐ Input ☐ Problem-solving ☐ Feedback/Reflection ☐ Revision ☐ Production
- **Main activities/tasks:**

- **Materials used (e.g., model texts, prompts, examples):**

- **Observed student performance (brief):**
Strengths: _____
Difficulties (language / task / teamwork): _____
- **Scaffolding provided (what, how, when):**

- **Feedback provided (teacher / peer):**

- **Adaptations made (and reasons):**

- **Notes on collaboration (ESP–Computer Science alignment):**

- **Issues to address next session:**

Appendix E. Task prompt (as given to students)

Task 1: Client Requirements Meeting (Simulation)

Scenario: You are part of a Computer Science/IT team. A client needs a solution to manage a real-world problem (provided by the instructor). Your goal is to clarify requirements and define the scope.

Your role: Computer Science team

Output: Participate in a short meeting simulation where you:

- ask questions to clarify needs, constraints, and users;
- confirm understanding (rephrase and summarize);
- identify key requirements and priorities.

Useful language (examples):

- *Could you clarify what you mean by...?*
- *So, if I understand correctly, you need...*
- *What will be the main users of the application?*
- *What is the priority: security, speed, usability, or cost?*
- *Do you have any constraints (budget/time/technology)?*

Task 2: Technical Solution Brief (Written + Oral)

Goal: Propose a solution based on the client's needs.

Deliverables:

1. Written brief (approx. 250–400 words; adjust if needed)
2. Short oral explanation (approx. 3–5 minutes; adjust if needed)

Required sections (recommended):

1. Problem and context
2. Key requirements (what the client needs)
3. Proposed solution (main features/modules)
4. Data and security considerations (basic)
5. Implementation considerations (timeline/resources)
6. Why this solution fits the client's needs

BIODATA

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