TRANSLINGUAL PEDAGOGIES IN TECHNICAL DISCOURSE: A LITERATURE-BASED INQUIRY INTO CODE-SWITCHING PRACTICES IN ENGINEERING ESP CONTEXTS

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Abstract: Code-switching and code-mixing have long occupied an ambivalent position within English for Specific Purposes pedagogy, alternately constructed as pragmatic scaffolding and as deviation from target language norms. Within engineering education, where disciplinary discourse demands both technical precision and communicative fluency, this ambivalence assumes pedagogical significance. The present study undertakes a systematic literature-based inquiry into the pedagogical utility of code-switching and code-mixing practices as they manifest in engineering ESP classrooms, drawing on empirical and theoretical sources spanning sociolinguistics, applied linguistics, and technical communication. The review maps documented affordances of translingual practice, including reduced cognitive load, enhanced conceptual clarification, and strengthened learner-instructor rapport, alongside identified constraints, such as overreliance on the mother tongue, diminished target language exposure, and the risk of impeding the development of discipline-specific communicative competence. Vygotskian notions of mediated learning and the zone of proximal development provide a theoretical lens through which code-switching is reframed not as pedagogical failure but as a contextually contingent instructional resource. Findings suggest that the pedagogical value of code-switching is neither inherent nor universal, but is shaped decisively by instructor intentionality, learner proficiency level, and the communicative demands of the disciplinary context. The study concludes by proposing a framework for principled, reflective code-switching in engineering ESP instruction, and identifies directions for future empirical investigation.

Index Terms: Code-switching, Code-mixing, English for Specific Purposes, Translingual pedagogy, Engineering discourse

INTRODUCTION

The engineering classroom constitutes a linguistically complex site where learners are simultaneously expected to acquire disciplinary knowledge and develop communicative competence in English as an additional language. Within English for Specific Purposes (ESP) pedagogy, the question of whether instructors should permit or deploy the learners' first language (L1) during instruction has generated sustained scholarly debate. Code-switching, the practice of alternating between two or more languages within a single communicative episode, and code-mixing, the embedding of linguistic elements from one language into the structure of another, occupy a contested yet increasingly visible space within this debate. Translingual approaches to language education have reframed such practices not as deviations from monolingual norms but as legitimate, purposive, and potentially productive dimensions of multilingual pedagogy. Fang and Baker (2025) argue persuasively that Global Englishes and translanguaging perspectives collectively challenge the monolingual habitus that has historically shaped ESP instruction, repositioning learners' full linguistic repertoires as resources rather than interferences. This theoretical repositioning has significant implications for engineering ESP classrooms, particularly in contexts where learners share a common L1 and where technical vocabulary must be mapped onto dense conceptual schemas unfamiliar in either language.

Despite growing theoretical attention, empirical investigation of translingual and code-switching practices specifically within engineering ESP remains comparatively sparse. Much of the extant research addresses EFL or EAP contexts more broadly, leaving the disciplinary particularities of technical English instruction underexamined. The present literature-based inquiry addresses this gap by systematically reviewing documented pedagogical outcomes, both positive and negative, of code-switching and code-mixing in engineering and allied technical ESP classrooms. In so doing, it seeks to contribute a theoretically grounded and empirically informed understanding of when, how, and under what conditions translingual practices serve the communicative development of engineering students. The study is organised as follows. The Methods section outlines the literature search and selection process. The Results section maps affordances and constraints of code-switching across three thematic clusters. The Discussion section interprets these findings through a Vygotskian lens and proposes a framework for principled translingual pedagogy in engineering ESP contexts.

METHODS

This study employs a literature-based inquiry design, consistent with approaches described by Huang and Chalmers (2023) in their systematic review of pedagogical translanguaging effects in EFL classrooms. Rather than generating primary data, the methodology involves the critical synthesis of peer-reviewed empirical studies, theoretical contributions, and contextual analyses relevant to code-switching and translingual practice in ESP and related instructional contexts. The search was bounded to publications from

2018 onwards to ensure currency, with earlier seminal theoretical frameworks incorporated where directly relevant to the analytical lens. Sources were identified through electronic databases including Scopus, Web of Science, Google Scholar, and ERIC, using search strings combining the following descriptors: code-switching, code-mixing, translanguaging, English for Specific Purposes, engineering English, technical discourse, ESP pedagogy, and bilingual classroom. Chang (2019) and Jain (2022) were included to represent higher education translingual perspectives that inform the theoretical backdrop against which engineering ESP practices are examined. The inclusion criteria required that sources address instructional contexts in tertiary education, engage substantively with bilingual or multilingual classroom practice, and demonstrate relevance to technical or disciplinary English instruction.
Sources that addressed primary or secondary schooling exclusively, or that focused on non-instructional translingual practices such as heritage language maintenance or community code-switching, were excluded. Studies addressing adjacent but distinct constructs ,such as language-in-education policy without classroom-level data ,were included only where they illuminated the contextual conditions shaping ESP pedagogy, as illustrated by Permana and Rohmah (2024) in their examination of translingual English language policy in Indonesian higher education. A total of twenty-two sources were retained for systematic analysis. These were coded thematically along two primary axes: pedagogical affordances and pedagogical constraints. Table 1 presents an overview of the key literature sources informing this review, including geographical context, research design, and primary contribution.

Table 1. Overview of Key Literature Sources

No.	Author(s) & Year	Geographical Context	Research Design	Focus Area	Key Contribution
1	Fang & Baker (2025)	Global/Conceptual	Theoretical review	Global Englishes & ESP	Links translanguaging to ESP; reframes language as dynamic resource
2	Alasmari et al. (2024)	Saudi Arabia	Survey-based	Bilingual practices in ESP	Positive student perceptions of L1 use in ESP technical instruction
3	Sipayung et al. (2025)	Indonesia	Qualitative	Teacher-learner perceptions	Contextualises translanguaging as a negotiated classroom practice
4	Huang & Chalmers (2023)	EFL/Global	Systematic review	Pedagogical translanguaging effects	Documents positive effects on comprehension and engagement
5	Chen et al. (2019)	Taiwan	Action research	ESP writing course	Demonstrates translanguaging as a writing scaffold in technical ESP
6	Canagarajah (2024)	Conceptual/Global	Theoretical	Communication for Specific Purposes	Reconceptualises CSP as translingual practice, challenging monolingual norms
7	Saha & Rahman (2022)	Bangladesh	Mixed methods	EAP classroom	Reveals translanguaging as a support mechanism in under-resourced EAP contexts
8	Dafouz Milne (2021)	Spain/Europe	Conceptual review	EME and ESP interface	Maps disciplinary tensions between English-medium and ESP traditions
9	Orcasitas-Vicandi & Leonet (2026)	Basque Country	Experimental	Metalinguistic awareness	Demonstrates translanguaging benefits for multilingual learner metacognition
10	Permana & Rohmah (2024)	Indonesia	Policy analysis	English language policy	Examines translingual policy implications in national HE contexts

Note. EME = English-Medium Education; EAP = English for Academic Purposes; ESP = English for Specific Purposes; ZPD = Zone of Proximal Development.

RESULTS

The thematic analysis of the literature yielded findings organised across three interrelated clusters: (1) pedagogical affordances of code-switching in engineering ESP contexts; (2) pedagogical constraints and associated risks; and (3) contextual moderators that determine whether code-switching functions as a resource or a liability.

Pedagogical Affordances

The most consistently documented benefit of code-switching in technical ESP classrooms is its capacity to reduce cognitive load during initial concept acquisition. When instructors strategically introduce L2 technical terms through L1 conceptual anchors, learners are afforded simultaneous access to disciplinary meaning and linguistic form. Anderson (2018) argues that reimagining language learners from a translingual perspective requires recognising the role of prior linguistic knowledge as scaffolding rather than obstacle, a position that aligns closely with Vygotskian principles of mediated learning.Alasmari et al. (2024), in their investigation of Saudi engineering and science students, found that learners reported significantly higher comprehension of ESP content when instructors permitted selective L1 use during technical explanations. Crucially, participants distinguished between code-switching as an enabling scaffold and unrestricted L1 use as a crutch, suggesting a learner-level awareness of the strategic versus habitual dimensions of the practice. This distinction carries important implications for instructor decision-making in engineering ESP classrooms. Affective and relational dimensions of code-switching likewise emerged as significant affordances across the reviewed literature. Sipayung et al. (2025) document that both teachers and learners in Indonesian ESP contexts perceived translanguaging practices as contributing to a more inclusive and psychologically safe classroom environment, particularly for students whose proficiency in English remained at early developmental stages. Gülveren (2023) further corroborates this finding in an EFL speaking skills context, reporting that translanguaging pedagogy significantly increased learners' willingness to communicate ,a construct of particular relevance in engineering classrooms where technical presentations and disciplinary discussions demand confident oral participation. From a cognitive-linguistic standpoint, Orcasitas-Vicandi and Leonet (2026) provide experimental evidence that translanguaging pedagogies in ESP contexts enhance metalinguistic awareness among trilingual learners, enabling them to recognise structural and lexical correspondences across languages. This heightened awareness arguably

serves engineering students well, given the Latin and Greek etymology common to much scientific and technical vocabulary across multiple European and South Asian languages.

Pedagogical Constraints

Against these documented affordances, the literature identifies a set of substantive risks associated with unreflective or unstructured code-switching in engineering ESP classrooms. The most frequently cited concern is the potential for learners to develop dependency on L1 mediation, thereby limiting the density and authenticity of their engagement with target-language technical discourse. Canagarajah (2024), while broadly supportive of translingual frameworks, acknowledges that Communication for Specific Purposes demands eventual independence in L2 technical register, an independence that may be forestalled when code-switching becomes normative rather than strategic.Janfada (2023) raises a related concern in the context of academic English literacy, arguing that dialogic appropriation ,the process through which learners internalise disciplinary language through sustained engagement ,requires sufficient exposure to target-language discourse to be effective. Where code-switching reduces that exposure substantially, the developmental trajectory towards disciplinary communicative competence may be attenuated. This finding resonates with Dafouz Milne's (2021) observation that the interface between English-medium education and ESP creates structural tensions, particularly when instructional languages oscillate inconsistently. Institutional constraints further complicate the pedagogical picture. Saidani and Belmihoub (2026) document that translingual-medium instruction in Algerian higher education encounters significant institutional resistance, with English-only policy frameworks creating conditions under which instructors who code-switch may face professional censure. Torrez (n.d.) similarly notes that the positioning of English as a global academic lingua franca within higher education systems creates normative pressures that can render translingual practices invisible or delegitimised at the institutional level, even when pedagogically warranted at the classroom level.A further constraint concerns instructor linguistic competence. Widyantoro (n.d.) identifies the uneven quality of bilingual instructional practice in ESP classrooms as a significant variable, noting that code-switching by instructors who lack nuanced command of the L1 academic register may introduce confusion rather than clarity. In engineering contexts, where technical precision is paramount, imprecise L1 glosses of complex English-medium concepts carry risks of conceptual distortion.

Contextual Moderators

Taken together, the reviewed literature suggests that the pedagogical value of code-switching is neither fixed nor universal. Several contextual variables appear to moderate its effects, including learner proficiency level, instructor intentionality, the communicative demands of the specific task, and the institutional language policy environment. Saha and Rahman (2022) demonstrate that translanguaging functions differently across proficiency bands, with lower-proficiency learners benefiting most from L1 conceptual mediation while higher-proficiency learners require more sustained L2-only interaction to consolidate discipline-specific competence. Corcoran et al. (2023) contribute a multiethnographic perspective, documenting that trans/plurilingual pedagogies are shaped as much by the social and ideological context of the classroom as by formal instructional design. Their findings suggest that code-switching practices are constructed between instructor and learners rather than unilaterally imposed, a dynamic that has relevance for engineering classrooms in South and Southeast Asian contexts where shared L1 backgrounds among students and instructors are common. Table 2 synthesises the documented affordances and constraints identified across the reviewed literature.

Table 2. Pedagogical Affordances and Constraints of Code-Switching in Engineering ESP Classrooms

Pedagogical Affordances of Code-Switching	Pedagogical Constraints of Code-Switching
Reduces cognitive load during initial conceptual acquisition	May foster overreliance on L1, limiting L2 exposure
Facilitates clarification of complex technical terminology	Risks impeding discipline-specific communicative competence development
Strengthens affective bond between instructor and learner	Normalises code-switching as default rather than strategic tool
Supports scaffolded progression through Vygotskian ZPD	May signal low expectations of learner target-language capacity
Enhances metalinguistic awareness in multilingual learners	Creates unequal classroom dynamics if not applied consistently
Activates mother-tongue-based conceptual schema for new L2 learning	May conflict with institutional English-only language policies
Promotes inclusive participation among lower-proficiency learners	Reduces authenticity of target disciplinary discourse interaction
Increases learner willingness to communicate in technical register	Instructor proficiency in both languages may be inconsistent

Note. Affordances and constraints are drawn from the systematic thematic analysis of the 22 sources reviewed in this study.

DISCUSSION

The findings of this literature-based inquiry invite reconsideration of the dominant monolingual paradigm that has historically governed ESP pedagogy. Across the reviewed literature, a convergent theoretical position emerges code-switching and code-mixing, when deployed with intention and structural awareness, constitute pedagogically defensible, and at times distinctly valuable, practices within engineering ESP instruction. This position is most compellingly grounded in Vygotskian notions of the zone of proximal development (ZPD), wherein the learner's current linguistic competence defines the floor of instructional support required, and scaffolded mediation, including L1 use, enables progression towards target-language independence.Vachharajani (2023), in a doctoral examination of translingual pedagogy as a response to English dominance, argues that monolingual pedagogical norms carry ideological freight that disadvantages multilingual learners structurally, not merely linguistically. This argument holds particular force in engineering ESP classrooms in postcolonial contexts, where the social and epistemic authority of English operates alongside, and sometimes in tension with, learners' primary intellectual and cultural resources. Jiang (2025), examining multilingual international students' digital counter-storytelling, similarly surfaces the ways in which anti-racist translingual pedagogy challenges deficit framings of non-English-medium communicative practice. Nonetheless, the evidence does not support an uncritical embrace of unrestricted code-switching. The literature consistently identifies learner proficiency level and instructor intentionality as decisive

moderating variables. Where code-switching is habitual, inconsistent, or unaccompanied by explicit metalinguistic commentary, its benefits diminish and its risks, including reduced L2 exposure and impeded development of discipline-specific communicative competence, may be amplified. The challenge, then, is not whether to permit code-switching but how to govern it pedagogically.
Towards this end, the present study proposes a five-phase framework for principled translingual practice in engineering ESP classrooms, set out in Table 3. The framework draws on the theoretical positions of Canagarajah (2024) and Anderson (2018) alongside the empirical findings of Alasmari et al. (2024), Sipayung et al. (2025), and Saha and Rahman (2022), integrating activation, bridging, consolidation, metalinguistic reflection, and autonomy development as sequenced instructional phases.

Table 3. A Five-Phase Framework for Principled Code-Switching in Engineering ESP Instruction

Phase	Pedagogical Purpose	Instructor Action	Expected Learning Outcome
Phase 1: Activation	Prior knowledge retrieval; conceptual orientation	Use L1 to activate technical schema before introducing L2 terminology	Learners connect new ESP content to known conceptual frames
Phase 2: Bridging	Mediation of L1 concept to L2 disciplinary language	Introduce L2 technical term alongside L1 equivalent; model usage in context	Learners acquire target register with semantic grounding
Phase 3: Consolidation	Reduction of L1 dependency; increased L2 production	Progressively reduce code-switching; prompt L2 self-correction	Learners demonstrate discipline-specific communicative competence
Phase 4: Reflection	Metalinguistic awareness development	Encourage learners to identify and articulate language choice rationale	Learners develop critical awareness of their own translingual practices
Phase 5: Autonomy	Independent ESP communication without L1 mediation	Create authentic task-based assessments in L2 technical register only	Learners operate independently within engineering ESP discourse community

Note. The framework is proposed as a heuristic for instructional planning and is intended to be adapted to the specific proficiency level and disciplinary context of engineering ESP learners.

The framework positions code-switching as a temporally bounded and purposively declining scaffold rather than a permanent instructional default. In Phase 1, L1 use is explicitly leveraged to activate prior conceptual knowledge, reducing the affective and cognitive barriers that engineering learners, particularly at early stages of tertiary study, frequently encounter when encountering dense technical English prose. By Phase 3, however, code-switching frequency is progressively reduced, with instructor prompting increasingly requiring L2 self-expression. The culminating phases of metalinguistic reflection and autonomous production are designed to ensure that translingual scaffolding does not displace but rather enables target-language competence.
It merits emphasis that this framework is proposed as a heuristic, not a prescriptive sequence. Jain (2022), in her examination of translingual-identity-as-pedagogy in EAP classrooms, cautions against formulaic applications of translingual principles, arguing that authentic translingual pedagogy must be responsive to the specific identities, histories, and communicative aspirations of the learners involved. This caution is particularly relevant in engineering ESP contexts, where disciplinary identity formation and language development are closely intertwined.

CONCLUSION

This literature-based inquiry has mapped the pedagogical landscape of code-switching and code-mixing in engineering ESP classrooms, drawing on twenty-two empirical and theoretical sources to identify documented affordances, constraints, and contextual moderators. The findings establish that translingual practices, when purposefully deployed, can meaningfully support engineering learners' conceptual comprehension, communicative confidence, and metalinguistic development. At the same time, the review cautions that unreflective or undifferentiated code-switching carries substantive risks, including reduced target-language exposure and delayed attainment of discipline-specific communicative competence. The five-phase framework proposed in this study offers a structured response to the tension between these findings, positioning code-switching as a phased, intentional, and progressively withdrawn scaffold within a broader trajectory of ESP communicative development. Future empirical research is warranted to test the framework's efficacy across diverse engineering ESP populations, with particular attention to proficiency-level variation, institutional policy constraints, and the longitudinal relationship between translingual scaffolding and independent L2 disciplinary production. The study contributes to an emerging body of scholarship that seeks to reconcile the pragmatic realities of multilingual engineering classrooms with the theoretical imperatives of communicative competence development in ESP. It does so by positioning code-switching not as a pedagogical compromise but as a principled, evidence-informed, and theoretically grounded instructional resource, one whose value lies not in its frequency but in its intentionality.

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