
| RESEARCH ARTICLE

Three Decades of ESP Innovation: A Review of Research Across Specialized and Underexplored Domains

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| ABSTRACT

This study seeks to fill a gap in the English for Specific Purposes (ESP) literature by conducting a systematic review (SR) of the author's research studies published between 1994 and 2025. This SR synthesizes ten studies that examine the teaching of English for legal, polytechnic, art education, Islamic, and translation for specific purposes, interpreting for tourism purposes and using artificial intelligence to translate common names of chemical compounds. For conceptual clarity, the ten studies were organized into three thematic clusters (i) the ESP course design (5 studies); (ii) interpreting and translation for specific purposes (2 studies); and (iii) Teaching approaches for ESP (3 studies). Across these three clusters, the findings revealed that effective ESP instruction is based on a deep understanding of the learners' academic and professional needs, the communicative demands of their domain, and the skills and cognitive processes required to process specialized texts and tasks. This SR highlights the importance of integrating language skills with domain knowledge, designing instruction that matches real world communicative practices, and using authentic materials that represent the students' area of specialization. Additionally, this SR shows that ESP instruction is shaped by technological innovation. Online learning environments, digital resources, and AI assisted tools expand students' access to specialized content and support the development of reading, vocabulary, translation, and research skills. At the same time, the studies underscore the need for digital literacy and instructional purpose to ensure that technology enhances rather than replaces thoughtful instructional design. Together, the studies in this SR contribute to a more extensive and inclusive understanding of ESP, one that embraces under represented disciplines, integrates multimodal resources, and highlights the connection between language skills and elements, cognitive competencies, and domain knowledge. This SR does not only synthesize a substantial body of research, but it also outlines a path forward for future research, curriculum development, and pedagogical innovation in ESP.

| KEYWORDS

Systematic Review (SR), English for legal purposes, English for polytechnic purposes, English for Islamic purposes, English for art education purposes, interpreting for tourism purposes, ESP course design, ESP teaching strategies, ESP technologies, students' needs assessment.

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I. Introduction

English for specific purposes (ESP)¹ is a subset of English as a second or foreign language (ESL/EFL). It usually refers to teaching English to university students or people already in employment, according to the vocabulary, discourse, and skills required in their academic or occupational fields. ESP is widely taught in universities around the world, and major professional associations such as TESOL and IATEFL have dedicated ESP sections.- ESP courses typically target a particular discipline or profession, such as Scientific English, Technical English, English for medical professionals, English for tourism, and Environmental English, Business English, Aviation English taught to pilots, air traffic controllers and civil aviation specialists to enable clear radio communications. A major

¹ [English for Specific Purposes](#)

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branch of ESP is English for Academic Purposes (EAP), taught before or during university studies, together with English for Occupational Purposes (EOP), which prepares learners for specific jobs.

ESP is different from standard English teaching in that the instructors are not only proficient in standard English, but they are also knowledgeable in a technical field. When doctors of foreign countries learn English, they need to learn the names of their tools, naming conventions, and methodologies of their profession before they can ethically perform surgery. Some ESP scholars recommend a "two layer" ESP course: the first layer covering all generic knowledge in the specific field of study, and then a second layer that would focus on the specifics of the individual's area of specialization.

ESP courses generally have the following Components: Needs analysis: Identification of the learner's specific requirements to define course objectives. (ii) Tailored curriculum: Designed for adults, intermediate, or advanced learners; (iii) Authentic material: Uses real-world documents and scenarios; and (iv) Goal-oriented: Focused on enabling performance in a specific research or study context. ESP is characterized by a high degree of specificity, often utilizing specialized terminology, grammar, and vocabulary to help professionals function efficiently.

Due to the prevalence of teaching ESP or EAP by institutions worldwide, a review of the literature showed a plethora of studies and systematic reviews (SRs) that investigated the teaching of ESP in many specialized domains to graduate and undergraduate students. For examples, two SRs limited their review to the methods reported in ESP research articles in two leading journals (Gollin-Kies, 2014); and trends in empirical research in ESP in SSCI-indexed journal articles (2014–2023) (Yan, 2025). Other SRs examined practices, challenges and innovations of ESP in context in a middle-income country (Bonar & Keary, 2026); an SR of ESP-based post-graduate research in Turkey (Akbaş, 2021); and a critical review of the current situation of teaching ESP in Iran (Suzani, Yarmohammadi & Yamini, 2011). Further SRs traced the development of ESP research over four decades (1980–2019) (Yang, Xu & Swales, 2023); the potentials and challenges of microlearning in ESP and ESP materials design (Caroline, Sumarni & Darmahusni, 2023); and mapping the trajectory of empirical research over four decades of publications in ESP (Ghanbar & Rezvani, 2024).

The following SRs focused on trends in need analysis of ESP for engineering students (Musdalifah, Bangsawan & Astika, 2024); the role of ESP in promoting health communication skills among medical students (Fransiska & Sigarete, 2025); ESP in business communication (Situmorang, et al., 2023); ESP for police (Waluyo, et al., 2024); and AI-enhanced flipped CLIL models for ESP education in tourism and hospitality contexts (Pongpanich, Jantakoon & Laoha, 2025). Another group of SRs focused on the integration of AI, technology and M-learning as the use of AI applications in ESP teaching and learning (Liashenko, 2025); the integration of technologies into ESP courses (Nguyen, Silalahi & Liu, 2024); and sustaining education with mobile learning for ESP (2012–2021) (Rafiq, Hashim & Yunus, 2021). A substantial number of SRs addressed the challenges of teaching ESP (Jande & Ibrahim, 2021); needs analysis in ESP within higher education (Pang & Abd Majid, 2025; Khalid, 2016); the efficacy and implementation of negotiated syllabi in EFL and ESP contexts (Taghipour & Kouhdadht, 2026); ESP teachers' current focus, collaboration, and sustainability (Supunya, 2023); teaching ESP vocabulary with the application of corpus-based materials at universities (Lacková, 2025) and the integrating technology in the instruction and retention of ESP vocabulary (Wannas, Altukruni & Naby, 2025).

Despite this extensive body of literature, the literature review shows a lack of SRs that cover studies on teaching English for geography, Islamic, polytechnic, legal, art education, research skills and translation of common names of chemical compounds by AI to graduate and undergraduate students. There is also lack of SRs that focus on a single author's research program. Therefore, this study aims to fill a gap in the ESP literature by conducting an SR of the author's research studies conducted between 1994 and 2025 on the teaching of English for Islamic, legal, polytechnic, art education, and translation for specific purposes, teaching interpreting for tourism purposes and using AI to translate common names of chemical compounds.

This SR is significant because it synthesizes more than three decades of the author's contributions to ESP (1994–2025), offering a rare longitudinal perspective that is absent from existing ESP reviews. Unlike previous SRs that focus on a single skills, technology, or discipline, this SR covers under-researched domains such as Islamic studies, geography, polytechnic education, art education, legal translation, research skills, and AI-based translation of chemical compound names, translation for specific purposes and interpreting for tourism purposes. It also introduces a novel approach by examining the evolution of a single scholar's research program, integrating both full ESP course designs. The review provides a comprehensive historical map of ESP development in Saudi Arabia, highlights neglected learner populations, and offers practical implications for ESP curriculum design and technology integration. As such, it fills a major gap in the literature and establishes a foundation for future ESP research agendas.

Finally, the current SR is part of a broader series of SR/MA projects by the author, that has so far included the following SRs/MAs of: translation error studies (Al-Jarf 2026a); mobile apps for developing multiple language skills in EFL (Al-Jarf 2026b); studies on pronunciation instruction and practice in L2 (Al-Jarf 2026c); Arabic–English transliteration of personal names and public signages (Al-Jarf 2026d); children's language acquisition and development in Saudi Arabia: (Al-Jarf 2026e); classroom practices, writing

enhancement and creativity among EFL struggling students (Al-Jarf 2026f); collaborative learning and teaching in digital environments (Al-Jarf 2026g); the effectiveness of mind-mapping on multiple English language skills in the Saudi context (Al-Jarf 2026h); an integrative analysis of inadequate staffing and large class sizes in Saudi EFL and translation programs (Al-Jarf 2026i); innovative word formation and pluralization processes in Arabic (Al-Jarf 2026j); 2024–2025 studies on AI Arabic translation, linguistics and pedagogy (Al-Jarf 2026k).

2. Methodology

2.1 Study Corpus

The study corpus consists of 10 articles by the author published between 1994–2025. Because the 10 studies addressed multiple aspects of ESP, they are organized into the following 3 thematic clusters that reflect the conceptual directions in the author's ESP research.

Cluster 1 – English for specific purposes course design

This cluster contains 5 studies as follows:

- Teaching English for legal purposes (Al-Jarf, 2023b).
- teaching English for polytechnic purposes (Al-Jarf, 2022c).
- Designing English for Islamic studies (Al-Jarf, 2021a).
- an ESP program model for graduate students at King Saud University based on their academic and occupational needs (Al-Jarf, 1994).
- common names of chemical compounds (Al-Jarf, 2025).

Cluster 2 – Interpreting and translation for specific purposes

This cluster contains 2 studies as follows:

- Teaching interpreting for tourism purposes (Al-Jarf, 2021d).
- Teaching translation for specific purposes (Al-Jarf, 2006).

Cluster 3 – Teaching Approaches for ESP

This cluster contains 3 studies as follows:

- Using online instruction in English for art education (Al-Jarf, 2009b)
- An integrated, communicative approach to teaching English for polytechnic purposes (Al-Jarf, 2022c).
- Can ESP students use artificial intelligence for translating common names of chemical compounds (Al-Jarf, 2025).

The above three-cluster classifications show that the studies are not merely grouped by traditional ESP subfields; rather, they reveal a gradual shift in the researcher's focus over time—from course and program design, to translation and interpreting, to instructional approaches. This organization provides readers with a clearer understanding of the developmental trajectory of the author's ESP research.

2.2 Eligibility (Inclusion & Exclusion) Criteria

To be included in the corpus, studies had to be authored by Reima Al Jarf, published between 1994 and 2025, and contain extractable data relevant to one or more ESP-related domains. Eligible topics included AI-based translation of common chemical compound names; teaching interpreting for tourism purposes; teaching translation for specific purposes; English for legal purposes; English for Islamic studies; English for polytechnic purposes; online instruction in English for art education; teaching and assessing graduate students' research skills in art-education-related ESP; and an ESP program model for graduate students at King Saud University based on their academic and occupational needs. Because the dataset constitutes a closed, author-bounded corpus, all publications were retrieved from the academic platforms listed in Section 2.4, and no external database search was required. Based on these inclusion criteria, several groups of studies by the author were excluded because they fall outside the scope of CLL, as follows:

- Duplicate studies in the form of conference presentations for which full journal articles already exist such as issues in designing English for Islamic studies courses (Al-Jarf, 2021c; Al-Jarf, 2005a).
- The author's papers that focus on specialized linguistic components such as: EFL students' difficulties with lexical and syntactic features of news headlines and news stories (Al-Jarf, 2021b); Can ESL students identify emphatic features of advertisements (Al-Jarf, 2025a); problems of identifying lexical and syntactic features of legal documents by undergraduate EFL students (Al-Jarf, 2023a); processing of advertisements by EFL Arab college students (Al-Jarf, 2007a); a multiple-associations approach to teaching technical terms in ESP courses (Al-Jarf, 2022a); teaching Greek and Latin roots to premedical students with mind-mapping software (Al-Jarf, 2011c); teaching and learning with medical animations and videos (Al-Jarf, 2017); helping

medical students with online videos (Al-Jarf, 2011b); teaching medical terminology with mind-mapping software (Al-Jarf, 2010); teaching grammar for professional purposes (Al-Jarf, 2009a); specialized dictionary mobile apps for students learning English for engineering, business and computer science (Al-Jarf, 2022b).

- Article that partially focus on ESP as: bridging the gap in reading for specific purposes (Al-Jarf, 2013b); using a small network to teach IT and internet searching skills to ESP graduate students (Al-Jarf, 2005b; Al-Jarf, 2005c); training ESP college students in electronic searching (Al-Jarf, 2003; Al-Jarf, 2002); research skills in English for art education (Al-Jarf, 2009); developing and testing reading skills through art texts (Al-Jarf, 2011a); what students' e-mails tell us about their needs (Al-Jarf, 2009c).
- Articles that focus on assessment as these are the focus on another study: teaching and assessing graduate students' research skills in English for art education purposes (Al-Jarf, 2013c); and assessing graduate students' research skills in EFL (Al-Jarf, 2013a); testing reading for specific purposes in an art education course for graduate students in Saudi Arabia (Al-Jarf, 2021e; Al-Jarf, 2021f).

2.3 Corpus Characteristics

The final corpus consisted of ten studies authored by Reima Al Jarf between 1994 and 2025. Because the dataset represents a closed, author-bounded research program spanning more than two decades, it is both comprehensive and internally coherent, reflecting the author's sustained scholarly trajectory in ESP. The studies employ diverse methodological approaches, including qualitative analyses, quantitative counts, and descriptive investigations. All articles share a common focus on ESP, across Islamic, polytechnic, legal, art education, geographic, and chemistry contexts, as well as translation and interpreting for specific purposes, including tourism, and AI-assisted translation. To facilitate synthesis, the ten studies were organized into three thematic clusters, each representing a distinct dimension of the author's research program (see Section 2.3). Together, these clusters provide an integrated overview of the author's contributions to ESP in English, translation, and interpreting. Overall, the corpus reflects a longitudinal, multimodal research agenda that traces the evolution of ESP technologies, instructional strategies, and practices over time.

2.4 Information Sources

The information sources were limited to platforms that index the author's complete scholarly output. No external database search was required, as the aim was not to identify all studies on ESP but to synthesize all ESP studies within a single, self-contained research program. All records were retrieved from publicly accessible academic databases in which the author's publications are fully archived. These sources include Google Scholar, ResearchGate, Semantic Scholar, Academia.edu, SSRN, ERIC, EBSCO, ProQuest, Scopus-indexed journals, and institutional repositories such as the King Saud University repository. Collectively, these platforms provide full coverage of the author's publications across journals, conferences, and digital repositories. All included and excluded studies were verified manually to ensure accuracy, remove duplicates, and confirm alignment with the eligibility criteria described in Section 2.2.

2.5 Data Extraction and Synthesis

Data extraction and synthesis followed an integrated, multi-stage procedure tailored to the descriptive, heterogeneous, and ESP-specific nature of the included studies. For each study, the following information was extracted from the full text: publication year; ESP domain (e.g., translation for specific purposes, interpreting for tourism, English for legal or Islamic studies, English for polytechnic purposes, English for art education, chemistry-related ESP, and general ESP); participant characteristics (e.g., undergraduate EFL learners, interpreting students, translation students, art-education graduate students); methodological approach (qualitative analysis, corpus-based mapping, instructional interventions); data sources (e.g., learner reflections, classroom tasks, surveys, test scores); and key findings related to ESP learning outcomes, assessment results, or pedagogical implications. These categories were selected to support thematic synthesis and cluster-level comparison rather than effect-size calculation, as the corpus consists primarily of qualitative, descriptive, and intervention-based ESP studies. All extracted information was entered into a structured matrix to ensure consistency across studies and to enable systematic comparison. Manual coding was used to preserve conceptual accuracy and to classify each study according to the ESP skill targeted, the technology or instructional tool employed, and the interacting learner groups.

Data synthesis proceeded in three stages: (i) all studies were grouped into 3 thematic clusters based on their ESP focus: ESP course design, translation and interpreting for specific purposes, instructional strategies and technology-supported ESP instruction (see Section 2.3). This clustering enabled synthesis within conceptually unified domains while preserving the distinct contributions of each study. (ii) Within each cluster, studies were compared according to ESP course domain, learner population, teaching methodology, technology used, methodological procedures, data sources, recurring patterns, and pedagogical implications. (iii) Findings were synthesized across clusters to identify broader patterns in ESP teaching and learning, including cross-skill mechanisms, cognitive processes, recurring challenges, and affordances of the strategies and technologies employed.

Because the corpus represents a single author's research program, the methodological framing and analytical categories were highly consistent across studies. This consistency minimized coding discrepancies and enabled a coherent synthesis of ESP findings spanning more than three decades of research.

2.6 PRISMA Flow Description

Because the current review is based on a closed, predefined corpus consisting of 10 studies published by the author between 1994 and 2025, the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) flow reflects a streamlined identification and screening process. All publications within this time frame were retrieved from the academic platforms listed in Section 2.4 and manually screened for relevance. After removing duplicates, all records were assessed against the eligibility criteria. Studies were excluded if they were duplicates or if ESP constituted only a partial rather than a primary focus. Following full-text evaluation, only studies directly addressing the teaching of English, translation and interpreting for specific purposes (e.g., Islamic, legal, polytechnic, tourism, art education, chemistry research, general ESP) were retained. The final set of studies was then organized into 3 thematic clusters for synthesis. The PRISMA flow therefore documents the progression from the initial identification of all publications within the author-bounded corpus, through screening and eligibility assessment, to the final inclusion of studies that directly contribute to the analysis of ESP across diverse technologies and skill domains.

3. Results

3.1 Overview

The results of this SR synthesize findings from 10 studies examining ESP course design, domain-specific skills, instructional strategies, and technologies used. The analysis is organized around the three thematic clusters allowing the results to highlight both the distinct contributions of each ESP strand and the cross-cluster patterns that characterize the author's research program. Across the corpus, the studies consistently demonstrate how specially designed English, translation, and interpreting courses address the academic and professional needs of learners in specific domains. This overview shows the major trends emerging from the corpus, including the ESP domains represented, the instructional strategies employed, the teaching and learning outcomes reported, and how ESP instruction facilitated learning.

The following subsections present detailed findings for each thematic cluster, followed by a cross-cluster synthesis that identifies shared pedagogical principles, recurring challenges, and broader implications for ESP course design and implementation.

3.2 Study Characteristics

Cluster 1 – English for specific purposes course design

The 5 studies in this cluster (Al-Jarf, 2023b; Al-Jarf, 2022c; Al-Jarf, 2021a; Al-Jarf, 2025b; Al-Jarf, 1994) focused on the design and development of ESP courses across a range of academic and professional fields, including legal studies, polytechnic education, Islamic studies, art education, and chemical terminology. Despite the diversity of disciplines, the studies shared a common emphasis on assessing learners' English proficiency level, identifying their academic and occupational needs, and analyzing the linguistic and discourse features characteristic of their area of specialization.

Across the five studies, ESP course design involved selecting authentic texts representing each domain, identifying specialized vocabulary and grammatical structures, and determining the skills required for the effective performance in each domain. For example, the legal English module incorporated legal terminology, complex syntactic patterns, and authentic documents such as contracts and statutes. The polytechnic module outlined procedures for selecting technical terms, defining learning outcomes, and integrating content knowledge with language skills. The analysis of Islamic studies materials highlighted weaknesses in existing in-house textbooks and recommended redesigning the courses to include coherent discourse structures, stylistic features, and appropriate reading and vocabulary tasks. The 1994 general ESP program model proposed grouping students by major, offering intensive transition courses for lower-proficiency learners, and focusing on authentic specialized texts to develop reading, translation, and study skills.

Collectively, these studies demonstrate a consistent approach to ESP course design that prioritizes learners' needs, authentic domain content, clear learning outcomes, and integration of language skills within meaningful academic and professional contexts. Although the fields differ, the studies converge on the principle that effective ESP instruction must align the linguistic content with the cognitive and communicative demands of learners' area of specialization.

Cluster 2 – Interpreting and translation for specific purposes

The studies in this cluster (Al-Jarf, 2021d & Al-Jarf, 2006) examined the design and implementation of instructional models for interpreting and translation within specialized professional and academic contexts. Although the two studies addressed different

domains, tourism interpreting and translation for art-education purposes, they shared a common focus on preparing learners to handle discipline-specific texts and communicative tasks through structured, needs-based ESP instruction.

The interpreting study proposed a comprehensive training model for tourism contexts, outlining the aims, materials, exercises, and assessment techniques required to develop students' ability to interpret English–Arabic content with or without prior preparation. The model incorporated cognitive and linguistic tasks, including breathing and memory exercises, shadowing, paraphrasing, summarizing, and interpreting increasingly complex tourism-related texts. Authentic multimodal materials such as podcasts, documentaries, and TED Talks were used to simulate real-world interpreting conditions, and students engaged in role-play and on-site interpreting at local tourist attractions. The study emphasized the importance of experiential learning, gradual skill development, and exposure to diverse tourism sub-topics (Al-Jarf, 2021d).

The translation study focused on graduate art-education students who required English proficiency to access specialized academic resources. A detailed needs analysis revealed significant gaps in reading comprehension, vocabulary knowledge, and translation ability despite strong disciplinary background knowledge. The instructional model integrated reading comprehension strategies, vocabulary enrichment, and translation techniques using authentic art texts drawn from encyclopedias, museum websites, book reviews, and academic sources. Students practiced identifying text structures, summarizing content, inferring meaning from context, and producing coherent Arabic translations that captured the overall meaning rather than literal sentence-by-sentence renderings. Instruction emphasized leveraging students' disciplinary knowledge, understanding differences between English and Arabic art discourse, and developing balanced translations across multi-section texts. Pre- and post-instruction assessments showed significant improvement in students' translation performance and strong correlations between vocabulary, reading, and translation skills (Al-Jarf, 2006).

Together, these studies highlight the importance of needs-based curriculum design, domain-specific content, authentic materials, and explicit strategy instruction in preparing learners for interpreting and translation tasks in specialized fields. Despite differences in context, both models underscore the value of structured training sequences, gradual skill development, and alignment between linguistic instruction and the communicative demands of the target profession.

Cluster 3 – Teaching Approaches for ESP

The studies in this cluster (Al-Jarf, 2025b; Al-Jarf, 2022c; Al-Jarf, 2009b) examined instructional approaches and technological innovations used to enhance ESP learning across different specialized domains. Although the contexts varied, art education, polytechnic education, and chemical terminology, the studies shared a focus on exploring how instructional strategies and digital tools can support learners' mastery of discipline-specific language skills.

The online-instruction study investigated the impact of supplementing traditional ESP instruction with a home-based online learning environment using Nicenet LMS. Ph.D. students majoring in art-education engaged with curated online resources, participated in asynchronous discussions, and completed vocabulary, reading, and translation tasks linked to authentic art materials. Pre- and post-instruction tests demonstrated significant gains in vocabulary, reading comprehension, and translation ability, and usage statistics showed a positive correlation between students' engagement with the online platform and their achievement. Students reported that online learning increased their motivation, expanded their exposure to authentic art content, and improved their ability to search for information and interact with digital resources (Al-Jarf, 2009b).

The AI-based translation study explored whether ESP students could use artificial intelligence to translate common names of chemical compounds between English and Arabic. By analyzing the accuracy and strategies used by Microsoft Copilot, the study demonstrated that AI tools can provide correct equivalents for a substantial proportion of chemical terms, particularly when users specify the domain and request multiple equivalents. The findings highlighted both the potential and limitations of AI-assisted translation, emphasizing the need for students to guide AI tools with contextual information and to critically evaluate AI-generated outputs (Al-Jarf, 2025b).

The integrated, communicative approach to teaching English for polytechnic purposes proposed a comprehensive instructional model that combines content knowledge with language skills. The model emphasized needs analysis, proficiency assessment, selection of technical terminology, integration of content with listening, speaking, reading, and writing skills, and the incorporation of global events and online resources. The study highlighted the importance of aligning instructional strategies with learners' disciplinary backgrounds and of using communicative, content-based techniques to support language development in technical fields (Al-Jarf, 2022c).

Together, these studies illustrate how technology-enhanced instruction, AI-assisted translation, and integrated communicative approaches can enrich ESP instruction. They demonstrate that effective ESP teaching requires flexible instructional strategies,

authentic materials, and the strategic use of digital tools to meet the evolving linguistic and professional needs of learners in specialized domains.

4. Discussion

4.1 Meta-Conclusion

Across the three thematic clusters, the research studies conducted between 1994 and 2025 reveal a coherent and evolving program of inquiry that consistently positions ESP as a discipline grounded in needs-based course design, domain-specific communication tasks and innovative teaching approaches. Although the studies cover legal, polytechnic, Islamic, art education, interpreting for tourism, and chemical terminology, they collectively demonstrate that effective ESP instruction must be anchored in a deep understanding of learners' academic, professional, and linguistic demands. A meta-level synthesis of the studies shows that needs analysis is the foundational principle underlying all ESP course design efforts. Whether the focus is legal English, polytechnic terminology, Islamic discourse, or research-skills training, the studies consistently highlight gaps in learners' proficiency and the inadequacy of existing instructional materials. This reinforces the central ESP premise that courses must be tailored to the communicative realities of each discipline rather than relying on generic language instruction. The research also demonstrates that ESP is inherently multimodal and multidimensional. In the translation and interpreting cluster, students are required to process specialized texts, apply domain knowledge, and perform cognitively demanding tasks such as summarizing, paraphrasing, and rendering meaning across languages. These studies underscore the importance of integrating linguistic, cognitive, and disciplinary knowledge in ESP pedagogy. The third cluster highlights the growing role of technology and innovative teaching approaches in ESP instruction. Whether through online learning environments or AI-assisted translation tools, the studies show that technology can expand learners' access to authentic materials, enhance engagement, and support the development of specialized vocabulary and reading skills. At the same time, the findings caution that technology must be guided by clear pedagogical principles and critical evaluation, as digital tools alone cannot replace informed instructional design.

Together, the studies reveal a unified research trajectory that advances ESP as a field committed to discipline-specific relevance, learner-centered design, integration of skills and content. The meta-conclusion that emerges is that ESP instruction—regardless of domain—must be responsive, contextualized, and empirically grounded. This thirty-year program of research not only fills gaps in under-represented ESP domains but also offers a comprehensive framework for designing and delivering ESP courses in higher education.

4.2 Meta-Interpretation

A meta-interpretation of the 3 clusters reveals that the research studies in this SR do not merely document isolated ESP practices across different disciplines; rather, it reflects a systemic, evolving understanding of how specialized language learning functions within academic and professional ecosystems. The studies collectively show that ESP is not a uniform instructional model but a dynamic process shaped by specialised knowledge, learner needs and engaging instructional strategies technological affordances. Across the three clusters, a central theme emerges: ESP learning succeeds when linguistic instruction is inseparable from domain knowledge. In legal, polytechnic, Islamic studies, art education, and chemical terminology, students do not simply learn vocabulary—they learn how to *read, think, and operate within* their area of specialization. This suggests that in their ESP learners acquire the analytical habits, content knowledge, and communicative norms of their discipline. The translation and interpreting cluster shows that successful performance requires more than language proficiency. It requires domain knowledge, inferencing skills, memory, summarization, and the ability to navigate multimodal input. These findings imply that ESP tasks activate a number of cognitive processes that combine language, cognition, and domain-specific expertise. The teaching-approaches cluster adds another interpretive layer: Technology acts as both a mediator and amplifier of ESP learning. Online instruction, AI-assisted translation, and integrated communicative approaches reveal that digital tools reshape how learners access content, interact with texts, and construct meaning. The studies also show that the impact of technology depends on instructional purpose, learner engagement, and alignment with domain-specific tasks.

Together, the 3 clusters reveal a meta-pattern: ESP is most effective when it is contextualized, cognitively demanding, technologically supported, and empirically validated. The research program demonstrates that ESP is not a supplementary skill but a core academic competency that enables learners to participate meaningfully in their disciplines. The meta-interpretation thus positions ESP as a field that integrates language skills, cognition and technology into a unified instructional framework that combines disciplinary demands and learner realities.

4.3 Cross-Cutting Insights

A cross-cluster analysis of the 3 thematic areas reveals several insights that cut across the study domains, methodologies, and instructional strategies. Despite the domain diversity, legal, polytechnic, Islamic studies, art education, tourism interpreting, and chemical terminology, the studies collectively reveal a set of foundational principles that define effective ESP practice.

The first cross-cutting insight is the centrality of academic and professional needs analysis in the ESP course design and implementation. Across all clusters, the studies begin by diagnosing learners' linguistic gaps, area of specialty demands, and academic or professional expectations. Whether the goal is to teach legal terminology, interpret tourism discourse, translate chemical compounds, or read art abstracts, the instructional models consistently emerge from a careful mapping of what learners must be able to do in their fields. This confirms that ESP is diagnostic, responsive, and context-dependent, rather than prescriptive or textbook-driven.

The second insight is that the studies show that ESP learners do not merely acquire vocabulary; they acquire the conceptual frameworks, analytical habits, and discourse features of their disciplines. Legal English requires navigating complex syntactic structures; polytechnic English requires understanding technical processes; Islamic studies require sensitivity to discourse coherence and stylistic norms; art education requires the ability to interpret research texts and visual terminology. This demonstrates that ESP learning is a cognitive-disciplinary, not purely linguistic.

The third insight is the role of multimodality and technological mediation. Across clusters, technology appears not as an add-on but as a component of ESP learning strategies. Online LMS expand access to authentic materials; AI tools support translation of chemical terminology; multimedia resources enrich interpreting practice. These studies collectively suggest that ESP instruction depends on learners' ability to explore digital environments, evaluate online information, and use technological tools efficiently. Technology thus functions as a cross-disciplinary literacy, essential for participation in modern academic and professional communities.

Finally, a unifying insight across all clusters is the interdependence of skills (vocabulary, grammar, reading, writing and translation and so on). Reading supports translation; vocabulary knowledge predicts interpreting performance; domain knowledge enhances comprehension; technology use correlates with achievement. These reveal that ESP learning is holistic, requiring the simultaneous development of linguistic, cognitive, technological, and domain competencies.

Together, these cross-cutting insights show that despite the diversity of domains, the underlying logic of ESP remains consistent: learners succeed when instruction aligns with real-world communicative demands, and integrates disciplinary thinking, leverages multimodal resources.

4.4 Implications

The cross-cluster findings of this review carry several important implications: (i) the consistent emphasis on needs analysis across all clusters. Institutions should therefore adopt structured needs-assessment frameworks to ensure that ESP courses reflect the linguistic, cognitive, and professional demands of each discipline rather than relying on generic or intuition-based materials. (ii) The studies demonstrate that ESP curriculum designers and instructors should collaborate closely with subject-matter experts to develop materials that reflect authentic discourse structures, genre conventions, and conceptual frameworks of the target field. Such collaboration is essential for preparing learners to participate meaningfully in academic and professional communities. (iii) The findings highlight the growing importance of technological literacy in ESP learning. Online platforms, digital resources, and AI-assisted tools as integral components of modern ESP pedagogy. Instructors and learners must also be trained to critically evaluate and strategically use technological resources, particularly AI-based translation tools. (iv) ESP instruction should adopt integrated, holistic approaches rather than treating reading, vocabulary, translation, and domain knowledge as separate components.

Collectively, these implications point toward an ESP paradigm that is contextualized, interdisciplinary, technologically informed, and empirically validated. Implementing these principles can enhance the effectiveness of ESP programs and better equip learners to meet the linguistic and academic demands of their fields.

4.5 Positioning This SR Within the Global ESP SR/MA Research

The current SR contributes to the global ESP literature which is traditionally dominated by studies from engineering, business, and medical English contexts. While global ESP research has long emphasized genre analysis, corpus-based studies, and EAP, this ST broadens the scope of ESP by addressing under-represented domains such as Islamic studies, art education, polytechnic studies, law, tourism interpreting, and chemical terminology. This SR aligns with global ESP literature through its reliance on students' needs analysis, which is a practical diagnostic tool that directs the ESP course design, material development, and assessment. This positions this SR within the global movement toward learner-centered, context-responsive ESP pedagogy.

At the same time, this SR extends global ESP research in fields that are rarely examined in the global literature. The detailed analyses of legal discourse, polytechnic and legal terminology, Islamic texts, and art-education research genres contribute to a

more inclusive understanding of ESP as a field that must accommodate cultural registers, and domain identities. This positions the SR as a bridge between global ESP theory and the linguistic realities of non-Western academic contexts.

The integration of technology and AI-assisted tools situates this research within emerging global discussions on digital literacies in ESP. While international studies increasingly explore online learning and machine translation, the research articles reviewed here provides empirical evidence from contexts where technological access is uneven and where AI tools are applied to highly specialized terminology. This contributes to a growing global recognition that ESP pedagogy must evolve alongside technological advancements while remaining sensitive to local constraints.

To summarize, this SR occupies a unique position in the global ESP literature: it aligns with international principles, extends ESP into new areas of specialty, and integrates technologies. In doing so, it contributes to a more extensive and inclusive, understanding of what ESP can be in diverse educational and cultural contexts.

4.6 Comparison of Current findings with Prior SR and MA Results

Findings of the current SR are consistent with findings of prior SRs and MAs in ESP research in that both highlight the centrality of needs analysis, authentic materials, discipline-specific vocabulary, and integrated skills instruction as core components of effective ESP pedagogy. Across all 3 clusters in this SR, the studies demonstrate that ESP instruction is most effective when it is grounded in pre-assessment, tailored to specialized discourse, and supported by authentic texts that reflect real-world communicative demands. However, the current findings extend prior SRs in several ways. Most global reviews focus heavily on ESP in engineering, business, medicine, and aviation domains that dominate the international literature. In contrast, the studies synthesized here address under-represented ESP contexts, including Islamic studies, art education, tourism interpreting, and chemical terminology. These areas are largely absent from existing SRs and MAs in the literature, which means that the present SR fills a gap by documenting how ESP principles operate in these new domains.

Current findings are partially consistent with prior MA which emphasize the importance of technology-enhanced ESP instruction but offer a more nuanced perspective. While global MAs examine technology in well-resourced contexts, the studies reviewed here show how online platforms or AI-assisted translation tools function in environments where access is uneven and where learners rely on home-based or supplementary digital resources. This contributes a unique dimension to the literature by demonstrating how technological innovation can support ESP learning even in settings with limited resources.

Finally, while prior SRs and MAs often treat ESP reading, vocabulary, translation, speaking as separate constructs, the current findings highlight their interdependence. The strong correlations observed between vocabulary, reading comprehension, translation ability, and technology use suggest that ESP learning is holistic, not modular. Therefore, this study advances the field by offering an integrated model of ESP competence that aligns with calls for more multidimensional frameworks.

In sum, the current findings both confirm established global principles and extend the ESP evidence base into new disciplinary, cultural, and technological territories. This positions the reviewed studies as a meaningful contribution to international ESP scholarship and as a corrective to gaps identified in prior SRs and MAs.

4.7 Limitations of This Systematic Review

Although this SR synthesizes more than three decades of ESP research across diverse academic and professional domains, several limitations should be acknowledged. First, the review is based on studies conducted by a single researcher. While this provides a coherent and longitudinal perspective, it may limit the diversity of methodological approaches, and instructional contexts typically found in multi-author or multi-institutional reviews. As a result, the findings reflect a unified research trajectory rather than a broad cross-section of global ESP scholarship. Second, the included studies cover thirty years (1994–2025), during which ESP pedagogy and technological tools, have substantially changed. Earlier studies were conducted in instructional environments with limited technological infrastructure, whereas later studies incorporated online learning and AI-assisted translation. This variation may introduce inconsistencies in the comparability of instructional models, assessment tools, and learner profiles across studies. Third, the review focuses primarily on ESP contexts within Saudi higher education. While this provides valuable insights into under-represented domains such as Islamic studies, art education, polytechnic studies and tourism interpreting, the findings may not fully generalize to ESP settings with different linguistic, cultural, or institutional characteristics. Certain characteristics, such as learners' proficiency levels, curricular structures, and technological access, should be considered when interpreting the broader applicability of the results.

Despite these limitations, this SR offers a comprehensive and coherent account of ESP course design, translation and interpreting pedagogy, and technology-enhanced instruction across multiple specialized fields. The limitations mentioned here provide a foundation for refining future research and expanding the evidence base in under-explored ESP domains.

5.8 Future Research Directions

For ESP research to become more interdisciplinary, technologically informed, methodologically diverse, and globally connected, this synthesis of findings across the 3 clusters points to several directions for future ESP research: (1) exploring specialized domains beyond the traditional engineering-business-medical triad, suggesting that future studies should continue to diversify the disciplinary landscape of ESP. (2) Collaborative research across universities, regions, and countries could illuminate how ESP needs and practices vary across cultural and educational systems. (3) Future research should explore how AI can support genre-based instruction, and how multimodal resources shape comprehension and production in specialized fields. (4) Most ESP studies rely on short-term pre- and posttest designs, which capture immediate gains but do not reveal long-term retention, transfer of learning, or the sustainability of instructional effects. Longitudinal studies could provide deeper insights into how ESP skills evolve as learners progress through academic programs or transition into professional settings. (5) Research on how teachers conceptualize ESP, design materials, and navigate emerging technologies would provide valuable insights for strengthening ESP programs globally.

5. Recommendations

Based on the synthesis of findings across the 3 clusters, the current study recommends the following: (1) Developing ESP curricula for neglected disciplines ensuring that specialized domains receive the same pedagogical attention as traditionally dominant fields. (2) Universities should create dedicated ESP units or centers that support long-term curriculum development, material design, and teacher training, rather than relying on ad-hoc or instructor-driven initiatives. (3) ESP instructors should work systematically with subject-matter experts to co-design materials, validate terminology, and ensure that course content reflects authentic disciplinary practices and epistemologies. (4) There is a need to build discipline-specific corpora in Arabic and English, especially in under-represented fields, to support material development, terminology research, and data-driven instruction tailored to regional academic contexts. (5) ESP programs should explicitly teach students how to navigate databases, evaluate online sources, use AI responsibly, and manage multimodal information in their disciplines. (6) Future research should include cross-institutional collaborations that compare ESP needs, practices, and outcomes across regions, enabling benchmarking and the identification of shared challenges. (7) Given the scarcity of published ESP research from the Arab countries, institutions should support publication, documentation, and open-access dissemination of ESP models, assessments, and instructional innovations.

6. Conclusion

This SR brings together three decades of research on ESP across diverse academic and professional domains. Despite the variation in contexts, ranging from legal studies and polytechnic education to Islamic studies, art education, tourism interpreting, and chemical terminology, the studies collectively reveal a coherent and evolving vision of ESP as a field grounded in contextual relevance, disciplinary authenticity, and evidence-based pedagogy. Across the 3 clusters, the findings demonstrate that effective ESP instruction emerges from a deep understanding of learners' needs, the communicative demands of their disciplines, and the cognitive processes required to navigate specialized texts and tasks. This ST highlights the importance of integrating linguistic skills with disciplinary knowledge, designing instruction that mirrors real-world communicative practices, and using authentic materials that represent each field. The review also shows that ESP pedagogy is shaped by online learning environments, digital resources, and AI-assisted tools that expand learners' access to specialized content and support the development of reading, vocabulary, translation, and research skills. At the same time, the studies emphasize the need for digital literacy and instructional purposes to ensure that technology enhances rather than replaces thoughtful instructional design. Together, studies in this SR contribute to a more expansive and inclusive understanding of ESP, one that embraces under-represented disciplines, integrates multimodal resources, and foregrounds the interdependence of linguistic, cognitive, and disciplinary competencies. This SR not only synthesizes a body of research but also outlines a path forward for future research, curriculum development, and pedagogical innovation in ESP.

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