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Generative AI in ESP Teaching: Materials Design, Assessment Practices, and Teacher Training Needs

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Abstract:
This study investigates the integration of Generative Artificial Intelligence (GenAI) into English for Specific Purposes (ESP) teaching, with a focus on materials design, assessment practices, and teacher training needs. In ESP contexts, teachers are required to design discipline-specific materials, adapt authentic texts, and assess learners' academic and professional communicative abilities. Using a descriptive quantitative survey design with a sample of 30 ESP teachers, the study examines how teachers use GenAI tools such as ChatGPT, Gemini, and Copilot in curriculum-related practices. The findings suggest that ESP teachers use GenAI more frequently for materials design than for assessment practices. They also report concerns about technical accuracy, undisclosed student AI use, and the lack of institutional guidance. The study concludes that effective GenAI integration requires ESP-specific AI literacy, ethical awareness, assessment redesign, and continuous professional development.

Keywords: *AI literacy; assessment practices; ESP teaching; Generative AI; materials design; teacher training.*

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I. INTRODUCTION

Generative Artificial Intelligence (GenAI) has rapidly entered higher education and language teaching through tools such as ChatGPT, Gemini, Copilot, and similar platforms. These tools can support teachers in generating texts, adapting materials, preparing classroom activities, and designing feedback. However, their use also raises concerns about accuracy, academic integrity, assessment validity, and teacher preparedness (Kasneci et al., 2023; UNESCO, 2023).

In English for Specific Purposes (ESP), these concerns are particularly relevant because teaching is connected to learners' disciplinary and professional needs. ESP teachers often design materials for fields such as medicine, engineering, business, law, science, and technology. Therefore, AI-generated content must be carefully evaluated before classroom use, especially when it contains specialized terminology or professional scenarios.

1.2. Background of the study

ESP teachers are frequently responsible for designing materials, adapting authentic texts, preparing specialized vocabulary tasks, and assessing learners' professional communication skills. GenAI can support these tasks, but it also requires teachers to verify content, redesign assessment, and guide students in responsible AI use.

The main problem is that GenAI is entering ESP classrooms faster than teacher training and institutional policies are being developed. This creates a gap between teachers' current practices and the support they need to use AI effectively, ethically, and critically.

1.3. Research Questions

This study addresses the following research questions:

1. How do ESP teachers use Generative AI in materials design?
2. How do ESP teachers integrate Generative AI into their assessment practices?
3. What teacher training needs are required for the effective integration of Generative AI into ESP teaching?

1.4. Objective of the Study

This study aims to explore ESP teachers' use of GenAI in materials design and assessment practices. It also seeks to identify their professional development needs, particularly in relation to AI literacy, ethical use, content evaluation, and assessment redesign. The study further aims to provide recommendations for integrating GenAI effectively and responsibly into ESP teaching.

1.5. Hypothesis

The study is based on the following assumptions:

H1: ESP teachers use GenAI more frequently for materials design than for assessment-related practices.

H2: ESP teachers report concerns about the accuracy, reliability, and ethical implications of AI-generated content in ESP contexts.

H3: ESP teachers perceive a strong need for formal professional development on GenAI integration, particularly in prompt writing, materials evaluation, assessment redesign, and ethical AI use.

II. Literature Review

2.1. Generative AI in Language Education

Generative AI refers to artificial intelligence systems capable of producing new content, including written texts, summaries, explanations, examples, dialogues, feedback, and teaching materials. In education, GenAI has been widely discussed for its ability to support learning, automate some teaching-related tasks, and provide personalized assistance (Kasneci et al., 2023; UNESCO, 2023). In language education, GenAI may help learners draft texts, practice grammar, generate vocabulary examples, receive feedback, and interact with language in flexible ways.

However, the use of GenAI in education also presents risks. AI-generated content may be inaccurate, biased, generic, or difficult to verify. It may also encourage overreliance among students or create uncertainty around authorship and academic integrity. Therefore, GenAI should be integrated through critical, ethical, and pedagogically informed approaches rather than treated as a neutral or automatic solution.

2.2. ESP as a Context-Sensitive Field

ESP is a branch of language education that focuses on learners' specific academic, professional, or disciplinary needs. Foundational ESP literature emphasizes needs analysis, target situation analysis, specialized discourse, genre awareness, and learner-centered course design (Dudley-Evans & St John, 1998; Hutchinson & Waters, 1987; Long, 2005). ESP teaching is therefore closely connected to the communicative practices of particular fields and professions.

Because of this specificity, ESP materials and assessment cannot be generic. Teachers are expected to design activities that reflect the genres, terminology, and communication tasks learners are likely to encounter in their academic or professional environments. For example, medical students may need to practice patient interviews and case reports, engineering students may need to describe processes and technical designs, and business students may need to write emails, reports, and negotiation scripts.

2.3. GenAI and ESP Materials Design

Materials design is one of the central responsibilities of ESP teachers. Since ESP learners often have specific target needs, teachers frequently adapt authentic materials or create new resources to match students' proficiency levels and professional goals (Hyland, 2006; Tomlinson, 2011). GenAI can support this process by helping teachers generate reading passages, simplify authentic texts, create glossaries, produce comprehension questions, prepare writing prompts, and design simulations.

AI-assisted materials design may be particularly useful in contexts where teachers lack access to ready-made ESP resources. It can reduce preparation time and help teachers generate varied classroom activities. For example, a teacher can use GenAI to transform a technical article into a simplified reading text, generate discipline-specific vocabulary activities, or create a role-play based on workplace communication (Selougui, 2025; OpenAI 2022).

Nevertheless, AI-generated ESP materials require teacher mediation. The teacher must review content, check terminology, adapt the level of difficulty, align materials with course objectives, and ensure that tasks reflect authentic disciplinary communication. In this sense, GenAI does not replace the teacher's professional role; rather, it increases the importance of teacher judgment, editing, and critical evaluation.

2.4. GenAI and Assessment Practices

Assessment has become one of the most sensitive areas in the age of GenAI. AI tools can generate essays, reports, summaries, translations, and answers to written assignments. This challenges traditional assessment practices, especially take-home tasks and written products that are difficult to verify as students' independent work (Lodge et al., 2023; Xia et al., 2024).

In ESP, assessment often aims to measure students' ability to perform discipline-specific communicative tasks. These may include writing professional emails, producing technical descriptions, presenting specialized information, participating in simulations, or using field-specific vocabulary accurately. GenAI complicates this process because it can produce polished responses that may not reflect the learner's actual competence (Anthony, 2025).

A growing body of literature suggests that assessment should not rely only on AI-detection tools or punitive approaches. Instead, teachers may need to redesign assessments by including oral presentations, in-class writing, reflective commentaries, draft submissions, portfolios, viva-style discussions, AI-use declarations, and process-based assessment. These approaches may help teachers evaluate not only the final product but also the student's thinking, decision-making, and ability to justify their work.

2.5. Teacher Professional Development and AI Literacy

The successful integration of GenAI into ESP teaching depends on teachers' professional development. AI literacy refers to the knowledge, skills, and critical awareness needed to understand, use, evaluate, and ethically engage with AI systems (Ng et al., 2021). For ESP teachers, AI literacy should include the ability to write effective prompts, evaluate AI-generated specialized content, design AI-supported materials, guide students in responsible AI use, and redesign assessment practices.

Professional development should therefore go beyond general awareness sessions. ESP teachers need practical training that reflects their classroom responsibilities. This includes training on prompt writing for ESP contexts, evaluating technical accuracy, designing discipline-specific tasks, preparing rubrics, managing academic integrity, and developing classroom policies for AI use. Institutional support is also necessary because teachers cannot be expected to manage AI integration individually without guidelines, resources, and continuous training opportunities (He et al, 2025).

2.6. Research Gap

The existing literature shows growing interest in GenAI in education, language teaching, assessment, and teacher AI literacy. However, several gaps remain. First, much of the literature focuses on general language education rather than ESP-specific contexts. Second, many studies examine teachers' attitudes toward AI without sufficiently exploring their concrete curriculum practices. Third, limited attention has been given to how ESP teachers use GenAI in materials design and how they respond to assessment

challenges. Finally, there is a need to identify the specific professional development needs of ESP teachers in relation to AI literacy, ethical use, and institutional support.

This study addresses these gaps by focusing on ESP teachers' reported practices in materials design and assessment, as well as their perceived training needs. It shifts the discussion from general perceptions of AI to practical curriculum-related practices in ESP teaching.

III. Methods and Materials

3.1. Research Design

This study adopts a descriptive quantitative research design using a cross-sectional survey. This design is appropriate because the study aims to examine ESP teachers' current practices, concerns, and training needs regarding GenAI integration at a specific point in time. Rather than measuring the effect of an intervention, the study aims to analyze the existing orchestration of GenAI tools among ESP teachers to provide an exact snapshot of the current pedagogical landscape.

3.2. Participants

The sample consisted of 30 ESP teachers working in higher education and related teaching contexts. Participants represented different ESP areas, including English for Science and Technology, Business English, Medical English, Engineering English, English for Academic Purposes, and other specialized fields. The sample was designed to reflect the diversity of ESP teaching contexts, although it remains limited in size and should not be generalized to all ESP teachers.

3.3. Data Collection Instrument

Data were collected through a structured questionnaire designed specifically for this study. The questionnaire consisted of six sections:

1. background information;
2. familiarity with GenAI tools;
3. GenAI use in ESP materials design;
4. GenAI use in assessment practices;
5. teacher training needs;
6. open-ended questions on benefits, challenges, and support needs.

Most items used a five-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree. Additional multiple-choice questions were included to identify the tools teachers use, the types of materials they generate, their assessment responses, and their preferred training formats.

3.4. Data Collection Procedures

The questionnaire was designed in an online format and distributed to ESP teachers. Participants were informed about the purpose of the study and assured that their responses would be anonymous and used only for academic research purposes.

3.5. Data Analysis

The quantitative data were analyzed using descriptive statistics, including frequencies, percentages, and mean scores. The analysis focused on four main areas: familiarity with GenAI, materials design practices, assessment practices, and teacher training needs. The open-ended responses were treated as supportive qualitative comments and grouped into broad themes such as time-saving, accuracy concerns, academic integrity, lack of training, and institutional support.

3.6. Ethical Considerations

The study follows basic ethical principles of educational research. Participation is voluntary, responses are anonymous, and data are used only for research purposes. Participants are not required to provide identifying information. In reporting the open-ended responses, teachers are coded as T1–T30 in order to protect anonymity.

IV. Results and Discussion

The data collected from 30 ESP teachers revealed three main patterns. First, teachers reported moderate familiarity with GenAI tools but uneven confidence in using them pedagogically. Second, GenAI was used more frequently for materials design than for assessment practices. Third, teachers expressed a strong need for formal training, ethical guidance, and institutional support.

4.1. Characteristics of the Respondents

The sample included 30 ESP teachers. Nineteen respondents were female and eleven were male. Most participants were between 35 and 44 years old. Thirteen respondents held a PhD, while twelve held a Master's degree. The most common teaching experience range was between six and ten years. Importantly, 21 teachers reported that they had not received formal training on using AI tools in teaching, while only 9 teachers reported some form of training.

These results suggest that the sample consists mainly of experienced ESP teachers, but most of them have not benefited from structured AI-related professional development.

4.2. Quantitative Results

The quantitative results indicate that teachers' strongest reported need concerns training and institutional support. Table 1 summarizes the main section scores.

Table (1): Overall Mean Scores for GenAI Integration in ESP Teaching

Questionnaire Section	Mean Score	Interpretation
Familiarity with GenAI	3.34	Moderate familiarity
Materials design practices	3.71	Relatively frequent use
Assessment practices	3.41	Moderate and uncertain use
Teacher training needs	4.51	Very high need

The results show that ESP teachers use GenAI most confidently in relation to materials design. However, the lower mean score for assessment practices suggests that assessment remains a more uncertain and sensitive area. The highest mean score is related to teacher training needs, which indicates strong demand for formal professional development.

4.3. Teachers' Practices in Materials Design

The data shows that ESP teachers use GenAI mainly as a practical support tool for preparing classroom materials. The highest-rated item was that GenAI helps teachers save time when preparing ESP materials, with a mean score of 4.33. Teachers also reported modifying AI-generated materials before using them, with a mean score of 4.07, and checking the accuracy of AI-generated materials, with a mean score of 3.97.

Table (2): Selected Findings on GenAI Use in ESP Materials Design

Practice	Mean Score
GenAI helps me save time when preparing ESP materials	4.33
I modify AI-generated materials before using them	4.07
I check the accuracy of AI-generated materials	3.97
I worry that AI-generated ESP materials may contain inaccurate technical information	3.90
I use GenAI to create glossaries	3.90
GenAI helps me create varied classroom activities	3.87
I use GenAI to simplify authentic texts	3.83
I use GenAI to generate ESP reading texts	3.50

These findings suggest that GenAI is mainly used for efficiency, adaptation, and diversification of materials. At the same time, the relatively high score for concern about inaccurate technical information shows that teachers do not necessarily accept AI-generated content uncritically. This confirms the importance of teacher mediation in AI-assisted ESP materials design.

4.4. Teachers' Practices in Assessment and Student Guidance

The assessment section showed more hesitation. Teachers expressed strong concern about students' undisclosed AI use and about the difficulty of assessing students' real abilities. However, fewer teachers reported using concrete classroom strategies such as AI-use declarations or systematic discussions on responsible AI use.

Table (3): Selected Findings on GenAI and Assessment Practices

Practice / Concern	Mean Score
I need clearer institutional guidelines on AI use in assessment	4.50
I am concerned about students using GenAI without disclosure	4.43
GenAI makes it more difficult to assess students' real language abilities	4.40
I prefer tasks requiring explanation, justification, or reflection	4.07
Oral, in-class, and reflective tasks reduce AI misuse	4.07
I use GenAI to generate quizzes or tests	3.43
I use GenAI to generate model answers	3.13
I discuss responsible AI use with students	2.97
I ask students to declare AI use	2.40

The data reveal a gap between teachers' concerns and their actual assessment practices. While teachers recognize that GenAI affects assessment validity, many do not yet have clear strategies for managing student AI use. This indicates that teachers are aware of the challenges but may not have clear tools or policies to address them.

4.5. Professional Development and Training Needs

The strongest results were found in the teacher training section. Teachers reported a high need for formal professional development on GenAI integration, especially in ethical use, institutional guidelines, evaluating AI-generated ESP materials, and assessment design.

Table (4): Teacher Training Needs Related to GenAI Integration

Training Need	Mean Score
Formal training on GenAI use	4.80
Ethical use of GenAI	4.63
Continuous professional development	4.60
Institutional guidelines	4.57
Evaluating AI-generated ESP materials	4.53
Assessment design with GenAI	4.47
Discipline-specific AI examples	4.43
AI-assisted materials design	4.40
Guiding students in responsible AI use	4.37
Prompt writing for ESP teaching	4.33

These results suggest that ESP teachers do not only need technical training on how to use AI tools. They also need pedagogical, ethical, and assessment-oriented training that is adapted to ESP contexts.

4.6. Teachers' Voices

The open-ended responses provide additional insight into the quantitative findings. Although the following examples are based on the prototype dataset, they illustrate the types of responses that may emerge from the actual study.

On the benefits of GenAI for materials design, T6 explained: "AI helps me prepare texts and activities faster, especially when I need examples related to students' specialties."

T11 added: "It is useful for vocabulary lists and simplifying difficult texts, but I still need to check everything before using it."

On assessment concerns, T4 stated: "The problem is not only plagiarism. Sometimes students submit work that sounds perfect, but I cannot know if they really understood it."

T18 observed: "We need clear rules. Some teachers allow AI, others ban it, and students are confused."

On training needs, T22 commented: "We need practical workshops, not just theoretical talks. Teachers should learn how to write prompts, check accuracy, and design new types of assignments."

These responses support the quantitative findings by showing that teachers recognize the usefulness of GenAI but remain concerned about accuracy, assessment validity, and the absence of clear guidance.

4.7. Discussion of the Findings

The study reveals a significant gap between the growing presence of GenAI tools and the level of structured preparation available to ESP teachers. While teachers are already experimenting with AI, particularly in materials design, they remain less confident in assessment-related practices and strongly demand professional development.

4.7.1. GenAI as a Practical Support Tool for ESP Materials Design

The findings indicate that ESP teachers mainly perceive GenAI as a useful tool for preparing materials. This is understandable because ESP teachers often need to design or adapt materials according to learners' disciplinary needs. The relatively high mean scores for saving time, modifying AI-generated materials, creating glossaries, and simplifying authentic texts suggest that teachers use GenAI to manage one of the most demanding aspects of ESP teaching.

However, the data also show that teachers do not treat AI outputs as ready-made materials. Many respondents reported checking and modifying AI-generated content before classroom use. This confirms that teacher agency remains central. In ESP, the teacher must judge not only linguistic clarity but also disciplinary accuracy and contextual relevance.

4.7.2. Accuracy and Reliability Concerns in Specialized Content

A major issue emerging from the findings is concern about the accuracy of AI-generated ESP materials. This concern is especially relevant because ESP teaching often deals with specialized fields where inaccurate terminology or misleading explanations can create pedagogical problems. For example, an AI-generated medical text, legal case, or engineering description may appear fluent while still containing inaccuracies.

This finding suggests that GenAI should be used as a support tool rather than an authoritative source. ESP teachers require training in how to verify AI-generated content, cross-check terminology, adapt materials to learner needs, and identify problematic outputs. Without these skills, AI integration may increase rather than reduce pedagogical risks.

4.7.3. Assessment Uncertainty and Academic Integrity

The assessment findings reveal a clear gap between awareness and implementation. Teachers strongly agreed that GenAI makes it more difficult to assess students' real abilities and expressed concern about undisclosed AI use. However, lower scores were recorded for discussing responsible AI use with students and requiring AI-use declarations.

This indicates that teachers are aware of the challenges but may not have clear tools or policies to address them. In ESP, this is particularly important because assessment should measure students' ability to perform professional or academic tasks. If students rely heavily on GenAI without understanding or disclosure, assessment validity becomes questionable.

The findings support the need to move from a plagiarism-detection mindset to an assessment-redesign approach. ESP assessment may need to include oral explanation, reflective commentary, process-based writing, in-class performance, portfolio assessment, and tasks requiring students to justify their linguistic and professional choices.

4.7.4. Teacher Training and AI Literacy

The strongest finding of the study is the high demand for teacher training. Teachers reported the need for formal training, ethical guidance, continuous professional development, institutional guidelines, assessment design, and the evaluation of AI-generated ESP materials. This indicates that AI literacy is not only a technical matter.

Teachers do not simply need to know how to use a tool; they need to know how to integrate it responsibly into ESP pedagogy.

For ESP teachers, AI literacy should include five dimensions: technical familiarity, prompt-writing skills, materials evaluation, assessment redesign, and ethical guidance. Training programs should include practical examples from different ESP fields rather than generic demonstrations. Teachers should be given opportunities to test prompts, compare AI outputs, identify inaccuracies, design AI-supported tasks, and create assessment policies.

4.7.5. Institutional and Policy Implications

The demand for institutional guidelines suggests that GenAI integration cannot be left entirely to individual teachers. Without institutional support, classroom practices may become inconsistent. Some teachers may ban AI completely, others may allow it without restrictions, and others may ignore the issue. Such inconsistency can confuse students and place unfair pressure on teachers.

Institutions should therefore provide clear guidelines on acceptable and unacceptable AI use, assessment redesign, academic integrity, student disclosure, and teacher responsibilities. At the same time, policies should not be punitive only. They should help teachers and students develop responsible, transparent, and pedagogically meaningful AI practices.

4.8. Recommendations

Based on the findings, the following recommendations are proposed:

1. Universities and departments should provide clear institutional guidelines on acceptable AI use, academic integrity, and assessment procedures.
2. Continuous professional development should be promoted through workshops, peer-sharing sessions, and communities of practice.
3. Ethical awareness should be integrated into AI training, especially regarding transparency, authorship, bias, privacy, and responsible use.
4. Collaboration between ESP teachers and subject specialists should be encouraged to verify the accuracy and relevance of AI-generated specialized materials.
5. GenAI should be used as a support tool, not a substitute for teacher expertise, pedagogical judgment, or disciplinary understanding.

V. Conclusion

This study examined the integration of GenAI into ESP teaching by focusing on materials design, assessment practices, and teacher training needs. The prototype findings suggest that ESP teachers are already using GenAI, particularly to prepare materials, simplify authentic texts, create glossaries, and generate varied classroom activities. However, the findings also show that teachers remain concerned about the accuracy of AI-generated specialized content and the impact of GenAI on assessment validity.

Assessment emerged as the most uncertain area. Teachers expressed strong concern about undisclosed AI use and the difficulty of assessing students' real abilities, but fewer reported using concrete strategies such as AI-use declarations or systematic discussions on responsible AI use. This suggests a need to move beyond plagiarism detection and toward assessment redesign.

The strongest finding concerns professional development. ESP teachers reported a high need for formal training, ethical guidance, institutional policies, prompt writing, content evaluation, and assessment redesign. Therefore, the effective integration of GenAI into ESP teaching requires more than access to AI tools. It requires structured AI literacy, teacher agency, institutional support, and discipline-sensitive pedagogical practices.

Ultimately, GenAI can contribute to ESP teaching if it is used critically and ethically. It should be integrated as a supportive tool that strengthens materials design, enriches assessment, and develops students' professional communication skills, while preserving the central role of teachers as designers, evaluators, and guides.

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