

## INTEGRATING DIGITAL AND AI-POWERED TOOLS FOR ESP: BENEFITS AND CHALLENGES

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### Abstract

*The rise of digital technologies and AI has reshaped English for Specific Purposes (ESP) teaching, creating new possibilities for engagement and skill development. This study reviews recent research in global higher education, examining benefits and challenges of using tools such as Moodle, Zoom, ChatGPT, and Grammarly. Advantages include learner autonomy, collaboration, authentic practice, and data-driven learning, while challenges involve access gaps, teacher readiness, pedagogy, integrity, and privacy. Grounded in frameworks by Richards and Rodgers and Kukulska-Hulme, the study calls for strategic integration through institutional support, teacher training, and digital literacy to ensure sustainable, goal-aligned ESP learning environments.*

**Keywords:** ESP, digital technologies, AI-powered tools

**JEL:** I23, O33, J24, A22

### Introduction

The rapid advancement of digital technologies and artificial intelligence (AI) has reshaped the landscape of ESP teaching and learning. Once reliant on static textbooks and traditional classroom interactions, ESP pedagogy now encompasses a wide range of digital platforms, AI-powered applications, and multimedia resources that can enhance discipline-specific language acquisition. The shift towards technology-enhanced ESP instruction is driven by global trends in higher education, increased demand for workplace-relevant communication skills, and the necessity to prepare learners for participation in digitally mediated professional environments (Benek, 2024; Kakoulli Constantinou & Papadima-Sophocleous, 2020).

Incorporating tools such as **Moodle**, **Google Classroom**, **Zoom**, and **Microsoft Teams** has enabled flexible, blended, and remote learning models, while applications like **Quizlet**, **Kahoot!**, and **Padlet** have gamified and personalised vocabulary learning in professional contexts. AI-powered tools, including

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**ChatGPT, Grammarly, and QuillBot**, offer learners immediate language feedback, supporting writing accuracy and stylistic adaptation to discipline-specific norms (Topal & Çoban, 2023). In highly specialised ESP domains – such as maritime communication or technical English – simulation software and corpus-based tools provide authentic, task-based training that bridges theory and practice (Kravchenko, 2024).

However, as the literature consistently notes, the integration of these tools presents notable challenges. Issues such as unequal access to technology, gaps in teacher digital competence, over-reliance on AI-generated content, and the need for careful pedagogical alignment can hinder the effective adoption of digital solutions (Rachmawati & Irawan, 2024; Kismetova & Utegenova, 2025). Concerns over privacy, assessment integrity, and cultural acceptance of technology-based methods further complicate the integration process.

This paper synthesises findings from recent studies across diverse ESP contexts – including higher education institutions in Europe, Asia, and beyond – highlighting the benefits and challenges of using digital and AI-powered tools. By examining the experiences reported by educators and researchers in the reviewed articles, the study aims to offer a nuanced perspective on how these tools can be strategically implemented to support both language acquisition and professional skill development.

### **Research goal and tasks**

The primary goal of this research is to examine the integration of digital and AI-powered tools in English for Specific Purposes (ESP) teaching and learning, identifying the pedagogical benefits and implementation challenges across diverse higher education contexts. The study aims to synthesise insights from recent empirical studies to provide evidence-based recommendations for effective technology adoption in ESP.

**Specific Research Tasks To achieve this goal, the study addresses the following tasks:**

1. **Review** recent literature on digital and AI-powered tools in ESP and ESAP instruction, with a focus on theoretical frameworks, technological trends, and pedagogical applications.
2. **Identify and categorise** the range of digital tools cited in current ESP research, detailing their primary functions and pedagogical purposes.
3. **Analyse** the benefits of integrating these tools into ESP, including impacts on learner engagement, accessibility, autonomy, and discipline-specific competence.

4. **Examine** the challenges associated with tool adoption, such as technical, pedagogical, and institutional constraints, as well as issues of academic integrity, privacy, and cultural acceptance.
5. **Synthesise** findings into a balanced framework for integrating digital tools in ESP, offering practical recommendations for educators, curriculum designers, and policymakers.

### Literature review

The integration of digital tools into English for Specific Purposes (ESP) instruction is underpinned by established pedagogical frameworks and evolving technological innovations. Foundational models of language teaching, such as Richards and Rodgers' (2014) comprehensive framework of approaches and methods, provide a conceptual basis for aligning instructional techniques with learner needs, syllabus design, and assessment practices. This framework has been adapted for technology-mediated contexts, enabling educators to select digital tools that support both communicative competence and subject-specific literacy.

The shift towards digitally enhanced ESP is further informed by Kukulska-Hulme's (2012, 2020) research on Mobile-Assisted Language Learning (MALL), which highlights the value of context-aware, flexible learning opportunities facilitated by mobile devices. Her work demonstrates how mobile platforms can extend ESP practice beyond the classroom, fostering situated learning experiences tailored to learners' professional fields. Similarly, studies on **digital literacy in higher education** emphasise the necessity for both students and teachers to develop skills for critically engaging with online resources and managing multiple digital platforms effectively.

A significant strand of ESP research has examined the role of **authentic materials** and **task-based learning** in technology-rich environments. Bhatia's (2014) work on critical genre analysis and Hyland's (2004, 2012) studies on academic discourse inform the development of ESP activities that integrate authentic texts, simulations, and domain-specific communication tasks. Tools such as **corpus analysis software** (AntConc) and discipline-specific online corpora, cited by Kravchenko (2024) and Živković (2016), enable learners to identify linguistic patterns, collocations, and register-specific conventions relevant to their professional domains.

In terms of learner engagement, gamification platforms like **Kahoot!**, **Quizlet**, and **Socrative** have been shown to enhance motivation and retention of technical vocabulary (Kismetova & Utegenova, 2025; Rashidova, 2024).

The literature also reflects growing interest in AI-powered language learning tools, including ChatGPT, Grammarly, QuillBot, and DeepL. Studies by

Topal and Çoban (2023) report that such tools support self-directed learning by providing instant language feedback, paraphrasing options, and translation assistance. However, concerns about over-reliance on automation and reduced critical language processing skills have been repeatedly noted (Topal & Çoban, 2023).

Challenges in implementation have been well-documented, particularly in relation to the digital divide. These include disparities in access to devices and connectivity, variations in teacher digital competence, and institutional infrastructure gaps. Furthermore, studies warn of privacy and security risks associated with cloud-based collaboration tools (Topal & Çoban, 2023), as well as the potential for cultural resistance to technology-enhanced instruction (Hasanah et al., 2024).

Overall, the literature indicates a consensus: digital tools, when carefully selected and pedagogically integrated, have the potential to significantly enrich ESP instruction. However, their success depends on contextual factors such as institutional readiness, teacher training, learner autonomy, and the appropriateness of the tool for the targeted professional domain. This dual perspective informs the subsequent analysis of benefits and challenges, as presented in the Findings section of this paper.

### **Digital tools**

The reviewed articles present a diverse range of **digital tools** integrated into English for Specific Purposes and English for Specific Academic Purposes (ESAP) teaching, highlighting both general educational technologies and specialised language learning platforms. Across contexts, these tools serve multiple pedagogical functions – from facilitating vocabulary acquisition and communicative competence to fostering collaboration and autonomous learning.

**First, Learning Management Systems (LMSs)** such as Moodle and Google Classroom are frequently mentioned as central organisational platforms for ESP courses. They enable structured delivery of content, assignment submission, and feedback, while also integrating multimedia materials to support multimodal learning (Benek, 2024; Kravchenko, 2024). These systems are also valued for enabling **blended learning** models, combining synchronous and asynchronous instruction. In ESP contexts, this flexibility ensures that students can revisit complex terminology, review professional case studies, and practise language skills at their own pace.

**Video conferencing platforms** such as **Zoom, Microsoft Teams, and Google Meet** provide the added benefit of real-time interaction (Kakoulli Constantinou & Papadima-Sophocleous, 2020; Kostoulas, 2024). These tools replicate face-to-face communication, enabling oral practice, group discussions, and live

presentations – activities essential for developing communicative competence in specialised domains. Screen sharing and breakout rooms further support collaborative learning and situational simulations, fostering authentic professional discourse. Authors note their utility for conducting role-plays, presentations, and group discussions in ESP contexts.

**Third, multimedia content creation tools** – including Canva, Padlet, and Genially – are cited as effective for promoting student-generated content, fostering creativity, and contextualising ESP learning in professional scenarios (Jambulova, 2024; Živković, 2016). Overall they encourage creativity and learner autonomy (Jambulova, 2024; Živković, 2016), enabling students to produce discipline-specific visual materials – such as infographics, posters, or interactive presentations – which helps reinforce terminology retention and contextual understanding. The visual and interactive nature of these tools enhances comprehension for complex technical concepts, making them particularly valuable in ESP. For example, Padlet supports collaborative brainstorming and peer feedback, while Canva allows for the design of professional-style presentations and infographics tailored to the target discipline.

The introduction of **AI-powered tools** such as **ChatGPT**, **Grammarly**, and **QuillBot** (Lika, 2024; Topal & Çoban, 2023) provides immediate, personalised feedback on writing. These applications support grammatical accuracy, paraphrasing, and stylistic refinement, helping students adapt their output to the conventions of specific professional or academic genres. They are cited for writing assistance, grammar checking, and paraphrasing tasks. These tools not only provide immediate feedback but also model correct usage and help learners refine discipline-specific register. Such tools also allow for more autonomous learning, as students can independently revise and improve their work before submitting it for instructor evaluation. Additionally, AI-based translation platforms such as DeepL and Google Translate are mentioned as aids for comprehension and vocabulary acquisition in technical contexts (Benek, 2024).

Specialised **language learning applications** like Quizlet, Kahoot!, and Socrative are cited for vocabulary drilling, interactive quizzes, and formative assessment (Kismetova & Utengenova, 2025; Rashidova, 2024). For **vocabulary development**, these platforms offer engaging, gamified learning experiences. By enabling teachers to create ESP-specific vocabulary sets, these tools make terminology acquisition more interactive and competitive, increasing motivation and retention. In addition, they support formative assessment by giving both learners and teachers instant feedback on progress. Quizlet, in particular, is noted for allowing teachers and students to create ESP-specific term sets, while Kahoot! gamifies assessment to increase engagement.

In professional fields such as maritime studies, **simulation software** like maritime navigation simulators (Kostoulas, 2024) delivers authentic, scenario-based training. Such tools bridge the gap between theory and practice by allowing learners to rehearse professional communication in high-stakes environments, reinforcing both linguistic and operational competencies. Overall, they enable authentic, task-based learning and allow learners to practise communication protocols and terminology in realistic, high-stakes scenarios.

**Collaboration platforms** like Google Docs, Microsoft OneDrive, and Trello are valued for enabling real-time document co-creation and project management in ESP tasks (Rachmawati & Irawan, 2024; Rashidova, 2024). These tools support peer review and group assignments, reflecting professional workflows in the target fields.

Facilitating real-time document editing and project management, these tools simulate professional team workflows, preparing students for collaborative tasks in the workplace. Peer review features also foster critical thinking and editing skills, which are essential in ESP writing contexts.

Several authors emphasise **corpus tools** such as AntConc and online discipline-specific corpora for vocabulary analysis and genre awareness (Kravchenko, 2024; Živković, 2016). Overall, they help learners analyse authentic language use within their target field. This encourages data-driven learning, allowing students to identify collocations, concordance patterns, and register-specific structures relevant to their discipline.

For oral skills, **speech recognition apps** like **Speechling** and **ELSA Speak** (Kismetova & Utegenova, 2025; Hasanah et al., 2024) offer automated pronunciation feedback, helping students fine-tune their delivery of technical terms. This is particularly useful in fields where accuracy of pronunciation can affect professional credibility and clarity. In other words, they provide automated feedback on pronunciation accuracy and fluency, which is particularly useful for ESP learners aiming to master technical terminology.

**Multimedia repositories** like YouTube, TED Talks, and discipline-specific video archives are cited as authentic input sources (Benek, 2024; Jambulova, 2024). They provide real-world examples of professional discourse, allowing learners to analyse speech patterns, terminology, and discourse structures. In other words, by supplying authentic, domain-relevant listening materials, learners are exposed to diverse accents, discourse patterns, and specialised vocabulary, while also offering models of professional presentations and discussions.

Additionally, **learning analytics tools** embedded in LMSs or standalone platforms are mentioned for tracking learner progress and tailoring instruction (Benek, 2024). These data-driven insights help teachers identify areas for intervention and adjust materials accordingly. Overall, by providing valuable insights into student performance and engagement, teachers can use these

analytics to tailor instruction, identify struggling learners, and adjust materials to meet specific needs.

Across all studies, there is a clear emphasis on the adaptability of digital tools to **discipline-specific needs**, from AI chatbots simulating professional dialogues (Chetveryk, 2025) to interactive glossaries for technical vocabulary (Lika, 2024). The integration of these tools reflects a shift towards learner-centred, technology-enhanced ESP pedagogy, where digital affordances are leveraged not only for language acquisition but also for professional skills development. In sum, the benefits of integrating these digital tools into ESP instruction include enhanced flexibility, richer exposure to authentic materials, improved learner autonomy, and more engaging, interactive learning experiences. These technologies not only address linguistic development but also prepare learners for the communicative and collaborative demands of their professional fields.

Findings: benefits of digital tools for ESP teaching and learning

Across the reviewed studies, the use of digital tools in ESP and ESAP contexts has been associated with enhanced flexibility, engagement, and professional relevance.

- **The first benefit pertains to ensuring flexibility and accessibility.** LMSs enable students to access materials, assignments, and feedback at any time, supporting both synchronous and asynchronous learning (Benek, 2024; Kravchenko, 2024). This flexibility is particularly valuable for revisiting complex terminology, reviewing case studies, and practising language at an individual pace.
- **The second benefit is connected with real-time interaction.** Video conferencing platforms facilitate oral practice, live discussions, and group presentations (Kakoulli Constantinou & Papadima-Sophocleous, 2020; Kostoulas, 2024).
- **Moreover, AI offers language support, as** various applications provide instant writing feedback, enabling students to refine grammar, paraphrasing, and register (Lika, 2024; Topal & Çoban, 2023).
- **Next, gamified learning and assessment is ensured, which has been found to** increase motivation and retention of ESP-specific terminology.

The next section offers a more detailed analysis of the benefits of **creativity and autonomy, on the one hand, and the support for authentic professional practice.**

**Firstly,** tools like **Canva, Padlet, and Genially** encourage learners to produce visual and interactive materials for discipline-specific contexts (Jambulova, 2024; Živković, 2016). This creative engagement deepens conceptual understanding and promotes independent learning. In other words, such digital platforms

offer students opportunities to engage with content in ways that extend beyond traditional text-based assignments. Each of these tools allows learners to design and present **visual and interactive artefacts** that mirror the communicative practices of their disciplines. In ESP contexts, this is particularly valuable because students are not only required to demonstrate linguistic competence, but also to apply their knowledge within professional genres that often demand multimodal representation. For instance, Canva enables the creation of policy briefs, infographics, and presentations that integrate text with charts, maps, and iconography; Padlet facilitates collaborative boards where learners can curate resources, post reflections, and co-construct timelines or case analyses; and Genially allows for the design of interactive posters, quizzes, and presentations, which can simulate professional outputs such as digital campaigns or training materials.

Engaging in these creative tasks requires learners to make deliberate decisions about **content selection, organisation, and multimodal representation**. This process inherently deepens **conceptual understanding**, as students must distil complex ideas into concise, audience-appropriate messages while maintaining disciplinary accuracy. For example, political science students asked to visualise a conflict timeline or create a diplomatic communiqué must clarify relationships, hierarchies, and causal links, thereby reinforcing their grasp of both language and subject matter. Similarly, vocational learners designing safety posters in Canva or interactive checklists in Genially practise applying technical vocabulary in authentic communicative contexts.

Moreover, these tools promote **independent learning** by shifting responsibility for knowledge construction to students. Instead of passively receiving content, learners actively transform information into multimodal artefacts that reflect their interpretation and understanding. This aligns with constructivist and experiential learning theories, where the act of creating becomes an integral part of learning. The autonomy provided by design platforms also fosters learner confidence, digital literacy, and critical thinking, as students experiment with rhetorical strategies and visual choices to achieve communicative goals.

Importantly, the use of tools like Canva, Padlet, and Genially supports the development of **transferable skills**. Beyond linguistic outcomes, students learn to communicate persuasively, manage collaborative projects, and present ideas professionally - skills that are directly relevant to academic conferences, workplace communication, and public advocacy. When thoughtfully integrated into ESP courses, these tools therefore serve not merely as digital add-ons but as **pedagogical mediators** that connect language learning with disciplinary practices and professional readiness.

**Secondly**, simulation tools, such as maritime navigation software, replicate real-life professional environments, bridging theory and practice (Kostoulas, 2024; Călin, 2024). **They** provide learners with immersive opportunities to replicate professional environments and tasks that they are likely to encounter in their future careers. In vocational and ESP contexts, these tools serve as **authentic mediators** between theoretical instruction and practical application. For example, maritime navigation simulators enable students to practise ship-handling, route planning, and communication protocols in a safe, controlled environment that closely mirrors the conditions of real-life operations. By working with simulated radar systems, electronic charts, and vessel control interfaces, learners gain hands-on familiarity with professional equipment and procedures, while simultaneously reinforcing the specialised vocabulary and discourse practices required in the maritime industry.

This process bridges the often-cited gap between **theory and practice**. Concepts introduced in the classroom, such as navigation rules, safety procedures, and international maritime regulations, are not left abstract but applied in context through interactive scenarios. When students navigate simulated vessels or respond to emergency situations, they are compelled to apply both their technical knowledge and their linguistic competence in ways that reflect authentic professional demands. Such tasks mirror workplace communication, requiring learners to give and follow instructions, log activities, and use maritime English in real time.

Furthermore, simulation-based learning fosters **experiential and situated learning** (Kolb, 1984). Learners engage in problem-solving, decision-making, and teamwork under conditions that approximate professional reality, which enhances retention and transferability of knowledge. Errors made in a simulation do not carry the risks of real-life navigation but still provide valuable feedback, allowing students to develop critical thinking, resilience, and adaptive strategies.

Finally, the integration of simulation tools supports broader educational objectives by enhancing **learner motivation and engagement**. The interactive, hands-on nature of simulators captures student interest and reinforces the relevance of theoretical study to professional practice. By contextualising abstract content within realistic tasks, simulation software encourages deeper learning, autonomy, and preparedness for the workplace.

### **Findings: challenges of digital tools for ESP teaching and learning**

While the use of digital tools in ESP instruction offers numerous pedagogical benefits, the reviewed articles also reveal a set of challenges that affect their implementation. These challenges span technological, pedagogical, and learner-related factors, underscoring the need for careful planning and support.

A primary obstacle is **unequal access to technology**. Several authors (Benek, 2024; Kakoulli Constantinou & Papadima-Sophocleous, 2020) note that students may lack reliable internet connections, up-to-date devices, or the digital literacy required to fully benefit from tools such as Moodle, Google Classroom, or AI-based platforms. This “digital divide” is particularly evident in regions where institutional infrastructure is underdeveloped, limiting the feasibility of synchronous sessions and high-bandwidth tools like Zoom or Microsoft Teams. Overall the **digital divide pertains to** unequal access to devices, stable internet, and updated software remains a significant barrier. Such disparities can hinder participation in both synchronous and high-bandwidth activities.

**Teacher readiness** emerges as another significant barrier. As Kravchenko (2024) and Rachmawati & Irawan (2024) point out, effective integration of tools like corpus software, learning analytics, or simulation technologies requires not only technical know-how but also pedagogical adaptation. Instructors who are unfamiliar with the functionalities of AI tools such as ChatGPT or Grammarly may underuse them or fail to align them with learning objectives. Moreover, some teachers may resist technology adoption due to workload concerns or scepticism about its value. Successful integration of AI tools, corpus analysis software, and learning analytics requires technical skills and pedagogical adaptation. Some instructors lack confidence or training in these areas.

**Pedagogical alignment** is a recurring theme. Tools such as Kahoot! and Quizlet, while engaging, risk being used for surface-level recall unless carefully embedded into task-based, context-rich ESP activities (Kismetova & Utegenova, 2025; Rashidova, 2024). Similarly, the integration of AI-powered writing aids (Lika, 2024; Topal & Çoban, 2023) raises concerns about over-reliance, where students may bypass critical thinking and editing skills in favour of automated corrections.

**Technical issues** can also disrupt learning. Authors such as Kostoulas (2024) and Călin (2024) note that simulation software and high-end multimedia platforms are prone to lag, compatibility problems, or the need for specialised equipment. These disruptions can hinder continuity in skills training and reduce student motivation. Simulation software and multimedia-heavy platforms can suffer from lag, compatibility issues, or hardware demands, disrupting training continuity.

**Assessment integrity** presents another concern. Online testing tools like Socrative and Google Forms, while efficient, are vulnerable to cheating if not accompanied by appropriate safeguards (Benek, 2024). The challenge lies in designing assessments that are authentic, open-ended, and difficult to replicate without genuine engagement. Online assessment tools are susceptible to cheating without authentic, open-ended task design.

The **cognitive load** of managing multiple platforms simultaneously can overwhelm learners and teachers alike. As Jambulova (2024) and Živković (2016) observe, juggling an LMS for content delivery, separate apps for vocabulary drills, and external tools for collaboration requires careful scheduling and digital literacy skills. Without proper orientation, students may spend more time navigating platforms than engaging with ESP content. In other words, navigating multiple platforms for different purposes can overwhelm learners and reduce focus on content.

There are also **privacy and data protection issues**. Some authors (Topal & Çoban, 2023; Rashidova, 2024) raise concerns about the use of cloud-based collaboration tools like Google Docs and Trello, which involve sharing personal data and potentially sensitive project work. Institutions may lack clear policies on data storage and consent, placing both teachers and learners at risk. Overall, cloud-based collaboration tools involve potential risks for data security, especially when handling sensitive projects.

**Cultural and motivational factors** influence the uptake of technology. In some contexts, learners accustomed to traditional teacher-centred instruction may view tools like Padlet or Genially as “non-academic” or time-consuming (Hasanah et al., 2024). This resistance can limit active participation, especially in collaborative or creative tasks. In other words, in some learning cultures, technology-driven activities may be perceived as non-academic or distracting.

Finally, **content adaptation for ESP** can be time-intensive. While tools such as YouTube or TED Talks offer rich authentic materials, they often need to be carefully selected, edited, and supplemented to match learners’ proficiency levels and disciplinary focus (Benek, 2024; Jambulova, 2024). Without this adaptation, learners may face comprehension difficulties that reduce the effectiveness of the activity. In fact, authentic resources often require careful editing to match learners’ proficiency levels and field-specific needs.

## Conclusion

The integration of digital tools into ESP teaching and learning presents a dynamic set of opportunities and challenges. On the one hand, platforms such as Moodle, Google Classroom, Zoom, and specialised applications like Quizlet, ChatGPT, and maritime simulators enhance accessibility, engagement, and authenticity in language learning. They enable flexible, learner-centred instruction, support the development of discipline-specific competencies, and foster collaboration in ways that mirror professional practice. On the other hand, their effective use is constrained by unequal access to technology, varying levels of teacher readiness, potential over-reliance on automation, technical disruptions,

and the need for careful pedagogical alignment. Issues of academic integrity, privacy, and cultural acceptance further complicate implementation.

Ultimately, the success of these tools in ESP depends on strategic integration grounded in sound pedagogy, institutional support for infrastructure and training, and the cultivation of digital literacy among both teachers and learners. When these conditions are met, digital tools can move beyond being mere add-ons to become integral components of a sustainable, context-sensitive ESP learning environment.

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