Journal of Creative Practices in Language Learning and Teaching (CPLT)
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PREFACE

THEME: Creative Spaces for Learning – Redefining Classrooms with AI in the 21st Century

The rapid advancement of artificial intelligence (AI) is reshaping the educational landscape in profound and unprecedented ways. No longer confined to the realm of science fiction, AI has emerged as a powerful force within classrooms, enhancing learning, personalizing instruction, and enabling new forms of creativity and engagement. Recognizing the importance of this shift, this special issue of the *Journal of Creative Practices in Language Learning and Teaching (CPLT)* is dedicated to the theme *"Creative Spaces for Learning: Redefining Classrooms with AI in the 21st Century."*

This issue brings together a diverse collection of scholarly works that explore how AI technologies are being adopted, adapted, and critiqued across a variety of educational contexts. From programming classes and ESL classrooms to entrepreneurial initiatives and financial literacy efforts, these papers offer insight into how AI can be meaningfully integrated to create learning environments that are not only intelligent but also inclusive, ethical, and imaginative.

The contributions featured in this issue include:

1. **Examining Student Satisfaction with the BMC Touch Application: The Role of Perceived Usefulness, Perceived Ease of Use, Application Performance and Interface Quality**
2. **AI-Driven Pedagogies: Reimagining English Language Learning in Creative Classroom Spaces**
3. **Generative Artificial Intelligence in Computer Programming Classrooms: A 21st-Century Review**
4. **AI or I? Exploring Student Attitudes Toward AI-Assisted Article Analysis**
5. **Enhancing University Students' Financial Satisfaction Through AI-Driven Financial Tools**
6. **Reimagining ESP Classrooms in Higher Education: An Empirical Mapping of Creative Spaces Enhanced by Artificial Intelligence**
7. **Exploring The Influence and Effectiveness of Block-Based Visual Programming on Self-Efficacy towards Human Resource Students: A Systematic Review**
8. **TESL Students' Intention to Use AI in Academic Writing: A Research Protocol**
9. **Empowering Shariah-Compliant Knowledge Online Business among Student Entrepreneurs: Integrating Teaching and Learning using AI Technology Tools**

Each article in this special issue contributes to a larger conversation about the role of AI in education, not as a replacement for human connection, but as a partner in creating dynamic, responsive, and future-ready learning environments. We believe this issue will spark further research, dialogue, and innovation, and we are proud to support these scholarly efforts.

On behalf of the editorial team, I extend our sincere appreciation to the authors, reviewers, and contributing scholars whose commitment to excellence has made this issue possible.

Warm regards,

Associate Professor Dr. Azlyn Ahmad Zawawi
Guest Chief Editor
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Reimagining ESP Classrooms: Mapping AI-Enhanced Creative Learning Spaces

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ABSTRACT

The integration of artificial intelligence (AI) is reshaping English for Specific Purposes (ESP) instruction in higher education, offering new opportunities to foster creativity, autonomy, and professional language skills. Traditional ESP classrooms often face limitations due to rigid curricula, static assessments, and minimal personalization. This study aims to explore how AI tools are transforming ESP classrooms into creative and adaptive learning environments. Although various AI applications have been introduced, including ChatGPT, adaptive platforms, and generative AI, there remains a lack of comprehensive synthesis on how these tools support creative spaces in ESP contexts. Addressing this gap, the study employed a systematic empirical mapping method to analyze 20 peer-reviewed Scopus-indexed articles published between 2020 and 2024. The analysis revealed several key themes: AI-facilitated formative assessment, immersive virtual learning spaces, ethical considerations, and improved learner motivation and reflection. Findings show that AI technologies can support personalized, feedback-rich, and creativity-driven instruction, aligning ESP learning with 21st-century educational demands. The study contributes to the growing field of AI-enhanced pedagogy by providing practical and theoretical insights for designing inclusive, learner-centered ESP curricula. It also calls for further empirical research into co-designed and ethically guided AI applications in language education.

Keywords: English for Specific Purposes (ESP), Artificial Intelligence in Education, Creative Learning Environments, Adaptive Learning Technologies, Generative AI in Language Teaching

INTRODUCTION

The rapid proliferation of digital technologies has significantly reshaped the educational landscape in the 21st century, particularly in higher education. Among these innovations, artificial intelligence (AI) has emerged as a transformative force, revolutionizing how knowledge is delivered, accessed, and assessed. Initially rooted in data science and automation, AI is now widely applied in education through intelligent tutoring systems, adaptive learning platforms, automated feedback tools, and natural language processing applications such as ChatGPT. These technologies are increasingly employed to personalize learning experiences, enhance pedagogical efficiency, and support learner engagement (Chai & Liu, 2022; Üstün & Yavuz, 2024). As institutions shift toward flexible, outcome-driven, and learner-centered models, AI functions not only as an instructional tool but also as a catalyst for broader pedagogical transformation.

Within this evolving digital ecosystem, the field of English for Specific Purposes (ESP), which focuses on discipline-specific language instruction, has begun to integrate AI tools to address the diverse and specialized needs of contemporary learners. As global educational demands grow more complex, ESP instruction must evolve beyond static, one-size-fits-all paradigms. AI technologies now provide opportunities to design creative, adaptive, and responsive learning environments that foster both linguistic proficiency and professional communication competencies (Tang, 2023; Palamar et al., 2023).

Integral to this transformation is the rise of creative learning spaces, which are educational environments intentionally designed to promote autonomy, collaboration, and critical thinking through immersive and personalized experiences. When enhanced by AI, these spaces challenge traditional pedagogies and reframe ESP instruction as a dynamic process of exploration and innovation.

However, despite these promising developments, significant barriers remain. Many ESP classrooms continue to operate within rigid curricular frameworks, suffer from minimal technological integration, and exhibit misalignment between assessment practices and the competencies needed in 21st-century professional contexts (Zhu, 2022). While various studies have demonstrated the effectiveness of AI tools such as writing assistants (Dou, 2024), virtual reality simulations (Lu, 2025), and collaborative platforms (Emerson, 2024), there remains a lack of comprehensive synthesis regarding how these technologies are collectively transforming ESP classrooms into creative learning spaces.

To date, research has largely focused on isolated aspects of AI integration in ESP instruction, including student perceptions (Sinkus & Ozola, 2024), writing proficiency gains (Dou, 2024), curriculum adaptation (Tang, 2023), and interactive teaching strategies (Lu, 2025). Although informative, these studies offer fragmented insights and fall short of capturing the holistic pedagogical shifts occurring in the field. Moreover, few employ systematic empirical mapping methods to trace these developments across diverse academic disciplines and institutional settings.

Recent scholarship has responded to these limitations by calling for a reconceptualization of traditional ESP needs analysis, particularly in light of digital and hybrid learning environments. For instance; Mansor et al. (2024) propose a stakeholder-informed framework that integrates technological advances, learner diversity, and evolving instructional goals, an approach that is increasingly relevant for ESP classrooms shaped by AI.

This study seeks to fill this gap by conducting a systematic empirical mapping of AI-enhanced creative learning environments within ESP higher education. It is guided by three objectives: (1) to identify key AI applications transforming ESP instruction, (2) to synthesize evidence on their pedagogical, cognitive, and affective impacts, and (3) to map prevailing challenges, ethical considerations, and future research directions.

The study offers two main contributions. First, it provides a structured, data-driven synthesis of recent empirical literature, offering educators and researchers a clearer understanding of AI's transformative role in ESP pedagogy. Second, by framing AI within the context of creative learning spaces, it proposes a novel conceptual approach for rethinking how language education is designed and delivered in technology-rich environments.

The remainder of this paper is structured as follows: Section 2 presents the literature review, synthesizing foundational and emerging studies on AI in education, creative learning spaces, and ESP instruction. Section 3 outlines the methodology, including data sources, selection criteria, and the empirical mapping framework. Section 4 presents the key findings of the review, categorized by thematic areas. Section 5 discusses the pedagogical implications, challenges, and policy relevance of integrating AI into ESP classrooms. Finally, Section 6 concludes with a summary of findings and directions for future research.

LITERATURE REVIEW

AI in Education

Artificial Intelligence (AI) has rapidly evolved into a transformative force in education, offering scalable solutions for personalized instruction, administrative support, and adaptive teaching strategies. In the domain of language education, AI facilitates tasks such as real-time feedback, learner profiling, and dynamic content delivery, which align well with contemporary educational models focused on flexibility and learner autonomy. Studies emphasize AI's potential to customize learning pathways through adaptive learning systems, which enhance both engagement and accessibility for diverse learners (Okolo et al., 2024; Mananay, 2024). In particular, AI-driven tools that utilize natural language processing (NLP), intelligent tutoring systems, and automated assessment platforms contribute to the development of student-centered learning environments (Son et al., 2023; Choudhury et al., 2024). However, despite these advantages, researchers also highlight several challenges, including ethical concerns, the need for teacher training, and the risk of overreliance on automated systems (Siregar et al., 2024).

Creative Learning Spaces

Parallel to advancements in AI is the increasing emphasis on creative learning spaces, which are educational environments that promote innovation, autonomy, and collaboration. These spaces, whether physical or digital, are intentionally designed to support flexible, student-driven inquiry and expression. Research highlights the importance of such environments in fostering learner motivation, critical engagement, and reflective thinking, particularly when augmented by technology (Thoring et al., 2012; Byers, 2020). AI technologies further enrich these spaces by introducing elements of personalization and adaptability, transforming them into dynamic ecosystems for active knowledge construction. For instance, intelligent systems can facilitate experimentation, tailor challenges to individual learning needs, and support creative outputs across disciplines (Richardson & Mishra, 2018).

ESP and AI Integration

English for Specific Purposes (ESP) focuses on equipping learners with the language skills necessary for specific academic or professional contexts. The integration of AI into ESP instruction offers targeted and contextualized learning experiences through the use of domain-specific vocabulary generation, role-based simulations, and adaptive curriculum design. Emerging tools such as ChatGPT allow learners to engage in field-relevant dialogue and receive immediate, customized feedback, thereby reinforcing the functional and communicative aspects of language learning (Tang, 2023; Sinkus & Ozola, 2024). While initial studies highlight the potential of AI in ESP instruction, much of the existing literature remains fragmented. Notably, there is a lack of systematic empirical mapping on how these technologies are being used to build adaptive and creative learning environments within ESP classrooms. This gap points up the need for broader interdisciplinary inquiry and integrated pedagogical frameworks to support AI adoption in ESP contexts.

Past Studies on AI, Creative Spaces, and Educational Innovation

A growing body of literature emphasizes the critical role of spatial design and pedagogical innovation in fostering creativity, learner engagement, and meaningful participation. These studies recognize that thoughtfully structured environments, both physical and virtual, can significantly influence how students interact, reflect, and collaborate across disciplines. As summarized in Table 1, the reviewed works span a variety of educational contexts, each illustrating how creative learning spaces have been purposefully designed to support deeper cognitive engagement, interdisciplinary exploration, and reflective learning practices. These environments not only enhance educational outcomes but also contribute to the broader goal of preparing learners for complex, real-world challenges.

Table 1. Summary of Significant Literature on Creative Spaces and Innovation in Education

Authors	Year	Title
Thoring K.; Luippold C.; Mueller R.M.	2012	Creative space in design education: A typology of spatial functions
Costin A.F.	2007	Implications of developing technical students' creativity
Jankowska M.; Atlay M.	2008	Use of creative space in enhancing students' engagement
Chappell K.; Craft A.	2011	Creative learning conversations: Producing living dialogic space
Manchester H. Creative	2013	Approaches to Improving Participation: Giving learners a say
Bocconi S.; Kampylis P.; Punie Y.	2014	Creative classrooms: A systemic approach for mainstreaming ICT-enabled innovation for learning in Europe
Cruz L.M.M. et. al.	2018	Creative workshop: Space configuration and social interaction in high school learning processes
Richardson C.; Mishra P.	2018	Learning environments that support student creativity: Developing the SCALE
Bonenberg A.	2018	Designing the living and working space of the creative class
Zhang J.	2020	The Creative Learning Spiral: Designing Environments for Flaring and Focusing
Byers T.	2020	What Does Teaching and Learning Look like in a Variety of Classroom Spatial Environments?
Campos P.; Luceño L.; Aguirre C.	2021	Physical spaces in higher education as scenarios of learning innovation: Compositional and formative synergies among architecture, music, and fashion
Henriksen D.; Creely E.; Henderson M.; Mishra P.	2021	Creativity and technology in teaching and learning: a literature review of the uneasy space of implementation

Authors	Year	Title
Thoring K.; Luippold C.; Mueller R.M.	2012	Creative space in design education: A typology of spatial functions
Swanzy-Impraim E.; Morris J.E.; Lummis G.W.; Jones A.	2023	An investigation into the role of innovative learning environments in fostering creativity for secondary visual arts programmes in Ghana
Wade Leeuwen B.J.; Lachlan K.M.	2023	Integrating Arts-Based Learning in Transformative "Third Spaces"
Hotar N.; et., al.	2024	Designing adaptive learning space by integrating technology to a sustainable classroom
Kinsella V.; MacGregor E.; Nenadic E.	2024	Characterising affective and situational dimensions of creativity in the primary classroom through a posthuman lens

The reviewed studies highlight the critical influence of both physical and pedagogical environments in fostering creativity, particularly within specialized or technical education domains such as English for Specific Purposes (ESP). Thoring et al. (2012), for instance, proposed a typology of creative learning spaces including solitary, team, tinker, and presentation spaces, which not only serve logistical functions but also correspond to different stages of creative cognition. This classification provides a useful framework for designing ESP classrooms that fluidly support both individual reflection and collaborative, profession-oriented tasks.

Building on this, Costin (2007) argued that nurturing creativity among technical learners necessitates a shift away from teacher-centered instruction toward greater learner autonomy. Her findings align closely with constructivist approaches and modern ESP methodologies, particularly those emphasizing problem-based and project-driven instruction. In such environments, students are positioned as active agents in their own learning journeys which is an essential element for fostering discipline-specific communication skills.

Complementing this perspective, Jankowska and Atlay (2008) offered empirical evidence that creatively structured classrooms enhance learner motivation, metacognitive awareness, and agency. These outcomes are particularly relevant for ESP, where student engagement is central to acquiring field-specific language competencies.

Cruz et al. (2018) further highlighted the role of spatial design in shaping social interactions and identity formation, which are crucial factors in professional communication settings. Their work suggests that spatial configuration can influence the effectiveness of ESP activities such as group debates, peer reviews, and collaborative writing exercises.

To summarize, these studies reflect a growing scholarly consensus: effective ESP instruction requires the integration of spatial, social, and technological dimensions to foster educational innovation. This convergence lays a foundational rationale for examining how emerging AI tools such as ChatGPT, virtual reality environments, and generative AI applications can be strategically implemented to create adaptive, creative, and discipline-aligned learning ecosystems in ESP classrooms.

Theoretical Framework

This study is grounded in two complementary theoretical perspectives: Vygotsky's Sociocultural Theory and Constructivist Learning Theory. Together, these frameworks provide a robust foundation for understanding the pedagogical implications of integrating artificial intelligence (AI) into creative English for Specific Purposes (ESP) learning environments.

Vygotsky's Sociocultural Theory highlights the central role of social interaction and cultural tools in cognitive development. A key construct within this theory, the Zone of Proximal Development (ZPD), posits that learners achieve higher levels of understanding through appropriate scaffolding provided by more knowledgeable others; be they teachers, peers, or mediating tools. In AI-enhanced ESP classrooms, technologies such as ChatGPT, adaptive writing assistants, and AI-driven feedback systems act as mediational tools, offering just-in-time support and personalized feedback. These platforms simulate expert interaction and align closely with Vygotsky's notion of socially mediated learning. As such, this framework informs the study's examination of AI as a cognitive and pedagogical scaffold, particularly in the development of discipline-specific language competencies and learner autonomy.

In parallel, Constructivist Learning Theory asserts that learners actively construct knowledge through experience, reflection, and interaction with their environment. This approach promotes student-centered learning, where knowledge emerges through inquiry, experimentation, and meaningful engagement. Within creative ESP learning spaces, constructivist principles are operationalized through AI-enabled tools that support iterative thinking, exploration, and problem-solving. Generative AI platforms, for example, enable learners to brainstorm ideas, rephrase content, and simulate professional communication tasks, thereby supporting deeper engagement with language use and authentic learning outcomes.

Mutually, these theoretical lenses underpin both the research design and the interpretation of findings. They guided the study's focus on how AI fosters creative autonomy, interactive learning, and personalized support in ESP instruction. Ultimately, the application of these frameworks offers a holistic understanding of AI not merely as a technological enhancement, but as a pedagogical catalyst that transforms ESP classrooms into spaces of innovation, collaboration, and learner empowerment.

METHODOLOGY

This study adopts a systematic empirical mapping approach rooted in evidence synthesis to examine how artificial intelligence (AI) is transforming English for Specific Purposes (ESP) classrooms in higher education. The methodology was carefully constructed to address three

primary research objectives: (1) to identify key AI applications influencing ESP instruction, (2) to synthesize findings on the pedagogical, cognitive, and affective impacts of these technologies, and (3) to map current challenges, ethical concerns, and future research directions in AI-enhanced ESP environments.

The Scopus AI platform served as the primary data source due to its extensive and reliable coverage of high-impact, peer-reviewed academic literature. A targeted search strategy was implemented using keywords such as "ESP in higher education," "artificial intelligence," "creative learning spaces," "AI in language teaching," and "technology-enhanced ESP." Boolean operators were applied to ensure precision, and the search was limited to publications from 2020 to 2024 to reflect the most recent trends and post-pandemic shifts in educational practices. The scope was further refined to include only peer-reviewed journal articles and conference proceedings written in English to maintain analytical consistency.

To ensure relevance, inclusion criteria were established based on the study's objectives: (1) articles must explore the use of AI technologies within ESP contexts in higher education; (2) they must present empirical data, practical implementations, or evaluative conceptual frameworks; and (3) the studies must contribute meaningfully to at least one of three thematic areas which are pedagogical innovation, cognitive or affective learning outcomes, or ethical and practical challenges of AI deployment in ESP instruction. An initial pool of 48 articles was retrieved. Following a multi-phase screening process; comprising title and abstract filtering, full-text review, and exclusion of duplicates or irrelevant studies; 20 articles were selected for final analysis.

A deductive-inductive coding strategy was employed for thematic analysis. In the first phase, deductive codes were aligned with the study's three objectives, allowing for categorization across: (1) AI application types (e.g., chatbots, generative AI, immersive tools), (2) impact domains (e.g., pedagogical shifts, learner engagement, cognitive development), and (3) reported barriers (e.g., ethical concerns, technological limitations, institutional readiness). In the second phase, inductive codes were generated through open coding to capture emergent patterns and subthemes across the dataset, providing deeper insight into contextual nuances.

To enhance methodological rigor, a data charting matrix was constructed, capturing key attributes from each study including publication year, educational context, research methodology, type of AI tool used, outcome variables, and conclusions. Cross-validation of thematic categories was conducted through iterative review, minimizing researcher bias and ensuring the robustness of the findings. A narrative synthesis technique was then applied to interpret relationships between themes, highlight conceptual linkages, and generate practical implications grounded in empirical evidence.

Overall, this methodological design enabled the study to go beyond a descriptive literature review by offering a structured empirical mapping. The process yielded an integrated, analytically rich synthesis of how AI technologies are shaping ESP pedagogy, both in terms of promise and complexity, while providing a framework for guiding future research and instructional design.

RESULTS AND FINDINGS

Objective 1: To identify key AI applications transforming ESP classrooms

The integration of artificial intelligence (AI) into English for Specific Purposes (ESP) classrooms has catalyzed profound pedagogical shifts in higher education. A central area of innovation lies in the adoption of AI-powered writing assistance tools, particularly those embedded with natural language processing (NLP) capabilities. These tools provide real-time feedback on grammar, vocabulary, structure, and discourse coherence, thereby enhancing learners' discipline-specific writing competencies. For instance, Dou (2024) reported that the implementation of ERNIE Bot 4.0 in civil engineering ESP courses significantly improved students' writing accuracy while boosting their motivation for academic writing. Similarly, Emerson (2024) found that collaborative platforms like *Collabowrite* fostered greater learner autonomy and engagement in English writing tasks through AI-supported peer collaboration.

Another transformative application involves AI-driven adaptive learning platforms. These systems leverage machine learning algorithms to customize instructional content based on individual learner profiles, enabling personalized and needs-responsive instruction. Tang (2023) demonstrated how AI-based needs analysis could align learning materials with the specific linguistic and professional demands of engineering students. Such platforms diagnose gaps in understanding, recommend targeted materials, and adjust pacing accordingly; addressing the challenges of technical terminology and time constraints common in ESP contexts.

Moreover, immersive AI technologies including virtual reality (VR), augmented reality (AR), and mixed reality (MR) are being employed to simulate authentic workplace scenarios. These tools are particularly valuable in ESP instruction, where contextual and situational learning is essential. Palamar et al. (2023) found that VR integration significantly increased students' cognitive engagement and internalization of professional terminology. In a related study, Lu (2025) utilized a hybrid deep learning and VR model (Intelligent Coral Reef Optimization-driven LSTM) to enhance learner retention and interaction, especially in technical fields requiring spatial and conceptual immersion.

In the realm of assessment, AI-based evaluation tools are redefining how language proficiency is measured in ESP classrooms. These tools facilitate dynamic formative assessment by delivering immediate, individualized feedback aligned with instructional goals. Zhu (2022) highlighted the potential of AI-enabled assessment systems to offer equitable, full-coverage evaluations that track performance trends and identify learner misconceptions in real time. The feedback-rich nature of these systems supports formative teaching practices and ensures alignment with the communicative and analytical competencies emphasized in contemporary ESP curricula.

To conclude, these applications signify a shift toward more intelligent, personalized, and contextually enriched ESP instruction. From writing enhancement and adaptive learning to immersive simulations and responsive assessments, AI tools are fundamentally reshaping both the content and delivery of language education in specialized fields. Nonetheless, the successful implementation of these technologies requires thoughtful curriculum alignment, sustained faculty training, and supportive institutional infrastructure. As AI continues to evolve, its integration into

ESP pedagogy holds the potential not only to improve learning outcomes but also to broaden access to high-quality, discipline-specific instruction across global contexts.

Objective 2: To synthesize evidence on the pedagogical, cognitive, and affective impacts of AI technologies in ESP classrooms

The integration of artificial intelligence (AI) into English for Specific Purposes (ESP) classrooms has yielded significant multidimensional impacts including spanning pedagogical, cognitive, and affective domains. From a pedagogical perspective, AI has redefined the educator's role, shifting it from that of a traditional knowledge transmitter to a facilitator of personalized and adaptive learning. AI-powered platforms enable instructors to differentiate instruction in real time based on student data, thereby accommodating diverse learning trajectories. Tang (2023) highlighted that AI-enabled needs analysis empowered ESP teachers to tailor materials that align with learners' professional and linguistic requirements, particularly in technical disciplines. Likewise, Zhu (2022) emphasized how AI tools facilitated a move toward performance-based, project-oriented teaching models that prioritize practical application over rote learning.

Cognitively, AI technologies have proven effective in enhancing learners' mental engagement, conceptual understanding, and metacognitive development. Intelligent tutoring systems and immersive simulations promote deeper learning by enabling students to apply knowledge in realistic scenarios. For example, Lu (2025) demonstrated that deep learning frameworks, when combined with virtual reality environments, led to improved retention of ESP content and more robust cognitive processing. Moreover, adaptive AI tools support metacognition by allowing students to track their progress, set goals, and reflect on their learning strategies fostering autonomy and self-regulated learning.

The affective dimension of AI integration has also been widely documented, particularly in enhancing student motivation, confidence, and emotional engagement. AI-enabled collaborative and interactive platforms contribute to a more stimulating and meaningful learning experience. Emerson (2024) found that students involved in AI-supported collaborative writing tasks expressed increased enthusiasm for writing in English and greater confidence in their abilities. Similarly, Palamar et al. (2023) observed that immersive AI environments triggered emotional involvement and cognitive curiosity both of which are critical in sustaining motivation, especially in the context of specialized or technical language learning common in ESP curricula.

Nevertheless, the literature also cautions against uncritical adoption of AI technologies. While these tools promote engagement and efficiency, they can also lead to surface-level learning or overdependence if not accompanied by thoughtful pedagogical scaffolding. Chai and Liu (2022) warned that some learners may rely excessively on AI-generated feedback, bypassing opportunities for critical thinking and deeper analysis. As such, educators must guide students in interpreting AI feedback constructively and uphold academic integrity. Additionally, ethical concerns including data privacy, algorithmic bias, and equitable access must be addressed to ensure inclusive and responsible use of AI in education.

In summary, AI technologies offer a powerful means of enhancing ESP instruction across pedagogical, cognitive, and affective domains. They facilitate learner-centered instruction, foster metacognitive and conceptual development, and improve emotional engagement. However, their

success depends on intentional integration, informed instructional design, and adequate teacher preparedness. Future models of ESP pedagogy must aim to balance innovation with ethical safeguards to fully leverage AI's transformative potential.

Objective 3: To map out prevailing challenges, ethical considerations, and future research directions in the use of AI in ESP classrooms.

Despite the transformative potential of artificial intelligence (AI) in English for Specific Purposes (ESP) instruction, its integration also raises a series of challenges and ethical concerns that merit critical examination. A primary issue is the risk of over-reliance on AI tools, which may hinder the development of learners' independent critical thinking and problem-solving abilities. Chai and Liu (2022) caution that habitual dependence on AI-generated feedback or automated writing suggestions may lead to superficial engagement with language learning, particularly in academic and technical writing tasks. This concern is particularly acute in ESP contexts, where mastery of field-specific discourse requires nuanced understanding, contextual judgment, and reflective practice including skills that current AI systems may not yet effectively support.

Another significant challenge lies in the limited digital literacy and AI-readiness among educators. While AI platforms can enrich instruction, many ESP teachers lack the training or confidence to adopt these tools effectively. Zhu (2022) noted that instructors, especially those in engineering English courses, require ongoing professional development to build their competence in selecting, implementing, and evaluating AI tools within their pedagogical practices. Without adequate institutional support, AI technologies may remain underutilized or inconsistently applied, exacerbating disparities between technologically advanced and resource-limited learning environments.

The integration of AI also introduces important ethical considerations, including concerns about data privacy, algorithmic bias, and academic integrity. Most AI systems depend on large-scale data collection, raising questions about how learner data is stored, processed, and protected. Tang (2023) emphasized the need for transparent and explainable AI algorithms to mitigate unintended bias in areas such as language assessment or adaptive feedback. Additionally, the potential for AI to unintentionally facilitate plagiarism via auto-completion or paraphrasing features underlines the importance of establishing ethical usage frameworks for students and educators alike. Clear institutional policies and guidelines are essential to uphold fairness, protect learner autonomy, and ensure that AI use aligns with academic standards.

In light of these challenges, several future research directions are necessary to guide responsible and effective AI integration in ESP education. First, longitudinal studies are needed to explore the long-term impacts of AI on learning outcomes, skill transfer, and student motivation. As Palamar et al. (2023) observed, much of the existing research is short-term and fails to capture how learner interaction with AI evolves over extended periods. Second, there is a need for interdisciplinary research focused on developing domain-specific AI applications such as tools tailored to medical English, legal writing, or business communication to bridge the gap between generic language models and the nuanced needs of ESP learners.

In conclusion, while AI continues to offer innovative pathways for enhancing ESP instruction, its adoption must be accompanied by thoughtful pedagogical planning, ethical safeguards, and

systemic support. Addressing the challenges of teacher readiness, data governance, and learner autonomy is essential to ensure that AI functions not as a substitute for meaningful teaching, but as a catalyst for inclusive, adaptive, and equitable learning environments. As the educational landscape evolves, future developments must strike a careful balance between technological advancement and the human-centered values that define effective language education.

Concept Map

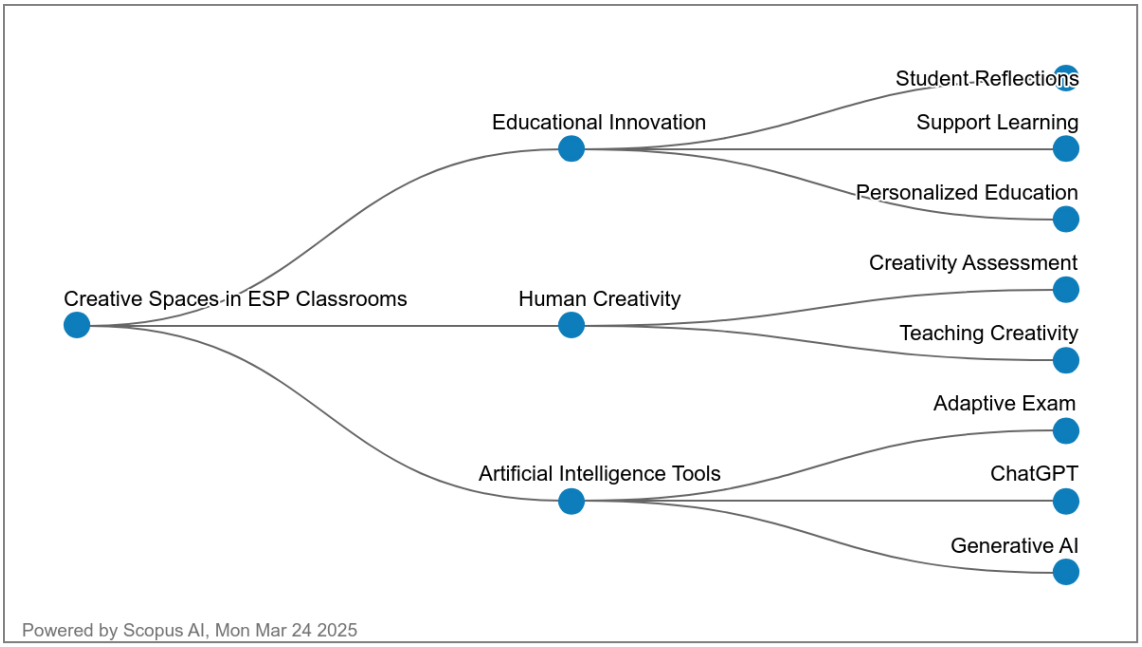

Figure 1. Visual Mapping of Themes in Creative ESP Classrooms

Figure 1 presents a conceptual map synthesizing key thematic clusters from the current literature on Creative Spaces in ESP Classrooms. The visualization is based on the empirical synthesis conducted using Scopus AI data as of March 24, 2025. It organizes major findings into three interconnected domains: Educational Innovation, Human Creativity, and AI Tools. These branches represent the core pathways through which creativity, pedagogy, and technology intersect in the context of modern ESP education.

The Educational Innovation cluster captures emerging pedagogical shifts, including the integration of student reflections, support for individualized learning, and personalized education strategies. This cluster reflects the growing emphasis on learner-centered approaches where AI supports differentiated instruction, enhances self-regulated learning, and promotes metacognitive development. These innovations position ESP classrooms as dynamic environments responsive to students' disciplinary and cognitive needs.

The Human Creativity cluster focuses on the enduring role of human agency in ESP education. While AI enhances many instructional processes, creativity remains a distinctly human trait. This cluster explores themes such as creativity assessment and the pedagogy of teaching creativity

reinforcing that AI should serve as a complement to, rather than a replacement for, human intuition, originality, and instructional judgment.

The AI Tools cluster represents the technological frontier of ESP instruction. It includes applications such as ChatGPT, Generative AI, and adaptive examination systems, all of which support content generation, language task simulation, and real-time assessment. These tools embody the operational layer of AI integration, reflecting the increasing adoption of intelligent technologies to enhance both teaching efficiency and learner engagement.

Together, these thematic clusters illustrate how creative learning spaces in ESP are being reshaped through the convergence of educational innovation, human creativity, and AI-driven tools. The concept map clarifies the evolving relationships between these elements and highlights the potential for AI to support transformative, inclusive, and context-sensitive ESP instruction.

Creative Spaces in ESP Classrooms: Driving Educational Innovation through Reflection, Support, and Personalization

The transformation of English for Specific Purposes (ESP) classrooms into creative spaces marks a significant shift in the pursuit of educational innovation in higher education. As institutions move away from traditional content-delivery models toward dynamic, student-centered learning paradigms, the physical and pedagogical configurations of the classroom play an increasingly pivotal role. Innovative Learning Environments (ILEs) often conceptualized as Creative Classrooms (CCR) are purposefully designed to support collaboration, flexibility, and technology-enhanced instruction (Bocconi et al., 2014). These spaces aim to promote creativity as both a pedagogical process and a learning outcome, particularly relevant in ESP contexts where linguistic competence is intertwined with real-world professional communication.

A core dimension linking creative classrooms to innovation is the cultivation of student reflection. Within these environments, learners are encouraged to engage in reflective dialogue, fostering metacognitive awareness, autonomy, and critical thinking. Manchester (2013) highlights how "creative learning conversations" empower students to articulate their perspectives, assume ownership of their learning, and take intellectual risks. These reflective practices are especially meaningful in ESP education, where learners must navigate and apply domain-specific language within authentic and often complex professional scenarios.

In addition to fostering reflection, creative spaces offer flexible and supportive environments that accommodate diverse learning styles and emotional needs. As Swanzy-Impraim et al. (2023) and Jankowska and Atlay (2008) suggest, such environments cultivate a culture of experimentation and resilience qualities that mirror the iterative communication demands of professional settings. Through spatial and pedagogical flexibility, students are encouraged to explore, make mistakes, and refine their skills. The SCALE model (Support for Creativity in a Learning Environment), developed by Richardson and Mishra (2018), provides a practical framework for designing such environments by emphasizing factors like task design, learning climate, and spatial configuration.

The role of personalized learning further enhances the impact of creative spaces, particularly through the integration of digital technologies and AI-driven tools. As Munna et al. (2024) argue, personalization requires a pedagogical shift where educators transition into facilitators of learner-

driven pathways. This approach is especially relevant in ESP settings, which often comprise students from a range of disciplines and professional tracks. By leveraging AI and flexible design, creative spaces can be tailored to align with students' disciplinary lexicons, communication goals, and learning preferences—thereby increasing the authenticity and applicability of ESP instruction. Deed et al. (2014) affirm that when pedagogy, space, and personalization intersect, student motivation and teacher efficacy are measurably enhanced.

In summary, the intersection of creative learning spaces and educational innovation in ESP classrooms lies in their collective ability to foster reflective thinking, adaptive support, and personalized engagement. While these concepts have gained traction across broader educational disciplines, their focused application to ESP remains an emerging area of inquiry. By reimagining the spatial and instructional dimensions of ESP through innovative lenses, educators can design immersive, responsive, and student-centered language learning experiences that equip learners not only to use English effectively—but to think, create, and problem-solve through it.

Human Creativity, Assessment, and Teaching in ESP Creative Classrooms

The incorporation of creative spaces within ESP (English for Specific Purposes) classrooms offers a powerful framework for cultivating human creativity, which is increasingly recognized as a core competency for 21st-century learning. These environments encompassing solitary zones, collaborative team areas, tinker spaces, and presentation corners are more than architectural enhancements; they are pedagogical tools designed to support exploration, self-expression, and iterative learning (Thoring et al., 2012). By intentionally shaping the spatial and emotional landscape of learning, creative classrooms empower students to become active participants in knowledge construction; an especially critical shift in ESP contexts, where language proficiency must be integrated with domain-specific problem-solving and communication.

In this setting, teaching creativity evolves from being a passive byproduct of learning to a deliberate instructional objective. Byrge and Hansen (2008) emphasize that creativity can be systematically taught through activities that blend cognitive engagement with emotional investment such as curiosity-driven inquiry, imaginative exploration, and design thinking. Within ESP, this involves moving beyond rote instruction to implement pedagogical strategies like role-play, scenario-based tasks, and project-based learning tailored to real-world professional environments. Costin (2007) further supports a shift in classroom dynamics by advocating for reduced teacher dominance and increased learner autonomy, thereby fostering a climate where innovation, self-direction, and linguistic experimentation are encouraged.

To ensure that creative growth is recognized and supported, assessment practices must evolve alongside teaching strategies. Traditional standardized tests are often misaligned with the complex, iterative, and contextual nature of creativity. Instead, scholars like Beghetto and van Geffen (2024) call for formative, contextualized assessments that value process over product and emphasize growth through reflection, peer feedback, and performance-based evaluation. This aligns with Watters (2015), who found that formative approaches significantly enhance students' willingness to engage with academic challenges, promoting a mindset conducive to creative language use particularly in the specialized, high-stakes contexts typical of ESP learning.

However, the assessment of creativity continues to face persistent challenges. Issues of authenticity, validity, and scalability complicate efforts to measure creative output in a reliable and meaningful way. Marrone et al. (2023) point out that many current tools lack the domain-specific nuance necessary for ESP and are often too slow or costly to be used in ongoing instruction. In response, recent innovations in AI-driven assessment technologies and natural language processing (NLP) tools are being piloted to deliver real-time, personalized feedback. These tools are particularly relevant in ESP writing and problem-solving tasks, offering scalable assessment that mirrors the linguistic and cognitive demands of professional contexts. Yet, their use must be carefully balanced with human judgment, ensuring that technology enhances rather than supplants the essential teacher-student relationship.

In summary, the synergy between human creativity, its deliberate cultivation, and its thoughtful assessment lies at the heart of transformative ESP pedagogy. These three dimensions are deeply interconnected: teaching creativity thrives in supportive, student-centered environments; such pedagogy requires assessments that acknowledge effort, originality, and contextual performance. While challenges in creativity assessment remain, emerging pedagogical frameworks and technological tools provide new opportunities to evaluate and support creative learning meaningfully. By integrating spatial design, instructional intent, and adaptive evaluation, ESP educators can build learning environments that develop not just language proficiency, but also the creative confidence and communicative agility students need in the modern professional world.

AI Tools and the Transformation of Creative Spaces in ESP Classrooms

The integration of artificial intelligence (AI) tools into English for Specific Purposes (ESP) classrooms marks a transformative shift in pedagogical design, learner engagement, and assessment. Creative learning spaces; once defined by their physical layout have expanded into digitally enhanced environments that encourage exploration, interaction, and personalization. In this context, AI functions not merely as a support system but as a catalyst for creativity, enabling dynamic, adaptive, and context-sensitive learning. For instance, in fields such as design and animation, tools like image-based generative AI have significantly improved student engagement and ideation (Kicklighter et al., 2024). In ESP contexts, where learners must master specialized language for professional tasks, AI can scaffold complex communication challenges while enhancing autonomy, creativity, and reflective practice.

One of the most transformative applications of AI is found in adaptive exam platforms, which personalize assessment by adjusting question difficulty in real-time based on student performance. These platforms, grounded in machine learning, allow assessments to evolve with the learner's pace and competency level (Ningsih et al., 2023). In creative ESP spaces, adaptive testing not only reduces assessment-related anxiety but also fosters learner confidence by emphasizing individual growth. Moreover, educators can incorporate domain-specific scenarios such as drafting engineering proposals or analyzing clinical cases into these assessments, thus aligning evaluation with real-world relevance. However, concerns about data privacy and the oversimplification of learning outcomes highlight the need for robust ethical guidelines and informed instructional practices (Üstün & Yavuz, 2024).

Another widely discussed tool in AI-enhanced classrooms is ChatGPT, which supports creativity and fluency through interactive text generation. While its use has been more widespread in general

EFL instruction, its relevance in ESP education is rapidly emerging. ChatGPT has been shown to aid in brainstorming, refining ideas, and scaffolding complex writing tasks in specialized fields (Mandidereza & Chamboko-Mpotaringa, 2024). When used with carefully designed prompts and under teacher guidance, it fosters critical thinking and promotes collaborative inquiry (Kicklighter et al., 2024). Nevertheless, the tool's dependency on prompt quality and the potential for misuse such as plagiarism or over-reliance call for stronger digital literacy training and clear academic integrity policies.

Beyond language generation, generative AI technologies like Variational Autoencoders (VAEs) and large language models (LLMs) further expand the creative potential of ESP classrooms. These tools are increasingly used in higher education for content ideation, visual representation, and narrative construction. Fleischmann (2024) observed that while design students used generative AI to accelerate ideation, they expressed skepticism about the authenticity and originality of its outputs. In ESP, such technologies can simulate authentic discourse genres like business emails, legal memos, or technical documentation allowing students to practice near-real-world communication. However, student attitudes toward generative AI remain divided, with concerns about ethical use, overdependence, and the need for clearer instructional frameworks (Gilreath, 2024).

In summary, AI tools ranging from adaptive assessment systems to generative platforms are redefining creative spaces in ESP classrooms. Adaptive exams foster individualized progress; ChatGPT enables interactive dialogue and critical writing; generative AI encourages exploration of disciplinary language and discourse. Yet, the success of these tools depends on intentional pedagogical design, ethical implementation, and institutional capacity-building. Rather than replacing human creativity, AI should be leveraged as an amplifier of learner agency, enabling ESP education to become more relevant, inclusive, and innovation-driven.

DISCUSSION

This study examined the intersection of artificial intelligence (AI) technologies and creative learning spaces in transforming English for Specific Purposes (ESP) instruction in higher education. The empirical mapping yielded three central findings: first, AI tools are fostering adaptive, immersive, and student-centered learning environments; second, human creativity in ESP classrooms is being supported through creative pedagogy and AI platforms such as ChatGPT and generative tools; and third, the integration of AI is reshaping instructional design, learner engagement, and the evolving pedagogical roles of educators.

Theoretically, these findings resonate with Vygotsky's Sociocultural Theory, particularly through the lens of the Zone of Proximal Development (ZPD). AI tools act as mediational aids, offering learners just-in-time scaffolding via personalized feedback, automated writing support, and simulations of discipline-specific language tasks. This supports learners' progression beyond their current capabilities through socially mediated tools. In parallel, the study reinforces Constructivist Learning Theory, which emphasizes active, student-driven knowledge construction. Creative learning environments underpinned by AI encourage reflection, exploration, and autonomy features that mirror the constructivist view of learners as co-constructors of meaning. In ESP

settings, these theories provide a strong foundation for interpreting how learners acquire professional communication competencies in authentic, technology-enhanced contexts.

From a practical perspective, the study presents several key implications for ESP educators and stakeholders. Teachers are encouraged to reimagine their classrooms not merely as sites of knowledge transmission but as creative hubs where AI tools scaffold complex writing tasks, simulate real-world professional scenarios, and support continuous formative assessment. For example, ChatGPT and generative AI applications can be strategically integrated to facilitate brainstorming, contextual language modeling, and collaborative project development. These technologies promote engagement and reduce cognitive load, particularly in technical or specialized language domains.

For curriculum designers, the findings suggest a compelling case for embedding AI technologies within task-based, project-based, and content-based instructional frameworks. This approach ensures that language learning remains relevant to learners' academic and professional trajectories while also aligning with institutional learning outcomes and ethical considerations. Developing ESP tasks that involve AI-generated prompts, industry-specific simulations, or adaptive assessments can help personalize instruction and enhance learner agency.

At the institutional level, successful AI integration requires more than just technological access as it necessitates sustained investment in faculty development and digital literacy training. Institutions must equip educators with the skills and frameworks necessary to select, apply, and evaluate AI tools in pedagogically sound and ethically responsible ways. Equally important is the development of policy frameworks that address academic integrity, data privacy, and inclusive access, ensuring that the benefits of AI in ESP classrooms are equitably distributed.

In sum, the intersection of AI and creative space design holds transformative potential for ESP education. However, this transformation must be accompanied by theoretical grounding, thoughtful pedagogy, and systemic support to fully realize its benefits.

CONCLUSION

This study examined the transformative potential of artificial intelligence (AI) in enhancing creative learning environments within English for Specific Purposes (ESP) classrooms in higher education. Through a systematic empirical mapping of peer-reviewed literature, the research revealed how AI tools ranging from adaptive assessment systems to generative platforms are supporting personalized, context-specific, and student-centered instruction. The findings contribute to a broader understanding of AI-enhanced ESP pedagogy by integrating insights from sociocultural theory and constructivist learning theory, emphasizing the role of mediated learning and active knowledge construction in digitally enriched classrooms.

Despite its contributions, the study is not without limitations. It is based solely on secondary data sourced from Scopus-indexed publications spanning 2007 to 2024, which may exclude recent or grassroots innovations, particularly from less-represented educational contexts. Additionally, the

absence of primary classroom data limits the depth of experiential insights into how teachers and learners interact with AI tools in real-world settings.

To build on this foundation, future research should adopt longitudinal, classroom-based methodologies to examine the evolving impact of AI on learner identity, creativity, and intercultural communication. Collaborative inquiries involving educators, students, and technology developers are essential for refining tool usability, ensuring ethical deployment, and designing inclusive practices for diverse learner populations. Such work can also explore the development of co-created, AI-mediated curricula that reflect local needs while aligning with global competencies.

In conclusion, AI-enhanced creative spaces represent a compelling frontier for reimagining ESP education. When implemented with pedagogical foresight, ethical rigor, and inclusivity, these environments have the potential to equip learners not only with linguistic fluency but with the creative confidence and professional agility required in 21st-century communication landscapes.

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Conflict of Interest

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Authors' Contributions

The author solely conceived, designed, and conducted the study, carried out the literature review and analysis, interpreted the findings, and was responsible for writing, revising, and finalizing the manuscript.