https://doi.org/10.17323/jle.2025.27419

Applying the SAMR Model to AI-Enhanced Business Language Instruction: Comparative Insights from German and Spanish Contexts

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ABSTRACT

Background: The SAMR model offers a structured way to analyze how technology reshapes teaching and learning. In the context of Generative Artificial Intelligence (GAI), it provides a productive lens for reconsidering how language instruction - especially within Languages for Specific Purposes (LSP) - evolves in response to AI integration.

Purpose: This article examines the use of AI-driven tools in Business German and Business Spanish across two contrasting settings: higher education and corporate training. It aims to build a comparative perspective that highlights how pedagogical intentions and constraints differ across these environments and what that means for responsible and effective AI integration.

Conceptual Contribution: We propose that the SAMR model can be reframed specifically for Generative AI in Business LSP to clarify how instructional practices move between enhancement and transformation. Rather than reporting empirical findings, the article argues that AI-enabled personalization, collaboration, and authentic task design can be interpreted as occupying distinct SAMR levels. This conceptual reframing distinguishes between uses of AI that streamline existing practices and those that fundamentally rethink language learning experiences.

Implications: By repositioning SAMR as a flexible analytic tool rather than a descriptive taxonomy, this article contends that educators can better anticipate both opportunities and risks in professional language instruction. The argument advances a foundation for integrating GAI in ways that support pedagogical innovation while safeguarding equity, integrity, and quality in Business German and Business Spanish education.

KEYWORDS

Generative AI; SAMR model; Languages for Specific Purposes; Business German; Business Spanish

Citation: Herget, K., & da Silva Ferreira, K. (2025). Applying the SAMR model to AI-enhanced business language instruction: Comparative insights from German and Spanish contexts. *Journal of Language and Education, 11*(3), 160-167. https://doi.org/10.17323/jle.2025.27419

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Received: June 26, 2025
Accepted: September 18, 2025
Published: September 30, 2025

INTRODUCTION

What happens to established models of technology integration when Generative AI (GAI) no longer supplements language teaching but actively co-constructs it? The rapid uptake of Large Language Model (LLM)-based tools in professional language education exposes a conceptual gap: frameworks like SAMR, originally developed by Puentedura[1,2], were not designed for technologies that generate discourse, simulate interactional scenarios, and redistribute agency between teachers, learners, and machines.

GAI is already reshaping language instruction by acting as tutor, collaborator, and content generator. Pratschke (2024, p. 53) argues that GAI "requires a complete rethink of how educators deliver teaching," insisting on structured scaffolding to ensure pedagogical coherence. Concerns raised by Floridi (2024)

[1] Puentedura, R. R. (2006, November 28). *Transformation, technology, and education in the State of Maine* [Web log post]. http://www.hippasus.com/rrpweblog/archives/2006_11.html

[2] Puentedura, R. R. (2013, May 29). *SAMR: Moving from enhancement to transformatio*n [Web blog post]. Retrieved from http://www.hippasus.com/rrpweblog/archives/000095.html

and Alonso-Rodríguez (2024) highlight the risks of opaque decision-making, data misuse, and the amplification of social inequality. Kohnke et al. (2024) further draw attention to the phenomenon of "technostress," a form of cognitive overload experienced by educators using unfamiliar and fast-evolving AI tools.

Despite SAMR's widespread adoption in educational technology discourses, it has been criticized for its linear structure and tendency to oversimplify complex pedagogical change (Hamilton et al., 2016). Its application to GAI in professional language education has so far been limited and unsystematic. Boateng et al. (2024, p. 44) note that "the SAMR model can be seen as a catalytic method in the transformation of educational technology, providing a guide for transformative learning experiences for both students and teachers," yet this catalytic potential has not sufficiently been adapted to GAI-mediated LSP contexts.

We position this article as a conceptual perspective rather than an empirical study. Our aim is to stimulate debate by re-examining SAMR in light of GAI's affordances and constraints for Business LSP. To illustrate our argument, we draw on examples from Business German in higher education and Business Spanish in corporate training.

Literature Review

The integration of GAI into language education has drawn increasing scholarly attention because of its potential to reshape how languages are taught, learned, and applied in professional communication. In Business Language Education and Languages for Specific Purposes (LSP), GAI enables more personalized, context-sensitive instruction adopted to workplace discourse demands. Skrabut (2023, p. 131) observes that GAI can "support multiple stages of the learning process by adapting to individual learner needs". Its ability to replicate realistic professional contexts makes it particularly relevant for Business LSP. Pack and Maloney (2023, p. 5) reinforce this view, arguing that "the potential affordances generative AI may offer language educators are often overlooked, and more attention needs to be given to the work of educators and researchers who explore the positive potentials of these technologies." Chatbots provide consistent linguistic input and simulate authentic conversational settings (Wan & Moorhouse, 2024), a function especially relevant in business-oriented LSP contexts where learners must adhere to pragmatic norms and genre conventions. Son, Ruzic, and Philpott (2023) identify automated writing evaluation, adaptive feedback, and intelligent tutoring systems as emerging practices that support real-time monitoring and individualized instruction. Chen et al. (2025) highlight five digital affordances of ChatGPT, including opportunities for practice, immediate feedback, and learner autonomy. In a systematic review, Weng and Fu (2025) report that GAI can boost inclusivity and motivation by addressing diverse proficiency needs in language classrooms.

Taken together, these studies demonstrate that GAI can increase access, personalization, and interactivity in language learning. However, for Business LSP, unresolved questions remain about whether such affordances adequately address domain-specific communication challenges. These limits signal the need to revisit existing models of technology integration, particularly SAMR.

The SAMR model offers a widely adopted framework for categorizing technology integration into four levels: Substitution, Augmentation, Modification, and Redefinition. Boateng et al. (2024, p. 44) describe it as "a catalytic method in the transformation of educational technology, providing a guide for transformative learning experiences for both students and teachers." However, the model has been criticized for its linearity and oversimplification of complex pedagogical dynamics. Ethical and practical concerns complicate the integration of AI tools. Floridi (2024) and Alonso-Rodríguez (2024) warn of opaque decision-making processes, potential misuse of learner data, and the amplification of social inequities. Yan et al. (2023, p. 3) caution that "despite the growing empirical evidence of LLMs' potential in automating a wide range of educational tasks, none of the existing work has systematically reviewed the practical and ethical challenges of these LLMs-based innovations," adding that training on unfiltered data can reproduce "biased and toxic knowledge (e.g., gender and racial biases)." Dabis and Csáki (2024, p. 1) emphasize institutional accountability, asserting that "student assignments must reflect individual knowledge (…) with human individuals retaining moral and legal responsibility." Caines et al. (2023) call for transparency and fairness in AI-mediated instruction, while Sharples (2023, p. 7) argues that effective use of GAI "requires building GAI to follow fundamental human rights, respect the expertise of teachers and care for the diversity and development of students." Aoun (2017) proposes a model of "humanics" that balances digital innovation with ethical, creative, and cognitive development - an approach especially relevant in professional language learning where judgment and accountability cannot be automated. Kohnke et al. (2024) add another concern: "technostress," the cognitive overload educators experience when adapting to rapidly evolving digital tools.

Within this broader context, the application of AI to LSP, particularly in professional and business communication, emerges as a promising yet under-explored area. As Grib et al. (2024, p. 1) argue, "the one-size-fits-all approach of conventional curricula does not effectively address the varied learning styles, cultural context, and educational background of a global student body". AI allows instruction to be more responsive, flexible, and aligned with individual learner goals.

Nevertheless, effective AI integration in LSP instruction depends on several critical conditions. First, digital infrastructure and access remain uneven across educational

institutions, with disparities that particularly affect under-resourced learners[3]. Second, while GAI can promote the linguistic accuracy and efficiency of communication training, it cannot replicate the emotional intelligence and cultural sensitivity that are essential for professional discourse. As such, human oversight remains vital to ensure that LSP instruction remains pedagogically sound and culturally responsive.

The integration of AI into language education must be guided by a combination of ethical frameworks, regulatory standards, and pedagogical competencies. International and European policy documents, such as *The Artificial Intelligence Act*, European Commission[4]; *Artificial intelligence, human rights, democracy, and the rule of law - A primer* (Leslie at al., 2021), among others, offer a comprehensive structure for aligning AI use with educational values such as equity, transparency, and inclusion. When embedded thoughtfully into curriculum design, AI technologies have the potential to not only increase language proficiency but also to contribute to learners' success in multilingual and digitally mediated work environments. This broader landscape sets the stage for examining how existing pedagogical frameworks account for GAI's impact on learning design in LSP.

Debates around technology use in education have long drawn on models such as SAMR. Rather than rehearsing its structure, this article argues for a reinterpretation of SAMR in light of how GAI reshapes pedagogical decision-making in Business German and Business Spanish. Although widely adopted, the SAMR model has been critiqued for suggesting linear progression, and for reducing analysis to tool replacement rather than learning design (Hamilton et al., 2016). Studies in AI-supported language learning (e.g., Son et al., 2023; Wan & Moorhouse, 2024) confirm that LSP learners do not passively receive content from AI; they engage in generative co-production. This suggests that the pedagogical question is not "What level are we at?" but "What kind of redesign is taking place when AI intervenes in professional discourse tasks?" The SAMR model still offers value here, but only when treated as a heuristic for examining shifts in task structure, rather than a checklist for technology adoption.

Application of SAMR Business German and Spanish Instruction

In Business Language Education, SAMR offers a way to distinguish between AI uses that simply digitize existing practices and those that enable qualitatively new forms of

Table 1

SAMR-Based Mapping of AI-Supported Business German and Spanish Tasks

Context	Task	AI Tool	SAMR Level	Learning Goal	Assessment Signal	Ethical Checkpoint
Business German	Drafting a *Mahnung bei Lieferverzug* (delay notification)	AI Email Writer	Substitution	Practice formal register and business correspondence conventions	Accuracy of syntax, register adherence	Human review of sensitive content to prevent overreliance on automated outputs
Business Spanish	Preparing minutes of a procurement meeting	AI Grammar Checker / Summarizer	Augmentation	Enhance lexical precision and coherence in professional genres	Improved cohesion and consistency in terminology	Transparency about AI assistance to preserve authorship integrity
Business German	Collaborative CSR project design	Miro AI (brain-writing + prompts)	Modification	Develop critical reasoning, intercultural awareness, and CSR-related domain language	Quality of collaborative synthesis and use of specialized terminology	Ensuring equitable participation across learners with different digital literacies
Business Spanish	Simulated negotiation with international partners	Custom-built AI roleplay	Redefinition	Engage in dynamic, pragmatic interaction requiring mitigation strategies	Ability to manage ambiguity, adapt register, and achieve negotiation outcomes	Safeguarding cultural authenticity, preventing stereotyping in AI-generated roles

[3] United Nations Children's Fund and International Telecommunication Union (2020). *How many children and young people have internet access at home? Estimating digital connectivity during the COVID-19 pandemic*. UNICEF.

[4] European Commission. (2021). *Proposal for a Regulation of the European Parliament and of the Council laying down harmonised rules on artificial intelligence (Artificial Intelligence Act) and amending certain Union legislative acts* (COM/2021/206 final). European Comission. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52021PC0206

learning. Rather than assuming transformation is always superior, the framework helps instructors align technological use with genre-specific communicative goals in German and Spanish for professional contexts. The focus here is not on tool novelty but on how AI reshapes or maintains the structure of core tasks.

To make these distinctions concrete, Table 1 presents a SAMR-based overview of tasks common to Business German and Spanish training. Each example links an instructional objective to a genre-bound communicative form, an AI tool, an assigned SAMR level, and an ethical checkpoint. The entries are illustrative and serve to anchor the interpretive analysis that follows.

As illustrated in Table 1, Substitution tasks in Business German, such as drafting a *Mahnung bei Lieferverzug* (*reminder for delayed delivery*) with an AI Email Writer, replicate existing tasks, without altering their fundamental pedagogical objective. In this case, the learning outcome - mastery of formal register and specialized terminology (*Lieferverzug*, *Mahnung*, *Zahlungsziel*) - remains intact, while the technology simply facilitates more efficient drafting and editing. Similarly, in Business Spanish, drafting a procurement-related message with AI support would maintain the same communicative goals, namely grammatical accuracy, register adherence, and genre-specific conventions. Although innovation is minimal at this stage, Substitution represents a meaningful step toward the digitization of conventional business communication tasks.

As shown in Table 1, Augmentation tasks enrich traditional activities by introducing functional improvements that scaffold comprehension and vocabulary use. In the context of Business Spanish, learners can use *Mapify* (*mapify.ai*, s.d) to generate a mind map on *Responsabilidad Social Corporativa (RSC)* (Figure 1).

In a lesson focused on Corporate Social Responsibility (CSR), the mind map (Figure 1) presents a well-structured overview of the topic, dividing it into clearly defined branches such as *Definición de RSC*, *Principios*, *Estrategias de implementación*, *Áreas de impacto*, and *Ejemplos de buenas prácticas*. This visual representation enables learners to see how key CSR concepts interconnect thematically and hierarchically. For example, the map outlines core CSR principles, including ethical behavior, transparency, and environmental sustainability, and links these to concrete practices such as reducing carbon footprints or promoting the circular economy. It also visualizes implementation strategies, like defining measurable goals, involving all organizational levels, and publishing sustainability reports.

As Amelina et al. (2023, p. 52) argue, mind maps support a wide array of learning activities. They assist in organizing information, visualizing relationships among ideas, and planning presentations or projects. These features are especially beneficial in the LSP context, where structured thinking, topic-specific vocabulary, and clarity of expression are key to communicative competence.

The Modification stage enables substantial redesign of learning tasks. In this phase, learners move beyond basic enhancements to engage with content in entirely new ways. In a project on CSR, digital platforms like *Miro AI* (*Miro AI*, s.d.) facilitate collaborative, inquiry-driven learning. For example, students begin the unit with a brain-writing activity on a Miro board, individually posting their ideas about what CSR means and how companies contribute to social and environmental goals (Figure 3).

Students use the Miro board to organize their findings, including definitions, strategies, and impact areas, as identified in the Spanish-language mind map (Figure 1). Each group selects a company and critically evaluates its CSR efforts, including successes and potential gaps. AI-generated prompts within Miro help scaffold language production, encouraging students to use domain-specific vocabulary and connect arguments logically. This redesigned learning experience transforms CSR from a theoretical topic into a collaborative, action-oriented investigation that integrates critical thinking, intercultural awareness, and language production.

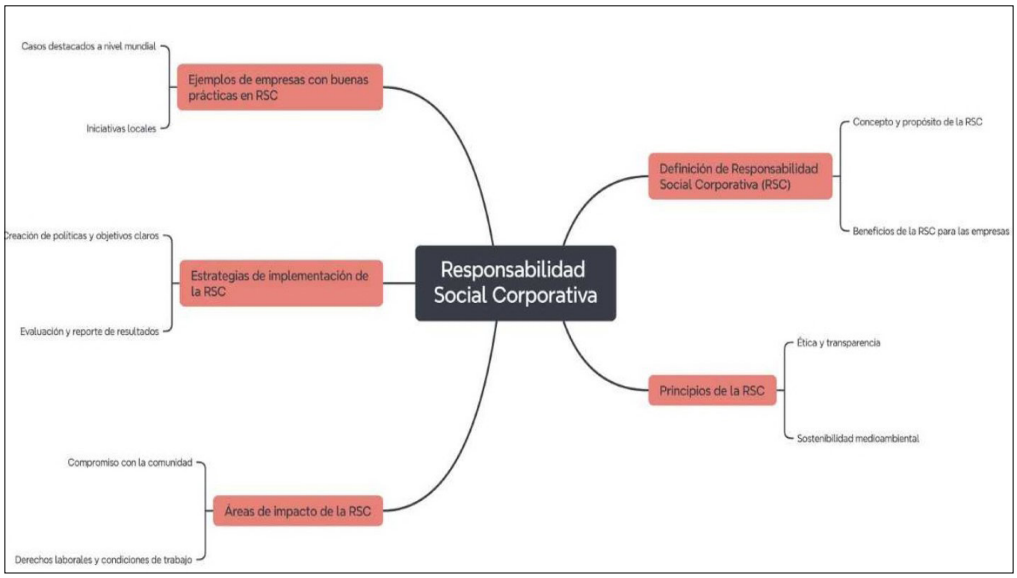
At the Redefinition stage of the SAMR model, GAI enables the design of interactive, collaborative language tasks that would have been logistically or pedagogically impractical without advanced technology. As Mollick & Mollick (2024, p.1) argue, "The transformative power of AI has put educators in the position of builders and creators, potentially democratizing the development of educational technology. Instead of having to choose from pre-built role-play experiences, you can more easily develop practice spaces and interactive solutions that better suit your learners". This shift allows instructors to custom-build AI-supported simulations.

For example, rather than merely reading scripted dialogues, learners can participate in dynamic simulations where they role-play as entrepreneurs pitching a new product to an international investor, or as marketing consultants negotiating contract terms with German or Spanish-speaking clients.

Peer review and AI feedback further augment the reflective and strategic dimensions of the task, supporting both linguistic improvement and metacognitive development. This redefined practice encourages learners to become not just consumers of AI-driven exercises, but co-designers of authentic communicative experiences in professional German and Spanish contexts.

Figure 1

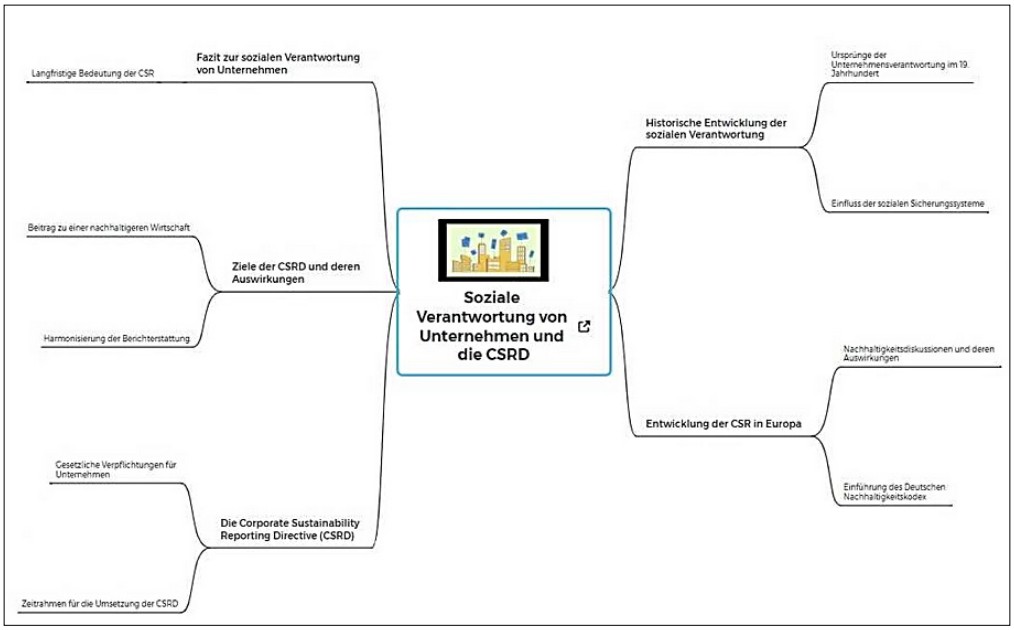
Digital Mind Map on Responsabilidad Social Corporativa



Note. Source: Mapify, auto-generated from Spanish input.

Figure 2

Mind Map on „Soziale Verantwortung von Unternehmen"



Note. Source: Mapify auto-generated from spoken video content.

DISCUSSION

AI tools frequently enact features from more than one SAMR stage simultaneously, which complicates linear interpretations of the model and underscores the need for a task-oriented approach. In this sense, the present paper aligns with Hamilton et al.'s (2016) critique and adapts SAMR as a heuristic rather than a hierarchy. Their position informs three design principles that can guide AI-supported LSP instruction: P1 process over product, P2 reflective scaffolding, and P3 collaborative inquiry.

Operationalising the principles in practice clarifies their relevance across SAMR stages. Under P1, learners are required to revise or justify AI-generated outputs rather than submit them unaltered, ensuring that drafting and correction remain cognitively active processes. Under P2, instructors integrate mandatory checkpoints—such as commentary on

Figure 3

Collaborative Brain-Writing Activity about CSR

Note. Source: Miro AI board used in CSR project.

AI suggestions—to foreground reflection rather than automation. Under P3, activities incorporate peer interaction or co-construction, whether in brainstorming, redrafting, or simulations, so that AI does not replace human dialogue but supports it.

These principles manifest differently across the model. At Substitution and Augmentation, grammar checkers, writing suggestions, and concept-mapping tools provide immediate feedback and structure, but learners must diagnose and adjust outputs, maintaining agency. At Modification, collaborative platforms such as Miro AI facilitate dialogic knowledge-building and distributed authorship, enabling students to integrate domain-specific content from authentic sources. At Redefinition, AI simulations generate professional scenarios that combine intercultural expectations, strategic language use, among others.

Two boundary conditions shape any flexible use of SAMR. First, uneven access to advanced systems limits the scalability of AI-supported task design. Second, domain-specific constraints in business communication require learners to cope with not only accuracy but also register, appropriateness, and cultural nuance. Assessment must therefore align with communicative outcomes rather than technology use, emphasizing move-structure completeness, mitigation or directness strategies.

This contribution is necessarily provisional. It offers a conceptual reframing supported by illustrative examples rather than empirical validation, and it is situated within a rapidly evolving technological landscape. Nevertheless, by grounding instructional design in Hamilton et al.'s principles and acknowledging infrastructural and pragmatic limits, this paper recasts SAMR as a flexible framework that can promote reflective, collaborative, and linguistically grounded task design in Business German and Spanish. Rather than classifying tools, it foregrounds learner agency, intercultural specificity, and process-oriented use of AI in professional language education.

CONCLUSION

SAMR must be reinterpreted in the context of GAI - not as a hierarchy of technological progress, but as a heuristic for aligning tools with the pragmatic, cognitive, and genre-specific demands of LSP instruction. As the application of AI in language education becomes more sophisticated, the boundaries between the SAMR stages tend to blur. This study illustrates that AI tools frequently operate across multiple levels of the model simultaneously, challenging the assumed linearity of progression. Therefore, rather than viewing SAMR as a rigid structure, it is more productive to interpret it as a flexible guide that encourage educators to

align technological tools with pedagogical goals, cognitive demands, and communicative contexts.

Through the case studies of Business German and Business Spanish instruction, it becomes evident that meaningful AI integration depends not on the tool itself but on how it is embedded within intentional instructional design. From supporting linguistic accuracy through automated feedback, to promoting collaborative inquiry and simulating authentic communication, GAI applications have demonstrated their capacity to transform LSP teaching into dynamic and context-rich learning environments.

To move meaningfully toward redefinition, educators must go beyond tool adoption and engage in pedagogical reimagination. This involves designing AI-integrated tasks that also cultivate metacognitive awareness, intercultural communication, and ethical engagement with AI systems.

When applied critically and contextually, the SAMR model offers a valuable perspective through which to evaluate the pedagogical affordances of GAI in business language education.

Across all SAMR levels, responsible AI use depends on three baseline practices: learners must revise and interrogate AI outputs rather than accept them wholesale; instructional design must make reflection visible through prompts, annotations, or peer review; and simulations or co-constructed tasks must preserve human agency and linguistic intentionality. Ethical engagement becomes part of instructional design, not compliance: disclosure of AI involvement, documentation of prompts and revisions, and scrutiny of generated language for bias or register drift should be standard.

The SAMR model retains its relevance in AI-mediated LSP only when detached from linear progression and aligned with communicative intent, task authenticity, and learner agency.

ACKNOWLEDGMENTS

The authors would like to thank the Centre for Languages, Literatures and Cultures at the University of Aveiro for the support of this research.

DECLARATION OF COMPETING INTEREST

None declared.

AUTHORS' CONTRIBUTIONS

Katrin Herget: conceptualization; data curation; formal analysis; funding acquisition; methodology; project administration; visualization; writing – original draft; writing – review & editing.

Katty da Silva Ferreira: formal analysis; investigation; methodology; resources; software; supervision; writing – original draft.

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