

HUMAN-AI COLLABORATIVE INSTRUCTIONAL DESIGN FOR CLIL IN COMPUTER SCIENCE: A DUAL-RUBRIC EVALUATION OF ESP MATERIALS FOR SOFTWARE ENGINEERING UNDERGRADUATES

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Abstract. *This paper examines human-AI collaborative instructional design within a CLIL (Content and Language Integrated Learning) framework in which content mastery and language development are pursued as co-objectives. A structured ecosystem of coursebooks and minicoursebooks was developed and implemented within an English for Specific Purposes course for first-year software engineering undergraduates, in alignment with the STEAME (Science, Technology, Engineering, Arts, Mathematics, and Entrepreneurship) approach. Two coursebooks are featured: Foundations of Software Engineering (FSE), grounded in SWEBOOK 4.0a, and Creativity & Entrepreneurship for Software Engineers (CSE), a creativity-oriented, startup-focused course. The two represent deliberately contrasting pedagogical logics within the same framework: FSE follows a structured knowledge-transmission model aimed at building foundational concepts and disciplinary register, while CSE employs an experiential, project-based model in which learners apply creativity skills as cognitive tools to design and pitch an AI-powered startup across nine development phases – inspired by authentic Y Combinator practitioner content encountered in the parallel Business Awareness for Software Engineers (BASE) course. The intended CLIL effect – language and content gains in synergy – is measured through identical Pre- and Post-Course questionnaires featuring exclusively higher-order Bloom’s taxonomy items. Material quality was evaluated by applying a two-rubric comparative instrument to one representative unit per coursebook: a Claude-developed rubric foregrounding ESP principles and AI integration, and a ChatGPT-generated rubric weighted toward engagement, authenticity, and assessment potential. The two instruments yielded complementary rather than redundant findings, with each mapping more productively onto the coursebook whose pedagogical logic it best reflected. The paper argues that a human-AI collaborative instructional design methodology can generate pedagogically differentiated materials – from structured knowledge transmission to experiential project-based learning – within a unified, rubric-validated ESP framework, demonstrating the architectural flexibility of AI-assisted course development at the undergraduate level.*

Key words: Artificial Intelligence, Computing Education, CLIL, English for Specific Purposes, Instructional Design, Undergraduate Education, Software Engineering, STEAME

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