

Association for Information Systems

AIS Electronic Library (AISeL)

CACAIS 2024 Proceedings

2024

Feeding Two Birds with One Scone: Teaching Students AI Literacy alongside Regular IS Topics by Integrating Generative AI into Assignment Design

Sarah Honigsberg

Laura Watkowski

Andreas Drechsler

Follow this and additional works at: <https://aisel.aisnet.org/cacaais2024>

This material is brought to you by AIS Electronic Library (AISeL). It has been accepted for inclusion in CACAIS 2024 Proceedings by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact elibrary@aisnet.org.

Feeding Two Birds with One Scone: Teaching Students AI Literacy alongside Regular IS Topics by Integrating Generative AI into Assignment Design

Sarah Hönigsberg

Supply Chain Management and
Information Systems
ICN Business School
sarah.honigsberg@icn-artem.com

Laura Watkowski

Branch Business & Information Systems
Engineering of the Fraunhofer FIT,
University of Bayreuth
laura.watkowski@fit.fraunhofer.de

Andreas Drechsler

School of Information Management
Victoria University of Wellington
andreas.drechsler@vuw.ac.nz

Abstract

We investigate the use of Generative Artificial Intelligence (GAI), such as ChatGPT, as an integral part of higher education (HE) courses to boost students' AI literacy. Addressing the dual aspects of opportunity and challenge presented by GAI, we explore embedding GAI into curricula to prepare students for the digital future. Through a case study, we apply Technology-Mediated Learning (TML) theory to illustrate how integrating ChatGPT into assignment work can enhance student learning by demonstrating the professional application of AI, fostering interactive and collaborative learning, and encouraging critical engagement with AI. Our findings offer insights on integrating GAI in higher education, highlighting GAI's role in developing AI literacy and equipping students for the workplace of the future by fostering entrepreneurial skills using AI.

Keywords (*generative AI, artificial intelligence, education, technology-mediated learning, IS curricula*)

Introduction

Generative Artificial Intelligence (GAI) is a technological phenomenon affecting almost all areas of life nowadays. The paradigm shift in AI applications creates the potential to enrich user experiences but also the possibility of bias and misinformation (Susarla et al. 2023). Combining the capabilities of GAI with human guidance is, therefore, an important way forward to blend human and AI capabilities, e.g., freeing up time and resources for higher-value tasks such as creative work, critical thinking, or generally enhancing efficiency and democratizing access to coding and technology skills (e.g., Luckin et al. 2016). However, GAI also presents challenges, including fears of job loss and replaceability, potential disconnection when workers are replaced or managed by AI, and concerns surrounding responsible AI usage (Benlian et al. 2022; Xie et al. 2019). To this end, it is important that the workforce – especially knowledge workers who perform non-repetitive work (Davenport 2018) – are AI literate and thus prepared for human-AI collaboration (Southworth et al. 2023). Higher education (HE) at universities and business schools can play an essential role in preparing future workforce for these new challenges (Southworth et al. 2023).

To address this need, HE institutions can cultivate AI literacy in knowledge workers by integrating frequent and reflective AI interactions into HE curricula. AI literacy manifests through students' abilities to identify situations where AI can be applied, recognize the potential and limitations of utilizing AI in these contexts, and engage in critical reflection on the input generated by AI (Ng et al. 2021). AI literacy thus involves not only learning how to use GAI tools such as ChatGPT through real-world case studies but also recognizing situations where AI can be applied practically, including how to write effective prompts for entrepreneurial cases. AI literacy is particularly relevant for information systems and business studies in HE, where understanding and leveraging technology is key to preparing students for the future. Further, students need to be prepared for the rapid and constant evolution of the digital world, which requires individuals and businesses to continuously adapt and innovate to remain relevant (Benbya et al. 2020; Grisold et al. 2021). Within education, relying on GAI tools marks a shift towards creative co-

creation between students and AI, focusing on the development of new ideas for updating business models and communication of business ideas (Dwivedi et al. 2023; Bell and Bell 2023) when educating future knowledge workers. Nevertheless, recently, the use of GAI within educational contexts has provoked criticism regarding the students' accountability for individual achievements and the evaluation of individual performance (e.g., Dempere et al. 2023; Rudolph et al. 2023). Often, the use of GAI is limited or even prohibited by university regulations, thereby limiting its potential to elevate students' education through its use (Schlimbach et al. 2024). Rather than penalizing the use of technology, we believe that educational concepts should embrace and integrate the advantages into teaching strategies since GAI technology is here to stay and will only develop further. We posit that educating students on the purposeful use of GAI is an important part of their skill set for their future professional careers.

Currently, there is a gap in the literature regarding the exploration and the development of frameworks for incorporating GAI tools into HE in order to boost AI literacy among students. While the transformative potential of GAI in education is generally acknowledged, there is a lack of detailed approaches for effectively embedding the technology into curricula. This deficiency extends to understanding how such integration can impact students' critical engagement with AI technologies, their readiness for future workforce challenges, and the wider implications for educational practices in disciplines such as information systems and business studies (Selwyn and Gašević 2020). Moreover, there is a need for conceptual models and empirical evidence that illuminate best practices for nurturing effective human-AI collaboration in educational settings, tackling challenges posed by GAI, and capitalizing on its educational benefits (UNESCO 2019). There is a need for studies that not only delve into the practical application of GAI in education but also evaluate related outcomes, challenges, and opportunities for enhancing AI literacy and equipping future workforce (Bostrom and Yudkovsky 2018; Drachler and Greller 2016):

How can GAI tools such as ChatGPT mediate learning in the higher education context and contribute to the development of the students' AI literacy?

To tackle the challenge of incorporating AI literacy in HE teaching, we provide insights from a specific case study. The case context is course assignments about business idea generation at a French Business School, and we draw on Technology-Mediated Learning (TML) theory to analyze the case. The general goal at the business school is to build AI literacy among students across multiple courses through the integration of ChatGPT into regular learning contexts. This approach ensures that students a) become aware of the potential applications of AI in future job or business settings, b) learn how to interact with AIs through prompting, c) gain experience in using AIs collaboratively, and d) finally, engage in critical reflection on their AI skills. This comprehensive approach not only equips students with the necessary skills to navigate AI technologies but also fosters a deeper understanding of AI's role in the modern business landscape, preparing them for the nuanced challenges and opportunities that lie ahead. From a TML perspective, GAI tools are an instance of technology that facilitates interactive and personalized learning.

This study's main contribution is twofold, encompassing theoretical and practical aspects within the realm of TML: theoretically, we analyze the case through the lens of TML to understand how students' use of GAI mediates learning in HE courses and concurrently facilitates the development of AI literacy. On a practical level, the study offers an approach to operationalize the use of GAI in teaching. The approach delineates the potential roles that GAI can assume within an educational setting involving students, specifically highlighting how AI can function as a virtual team member. This dual contribution provides valuable insights into the integration of GAI in educational practices, offering a comprehensive understanding of its implications for teaching and learning as well as outlining a framework for effectively incorporating AI into pedagogical strategies.

Conceptual Foundation

GAI in Higher Education Teaching

Embedding AI and machine learning (ML) in education marks a defining shift in pedagogical methodologies: to teach students – as the workforce of tomorrow – to become AI-literate humans who know how to use GAI tools such as ChatGPT and to assess their abilities (van Slyke et al. 2023). Van Slyke et al. (2023) suggest that embracing AI tools as legitimate learning aids is the most promising strategy to use these tools for the benefit of all participants. Research on the acceptance and use of GAI tools among university students indicates the growing need for intuitive educational technologies that can adapt to different learning environments and student demographics (Strzelecki and ElArabawy 2024). Sundberg and Holmström (2024) further highlight the potential of code-free AI platforms to democratize ML education in various academic disciplines and emphasize the role of AI in improving learning

outcomes regardless of students' technical background. In addition to learning the straightforward use of AI and GAI tools, it is equally important to cover the principles of responsible AI use as well as the importance of ethical and safe AI practices (Aler Tubella et al. 2024). Bansal et al. (2024) point out the need for a human-centered approach to the AI-human dynamic, and their work calls for the integration of ethical AI considerations into the HE curriculum. The role of AI in personalization and decision-making in education is another current area of exploration where e.g., Saad and Tounkara (2023) propose an AI-based method to assist faculty in identifying at-risk students in distance education, demonstrating the utility of AI for improving knowledge transfer and decision-making processes. Thus, AI systems can be used to improve educational outcomes in HE institutions, highlighting the potential of AI to address individual learning needs (Teng et al. 2023).

Technology mediated learning

The concept of TML explores how digital tools and platforms can enhance and transform educational experiences (Gupta and Bostrom 2009). Gupta and Bostrom (2009) identify adaptability and interactivity as central principles in TML. They argue that learning technologies must be designed to engage learners actively and adapt to their individual preferences and needs, thereby enhancing the overall learning experience. Past research used TML to underpin the integration of technology into educational settings, aiming to improve engagement, comprehension, and the application of knowledge in diverse learning contexts. These include, for instance, online and distance education to examine the effectiveness of online learning compared to traditional face-to-face instruction (Means et al. 2009), blended learning environments to explore an integration of face-to-face and online learning (Garrison and Kanuka 2004), and Massive Open Online Courses to showcase how TML principles are applied in designing such courses (Margaryan et al. 2015). In each of these contexts, TML provides a foundation for designing educational experiences that leverage technology to meet learning goals. Therefore, we draw on TML to provide a lens that allows to understand how GAI mediates learning in HE and how students approach the goal of AI literacy.

Referring to the central TML principles of adaptability (1) and interactivity (2), GAI can play a crucial role in leveling knowledge disparities among students, particularly those with limited subject literacy. For instance, GAI facilitates access to information by delivering tailored, interactive responses, making complex subjects more accessible and engaging (1). Moreover, Wang et al. (2020) illustrate how technologies that mediate learning can significantly enhance engagement and deepen understanding of complex topics (1). This approach aligns with Huang and Rust's (2018) findings, which highlight technology's capacity to democratize knowledge access, thus catering to diverse learner needs. Furthermore, Sun et al. (2008) emphasize the potential of technology to create adaptive learning environments that respond dynamically to individual learners' requirements, effectively bridging knowledge gaps (2). GAI tools, by providing simplified explanations and interactive examples, cater to students who might find traditional educational resources challenging due to their subject skill levels (2). Thus, we claim that TML underscores the role of technologies in bridging knowledge gaps and derive the following proposition (P):

P1: GAI mediates learning by leveling knowledge disparities among students with limited subject literacy.

Second, GAI profoundly impacts adaptive learning by embodying the principles of TML, providing personalized, scalable, and instant feedback that mirrors the dynamics of one-on-one tutoring. For instance, Baker and Inventado (2014) illustrate how AI can analyze learners' responses to allow educators to tailor educational content, ensuring that each student's journey is uniquely aligned with their learning pace and style. This capability for personalization is at the heart of adaptive learning, allowing educational experiences to be molded to individual needs. The scalability of GAI, as discussed by Koedinger et al. (2012), breaks the barriers of traditional educational settings, where the student-to-teacher ratio can limit personalized instruction. GAI, not limited by such constraints, can extend learning experiences to an expansive audience, democratizing access to adaptive education:

P2: GAI mediates learning by enabling adaptive learning at scale.

Further, experiential learning (Kolb 1984), a key aspect of TML, highlights the importance of direct engagement with learning materials, which, in the context of GAI, enables students to interactively learn about AI by using GAI tools, thus promoting a hands-on understanding of AI technologies. The constructivist approach within TML further supports this perspective by suggesting that knowledge is constructed through direct experiences, where engaging with GAI allows learners to explore and experiment with AI functionalities, enhancing their understanding of AI principles (Jonassen and Rohrer-Murphy 1999). By using GAI in real-world tasks and projects, students can experience firsthand how AI is applied in various domains, thus gaining practical AI literacy that extends beyond theoretical knowledge (Collins et al. 2018). Thus, we derive our third proposition:

P3: GAI can be utilized as a technology to generate AI literacy through a learning-by-doing approach.

Technology-mediated business ideation as a teaching subject

In a recent study by Schlimbach et al. (2024), the need for technology-mediated business ideation, especially in the context of digital entrepreneurship, is emphasized. According to the authors, students need to be prepared for the rapid and constant evolution of the digital world, which requires individuals and businesses to adapt and innovate continuously to remain relevant. This makes the development of new ideas for updating business models, responding to external shocks, and creating alternatives to traditional methods increasingly important (Benbya et al. 2020; Grisold et al. 2021). The ability to develop new ideas and an entrepreneurial mindset that includes recognizing business opportunities and creativity is important as it prepares students for their future role in fostering innovation in their professional lives (Bell and Bell 2023). With the increasing importance of digital and hybrid education formats, there is a need for tools that better support online entrepreneurship education (Liguori and Winkler 2020). Research in the field of digital entrepreneurship and business model innovation emphasizes the promising role of digital infrastructure and modern digital tools in facilitating collaboration, documentation, experimentation, and creativity (von Briel et al. 2021). These tools are important for the communication of business ideas in the context of entrepreneurial education, as they systematically organize idea-generation processes and increase efficiency (Gonul 2019). In this context, Schlimbach et al. (2024) discuss the integration of conversational agents (like Chat GPT) for technology-mediated business ideation to promote the development of key competences (specific and more technical) and literacy (with cognitive and social facets) in idea generation and innovation to prepare students for the digital working world. Nevertheless, combining the principles of TML and digital entrepreneurship to build context-related AI literacy that supports digital entrepreneurship skills of IS and business students is currently missing.

Research Methodology

We draw on a comparative case study of two similar yet distinct versions of a project assignment – as our unit of analysis (George and Bennett 2005; Yin 2018) – which uses GAI in a business education setting. The study was conducted within the masters’ programs of a French business school, which span various areas of study, such as finance, luxury and design management, and human resources. As part of the curriculum, an assignment was developed to familiarize students with practical applications of GAI in the two courses “Business Analytics & Big Data” and “Digital Transformation & Cyber Security.” The choice of a French Business School as the setting for our comparative study was made for several reasons. First, this setting offers a richness of context and theoretical relevance (Eisenhardt 1989). French Business Schools, stemming from the Grande Ecoles tradition, are elite institutions in the French HE system (Thomas et al. 2014). ICN Business School, recognized as a Grande Ecole of Management and with triple accreditation (AACSB, EQUIS, and AMBA), is a vital player in the highly competitive French business education market. Such competitiveness fosters a culture of innovation in curriculum development and the early integration of advanced educational technologies (Thomas et al. 2014), including AI. Secondly, the setting studied offers diversity and contrasts in the sample. Our sample includes a diverse blend of groups (8 French-speaking and 14 English-speaking), which allows for comparative analysis across language and cultural groups within the same institutional setting (Creswell, J.W. and Creswell, J.D. 2017). In addition, one author affiliated with the school has conducted the data collection and has been engaging with the students for over six months during the courses, potentially enriching the quality of the data and the insights gained (George and Bennett, 2005; Yin 2018).

Teaching Concept of the Two Cases

The examined assignments for the “Big Data & Business Analytics” and “Digital Transformation & Cyber Security” courses aim to immerse students in the practical applications of GAI for business innovation. Each assignment, tailored to the respective course, takes students through conceptualizing, developing, and refining a startup idea, focusing on using AI for business modeling and decision-making. Each assignment session lasted 150 to 180 minutes in class, combined with 24 hours of finishing time. Students were encouraged to work together intensively in their groups during these assignments and collaborate with the AI.

In the “Big Data & Business Analytics” version of the assignment, students embark on a journey from idea generation to creating a comprehensive Big Data-based business model. This task is structured around using AI as a digital consultant, with ChatGPT helping to refine the students’ business ideas through interactive feedback. Students are tasked with brainstorming, getting advice from AI, pitching in front of all students, and finally documenting their Big Data-based business model. The session ends with reflections on the role of Big Data in

business and the use of AI as an advisory tool. It encourages an in-depth reflection on the importance of Big Data in future businesses and how they perceived ChatGPT as a digital consultant for business mediation. In contrast, the “Digital Transformation & Cybersecurity” version of the assignment positions the AI as a CEO and focuses on innovation and strategy in the areas of general start-up ideas. The students are to learn to create effective pitches for their start-up ideas, consult the “AI CEO” to validate and improve their ideas and refine their startup concepts based on AI and peer feedback. This assignment focuses on the practical application of AI insights in developing marketable strategies and innovative solutions to digital transformation challenges. Although the assignment was part of a digital transformation course, the students could freely choose to integrate any digital technologies into their business ideas. Both assignments involve an intensive exploration of GAI (in the form of ChatGPT) as a facilitator for business ideation. Both courses provide students with experience in GAI’s important role in future business practices, especially in strategic decision-making. The assignment’s results were graded and provided a quantifiable measure of student success and engagement. Based on each course’s learning objectives, the assessment criteria evaluated the collaborative efforts. The comparison of both assignments is summarized in Table 1.

Feature	Big Data & Business Analytics	Digital Transformation & Cyber Security
Objective	Develop Big Data-based business ideas using AI as a digital consultant.	Use AI as a CEO to drive innovation in a digital start-up.
AI Role	Digital Consultant for refining business models and strategies.	CEO for validating and enhancing startup ideas and strategy.
Key Deliverables	A PowerPoint presentation including a business model canvas (8-10 slides) reflecting on Big Data and AI as business tools.	A Word report (7-10 pages) detailing the startup idea, AI consultation, and reflections.
Engagement with AI	Extensive interaction for feedback on business models, market feasibility, and growth strategies.	Directed Q&A with AI for idea validation, market analysis, and strategic insights.
Assessment Focus	Originality of startup idea, engagement with AI, the robustness of the Big Data-based business model, and depth of reflection.	Originality of the idea, engagement quality with AI, pitch quality, and feedback application.

Table 1: Assignment Comparison.

Data Collection and Data Analysis

Data was collected across course offerings at different times and in different languages. The group sizes within each course ranged from three to six members to encourage different perspectives and teamwork skills essential for future business environments. All ethical guidelines related to student participation and assessment were strictly followed when conducting this assignment and collecting data. While maintaining anonymity and fairness, the study aims to provide valuable insights into the effective integration of GAI into HE curricula. Table 2 shows the 22 groups that were collected over four different collection points ranging from September 2023 to March 2024.

Course	Language Track	Date	Number of Groups
Digital Transformation & Cybersecurity	English	September 08, 2023	4
	English	February 23, 2024	3
Big Data & Business Analytics	French	March 13, 2024	8
	English	March 15, 2024	7

Table 2: Sample Overview.

In our data analysis, we were inspired by Baiyere et al.’s (2020) four-stage abductive theory approach. First, we anchored our analysis in the theoretical framework of TML. This deductive view allowed us to develop three theoretical themes that shaped our understanding and expectations regarding the impact of GAI on learning processes. Second, following Gioia et al. (2012) and the principles of grounded theory (Glaser and Strauss 1967), we then conducted an inductive open coding of the group results obtained from the assignments in the two aforementioned courses separately. This enables empirical anchoring and subsequent case comparisons. Third, we refined these concepts into second-order themes through axial coding (Gioia et al. 2012). This consolidation of the first-order concepts allows us to abstract the themes and identify whether themes emerged from one or both cases. Fourth and finally, we mapped these second-order themes onto the three original theoretical domains of our deductive lens. This step allowed us to compare our empirical findings with our theoretical expectations (Baiyere et al. 2020), thus deepening our theoretical understanding of technology-mediated learning on GAI use in HE.

Results

In this chapter, we describe the results of our data analysis. Prompted by our assignments around the development of start-up ideas (once with a big data focus and once without a specific technology focus), four main dimensions emerged from our investigation as to whether GAI enhances learning by filling gaps in students' knowledge. First, the GAI tool was able to promote the development of students' entrepreneurial literacy. Second, when the assignment challenges students to integrate advanced technologies into their business ideas, the GAI tool could promote the development of students' technology-business integration competence. The third dimension covers how GAI was used as a scalable learning support, illustrating how GAI tools facilitate diverse types of student interactions and responses. Finally, the fourth dimension covers the role of GAI in developing AI literacy among students through a practical, learning-by-doing approach with ChatGPT. Figure 1 shows the full coding scheme.

GAI for Developing Student's Entrepreneurial Literacy

The assignment results show that Chat GPT enabled students to engage confidently with entrepreneurial tasks. Some groups directly expressed this by mentioning that the tool validated their ideas in an unfamiliar work environment. Notably, all student groups, regardless of the course or master program they were in or their language skills, demonstrated the ability to identify critical business trends such as personalization, customization, sustainability, well-being, self-expression, and convenience. Furthermore, the students were able to develop comprehensive business ideas and models. These included various components, spanning the classical business model canvas elements (Osterwalder and Pigneur 2010) to branding and crafting coherent start-up narratives. Despite uniform success in these areas, there were differences in the level of innovativeness and feasibility of the proposed business models. While some groups were able to discover unique market niches, others chose saturated markets, such as fitness apps, suggesting that these tasks were more difficult to solve using GAI tools such as ChatGPT.

GAI for Developing Student's Technology-Business Integration Competence

When examining the integration of technology into business, it becomes clear that the discussion about the role of technology varies considerably depending on the assignment type (digital transformation or big data) but not by students' languages or their specific program of study. A dominant topic the students discussed was how AI can support aspects of business management and start-up development. Key topics included the potential of AI to improve decision-making, increase efficiency through automation, and refine business strategies, as well as the use of machine learning and data mining for market insight. This focus was significantly stronger in the results for the "Digital Transformation" assignments compared to the "Big Data" assignments. Conversely, assignments focusing on big data business models prompted students to delve deeper into the technical aspects of the new technologies. Students identified and discussed numerous business applications for advanced technologies, such as AI-driven image recognition for skin care, IoT sensors for gardening, recommendation systems, real-time data analytics, and cloud computing for efficient data processing. These discussions extended to how AI can be woven into the business model. Topics such as improving decision-making processes, automation to increase efficiency, reducing operational downtime, and providing round-the-clock customer service through chatbots were discussed. Some aspects, such as the latter topic, can also be found in the results of the digital transformation groups.

GAI as Scalable Learning Support for Students

Through our analysis focus on GAI as enabling adaptive learning at scale, it became apparent that GAI tools like ChatGPT facilitate diverse types of student interactions and responses, shedding light on its role in scalable learning support. Firstly, some students tend to humanize their interactions with GAI, employing human-like descriptions and attributing emotions or intentions to the AI, such as using male pronouns (ChatGPT = he), stating that ChatGPT is 'thinking.' This anthropomorphizing reflects the depth of engagement GAI can elicit but can also be a sign of lower AI literacy. Additionally, GAI is perceived as a motivational tool, challenging students to extend beyond their current capabilities and assumptions and fostering a proactive learning attitude. Moreover, the convenience of GAI is highlighted in all groups regarding scale, quality of feedback, and advice it provides. Students appreciate the immediate, organized, and insightful feedback, recognizing GAI's capacity to support learning through its scalability and the ability to offer non-emotional, objective advice. Some student groups highlighted that this aspect is valuable in facilitating collaboration among intercultural learning teams. However, students also acknowledge the irreplaceable value of human interaction in learning. While GAI significantly enhances learning experiences, it lacks the emotional depth, cultural understanding, and criticality that human educators offer.

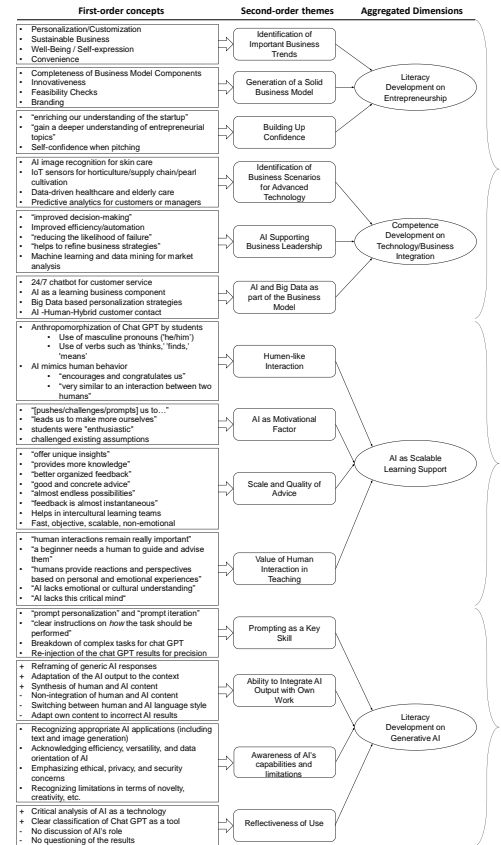


Figure 1: Coding Scheme.

GAI for Developing Student's AI Literacy

When looking at developing AI literacy among students through a practical, learning-by-doing approach using ChatGPT, our analysis highlighted two critical aspects of AI literacy: practical skills in using GAI tools like ChatGPT and cognitive awareness of the capabilities and implications of these tools.

In terms of hands-on skills, firstly, learning effective prompting emerges as a key factor. Students learned the importance of effective strategies to divide tasks into smaller, manageable components for better outcomes and understanding that detailed inputs lead to more personalized outputs. Additionally, students expressed that they realized during the assignment that refining and iterating prompts are important steps to creating useful results. Secondly, the successful integration of AI-generated content into their work is a critical skill. Some students demonstrated the ability to adapt generic AI responses to specific contexts and synthesize human and AI feedback. Others showed severe problems in creating a coherent work report, leading to breaks in style and content. On the one hand, mental awareness of GAI tools is involved in recognizing their capabilities and limitations. This includes the awareness and willingness to leverage GAI's efficiency, versatility, and data orientation. On the other hand, many student groups expressed concerns related to ethics, privacy, and security and underscored the constraints in terms of novelty and creativity imposed by GAI. Further, reflective use of GAI, marked by critical analysis and clear classification of ChatGPT as a tool, was observable in many groups. However, some students failed to critically assess the role of GAI in their work or to question the accuracy of its outputs, indicating a lack of AI literacy. These points were equally strong among all groups, with no effects by language, assignment type, or master's program.

Discussion, Conclusion, and Outlook

The goal of this study is to contribute an initial understanding of how to integrate AI tools effectively into HE curricula and build AI literacy among students, as reflected by our research question. To this end, we conducted a

comparative case study, integrating the use of ChatGPT into two different course assignment scenarios at a French Business School. We critically reflect our results against three propositions derived from the literature on TML.

P1: GAI mediates learning by leveling knowledge disparities among students with limited subject literacy.

We find support for the first proposition as students show at least a certain level of ideation and technology understanding, thus GAI mediating knowledge disparities. This is in line with previous research (Huang and Rust 2018) that identified technology usage suitable to address diverse learner needs (e.g., personalization/customization). Further, we also find evidence in line with Wang et al. (2020) that technologies mediating learning can significantly enhance engagement and deepen understanding of complex topics (e.g., completeness of business model components). However, we must also acknowledge that students' over-reliance on technology might hinder the development of critical thinking and ideation skills. Teachers must consider both critical thinking and ideation skills when designing human-AI interactive courses. The level that the GAI tool can produce to solve a task must then be set as the minimum to be expected from students when solving a task. Higher grades must instead acknowledge a surplus of understanding, critical thinking, and innovativeness.

P2: GAI mediates learning by enabling adaptive learning at scale.

Our results showcase that GAI displays varying roles in human-AI interaction. While some groups rely on GAI as a knowledge bearer, ideator, or corrector – so in rather functional roles – other groups used GAI as a coach or consultant, so in more relational roles. This supports the TML concept of adaptive learning (Baker and Inventado 2014), where individual needs are addressed by the technology used (i.e., the GAI provides almost endless possibilities for input, its feedback is almost instantaneous, etc.). In traditional course settings, these roles are mostly provided by a lecturer guiding students through their tasks. Nevertheless, lecturer-student interaction is regularly very limited, while knowledgeable use of a GAI tool can scale interaction and personalization, as discussed by Koedinger et al. (2012). On the other side, the unreflected use of a GAI tool can lead to anthropomorphizing what might be an indicator of lower AI literacy and reflection of GAI use. Therefore, clarifying the GAI tool's capabilities and weaknesses within teaching must be part of successful curricula integration, building a better understanding of how to use GAI as scalable learning support among students.

P3: GAI can be utilized as a technology to generate AI literacy through a learning-by-doing approach.

ChatGPT has proven to be a tool that enables interactive use (which is a key aspect of TML) of GAI technology and thus promotes a hands-on understanding, as suggested by Kolb (1984). This hands-on understanding of developing AI literacy is manifold. To enable students' knowledgeable use of AI tools, lecturers must ensure that students can use a GAI tool for defined purposes, e.g., by practicing prompting effectively. Here, disparities among students' use are visible (e.g., no questioning of the AI-created results or no necessary breakdown of complex tasks). Lecturers, hence, need to enable and encourage students to iterate their prompts or reinject results. Through constructivist learning (Jonassen and Rohrer-Murphy 1999), students' understanding of GAI principles is strengthened by building AI literacy. Further, while some student groups synthesized the AI output and their own ideas, this process requests reflection on the usage of AI tools (i.e., its capabilities), the output of the tool, and bridging different thoughts, thus being quite a complex task for students. Building AI literacy must thus be adequately supported by the preceding lecture content.

From a theoretical perspective, we used the lens of TML to understand how students' use of GAI mediates learning in HE courses and facilitates the development of AI literacy. We find support for all our derived propositions, albeit limited by individual student skill of GAI usage, thus requiring adequate lecturer support. In a practical perspective, our study offers an approach to operationalize the use of GAI in teaching. The study outlines the themes related to GAI within an educational setting, including AI's role as a team member, designing prompts, and reflecting on AI-generated output. While our study offers a first step towards GAI integration in HE teaching, it is limited by the choice of ChatGPT, the task and reflections performed by students, and the context of one specific business school, impacting the generalizability and external validity. Future research should focus on an in-depth understanding of how GAI tools can foster knowledge and competence goals across different GAI literacy levels and the long-term impact of AI integration in HE curricular, as well as empirically testing our propositions.

Acknowledgments

We thank Professors Alaeddini and Khalfaoui for assisting with data collection and Professor Mallek as module lead for the Digital Transformation & Cybersecurity course at ICN Business School.

References

- Aler Tubella, A., Mora-Cantalops, M., and Nieves, J. C. 2024. "How to Teach Responsible AI in Higher Education: Challenges and Opportunities," *Ethics and Information Technology* (26:3), Springer Science and Business Media B.V., pp. 1–14.
- Baiyere, A., Salmela, H., and Tapanainen, T. 2020. "Digital Transformation and the New Logics of Business Process Management," *European Journal of Information Systems* (29:3), pp. 238–259.
- Baker, R. S., and Inventado, P. S. 2014. "Educational Data Mining and Learning Analytics," in *Learning Analytics: From Research to Practice*.
- Bansal, G., Mitchell, A., and Li, D. 2024. "A Panel Report on Higher Education in the Age of AI from the Perspective of Academic Leaders in the Midwest U.S.," *Communications of the Association for Information Systems* (54), pp. 360–375.
- Bell, R., and Bell, H. 2023. "Entrepreneurship Education in the Era of Generative Artificial Intelligence," *Entrepreneurship Education* (6:3).
- Benbya, H., Nan, N., Tanriverdi, H., and Yoo, Y. 2020. "Complexity and Information Systems Research in the Emerging Digital World," *MIS Quarterly: Management Information Systems* (44:1).
- Benlian, A., Wiener, M., Cram, W. A., Krasnova, H., Maedche, A., Möhlmann, M., Recker, J., and Remus, U. 2022. "Algorithmic Management: Bright and Dark Sides, Practical Implications, and Research Opportunities," *Business and Information Systems Engineering* (64:6).
- Bostrom, N., and Yudkowsky, E. 2018. "The Ethics of Artificial Intelligence," in *Artificial Intelligence Safety and Security*, R. V. Yampolskiy (ed.), New York: Chapman and Hall/CRC, pp. 57–69.
- von Briel, F., Recker, J., Selander, L., Jarvenpaa, S. L., Hukal, P., Yoo, Y., Lehmann, J., Chan, Y., Rothe, H., Alpar, P., Fürstenau, D., and Wurm, B. 2021. "Researching Digital Entrepreneurship: Current Issues and Suggestions for Future Directions," *Communications of the Association for Information Systems* (48).
- Collins, A., Brown, J. S., and Newman, S. E. 2018. "Cognitive Apprenticeship: Teaching the Crafts of Reading, Writing, and Mathematics," in *Knowing, Learning, and Instruction: Essays in Honor of Robert Glaser*.
- Creswell, J.W. and Creswell, J.D., 2017. 2017. "Research Design: Qualitative, Quantitative, and Mixed Methods Approaches," *Sage Publications*.
- Davenport, T. H. 2018. "From Analytics to Artificial Intelligence," *Journal of Business Analytics* (1:2).
- Dempere, J., Modugu, K., Hesham, A., and Ramasamy, L. K. 2023. "The Impact of ChatGPT on Higher Education," *Frontiers in Education*.
- Drachler, H., and Greller, W. 2016. "Privacy and Analytics - It's a DELICATE Issue a Checklist for Trusted Learning Analytics," in *ACM International Conference Proceeding Series* (Vol. 25-29-April-2016).
- Dwivedi, Y. K., ..., Wirtz, J., and Wright, R. 2023. "'So What If ChatGPT Wrote It?' Multidisciplinary Perspectives on Opportunities, Challenges and Implications of Generative Conversational AI for Research, Practice and Policy," *International Journal of Information Management* (71).
- Eisenhardt, K. M. 1989. "Building Theories from Case Study Research," *Academy of Management Review* (14:4). (<https://doi.org/10.5465/amr.1989.4308385>).
- Garrison, D. R., and Kanuka, H. 2004. "Blended Learning: Uncovering Its Transformative Potential in Higher Education," *Internet and Higher Education* (7:2).
- George, A., and Bennett, A. 2005. "Case Studies and Theory Development," *Case Studies and Theory Development in the Social Sciences* (36:3).
- Gioia, D. A., Corley, K. G., and Hamilton, A. L. 2012. "Seeking Qualitative Rigor in Inductive Research: Notes on the Gioia Methodology," *Organizational Research Methods* (16:1), pp. 15–31.
- Glaser, B. G., and Strauss, A. L. 1967. *The Discovery of Grounded Theory Strategies for Qualitative Research*, New Brunswick: AldineTransaction.
- Gonul, O. O. 2019. "Teaching and Implementing Ideation in Entrepreneurship: A Systematic Approach," *Journal of Entrepreneurship and Business Innovation* (5:2).
- Grisold, T., Vom Brocke, J., Gross, S., Mendling, J., Röglinger, M., and Stelzl, K. 2021. "Digital Innovation and Business Process Management: Opportunities and Challenges as Perceived by Practitioners," *Communications of the Association for Information Systems* (49).
- Gupta, S., and Bostrom, R. P. 2009. "Technology-Mediated Learning: A Comprehensive Theoretical Model," *Journal of the Association for Information Systems* (10:9).
- Huang, M. H., and Rust, R. T. 2018. "Artificial Intelligence in Service," *Journal of Service Research* (21:2).
- Jonassen, D. H., and Rohrer-Murphy, L. 1999. "Activity Theory as a Framework for Designing Constructivist Learning Environments," *Educational Technology Research and Development* (47:1).

- Koedinger, K. R., Corbett, A. T., and Perfetti, C. 2012. "The Knowledge-Learning-Instruction Framework: Bridging the Science-Practice Chasm to Enhance Robust Student Learning," *Cognitive Science* (36:5).
- Kolb, D. A. 1984. "Experiential Learning: Experience as The Source of Learning and Development," *Prentice Hall, Inc.* (1984).
- Liguori, E., and Winkler, C. 2020. "From Offline to Online: Challenges and Opportunities for Entrepreneurship Education Following the COVID-19 Pandemic," *Entrepreneurship Education and Pedagogy*.
- Luckin, R., Holmes, W., Griffiths, M., and Forcier, L. B. 2016. "Intelligence Unleashed An Argument for AI in Education," London.
- Margaryan, A., Bianco, M., and Littlejohn, A. 2015. "Instructional Quality of Massive Open Online Courses (MOOCs)," *Computers and Education* (80).
- Means, B., Toyama, Y., Murphy, R., Bakia, M., and Jones, K. 2009. "Evaluation of Evidence-Based Practices in Online Learning," *Structure*.
- Ng, D. T. K., Leung, J. K. L., Chu, S. K. W., and Qiao, M. S. 2021. "Conceptualizing AI Literacy: An Exploratory Review," *Computers and Education: Artificial Intelligence* (2).
- Osterwalder, A., and Pigneur, Y. 2010. "Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers," John Wiley & Sons, Hoboken, NJ, Vol. 1.
- Rudolph, J., Tan, Samson, and Tan, Shannon. 2023. "ChatGPT: Bullshit Spewer or the End of Traditional Assessments in Higher Education?," *Journal of Applied Learning and Teaching* (6:1).
- Saad, I., and Tounkara, T. 2023. "Artificial Intelligence-Based Group Decision Making to Improve Knowledge Transfer: The Case of Distance Learning in Higher Education," *Journal of Decision Systems*.
- Schlimbach, R., Lange, T., Wagner, F., Robra-Bissantz, S., and Schoormann, T. 2024. "An Educational Business Model Ideation Tool – Insights from a Design Science Project," *Communications of the Association for Information Systems* (In Press), pp. 1–22
- Selwyn, N., and Gašević, D. 2020. "The Datafication of Higher Education: Discussing the Promises and Problems," *Teaching in Higher Education* (25:4).
- van Slyke, C., Johnson, R. D., and Sarabadani, J. 2023. "Generative Artificial Intelligence in Information Systems Education: Challenges, Consequences, and Responses," *Communications of the Association for Information Systems* (53).
- Southworth, J., Migliaccio, K., Glover, J., Glover, J. N., Reed, D., McCarty, C., Brendemuhl, J., and Thomas, A. 2023. "Developing a Model for AI Across the Curriculum: Transforming the Higher Education Landscape via Innovation in AI Literacy," *Computers and Education: Artificial Intelligence* (4).
- Strzelecki, A., and ElArabawy, S. 2024. "Investigation of the Moderation Effect of Gender and Study Level on the Acceptance and Use of Generative AI by Higher Education Students: Comparative Evidence from Poland and Egypt," *British Journal of Educational Technology* (0:0), John Wiley and Sons Inc, pp. 1–22.
- Sun, P. C., Tsai, R. J., Finger, G., Chen, Y. Y., and Yeh, D. 2008. "What Drives a Successful E-Learning? An Empirical Investigation of the Critical Factors Influencing Learner Satisfaction," *Computers and Education* (50:4).
- Sundberg, L., and Holmström, J. 2024. "Using No-Code AI to Teach Machine Learning in Higher Education," *Journal of Information Systems Education* (35:1), pp. 1–10.
- Susarla, A., Gopal, R., Thatcher, J. B., and Sarker, S. 2023. "The Janus Effect of Generative AI: Charting the Path for Responsible Conduct of Scholarly Activities in Information Systems," *Information Systems Research* (34:2).
- Teng, Y., Zhang, J., and Sun, T. 2023. "Data-Driven Decision-Making Model Based on Artificial Intelligence in Higher Education System of Colleges and Universities," *Expert Systems* (40:4).
- Thomas, L., Billsberry, J., Ambrosini, V., and Barton, H. 2014. "Convergence and Divergence Dynamics in British and French Business Schools: How Will the Pressure for Accreditation Influence These Dynamics?," *British Journal of Management* (25:2).
- UNESCO. 2019. "Artificial Intelligence in Education: Challenges and Opportunities for Sustainable Development," *UNESCO*.
- Wang, X., Tan, S. C., and Li, L. 2020. "Technostress in University Students' Technology-Enhanced Learning: An Investigation from Multidimensional Person-Environment Misfit," *Computers in Human Behavior* (105).
- Xie, H., Chu, H. C., Hwang, G. J., and Wang, C. C. 2019. "Trends and Development in Technology-Enhanced Adaptive/Personalized Learning: A Systematic Review of Journal Publications from 2007 to 2017," *Computers and Education* (140).
- Yin, R. K. 2018. *Case Study Research and Applications: Design and Methods*, Los Angeles: Sage Publications Inc.