FROM THE EDITORS

CRITICAL THINKING IN THE AGE OF GENERATIVE AI

The rapid rise of generative artificial intelligence (GenAI) has prompted a vigorous discussion about the role this technology should play in the business classroom (Adeshola & Adepoju, 2023; Davis, 2024; Ratten & Jones, 2023). GenAI tools (e.g., ChatGPT and Midjourney, among many others) are "computational techniques that are capable of generating seemingly new, meaningful content such as text, images, or audio from training data" (Feuerriegel, Hartmann, Janiesch & Zschech, 2024: 111). Some management educators have expressed optimism about GenAI's potential for enhancing learning and education, noting that it can (a) simplify the development of innovative teaching materials (Krammer, 2023; Mollick & Mollick, 2023), (b) provide accountability to students who struggle with focus and frustration (Khan, 2024), (c) give students diverse perspectives and feedback (Hyde, Busby & Bonner, 2024), and (iv) increase the accessibility of online instruction and skills development (UNESCO, 2021).

Along with these benefits, educators have identified challenges resulting from GenAI, particularly with respect to the efficacy of traditional teaching and assessment methods (e.g., Lindebaum & Ramirez, 2023). Underlying these concerns, however, is a much more foundational problem, which is that some features of GenAI appear to lessen individual willingness and ability to engage in meaningful critical thinking about its output (Lindebaum & Fleming, 2024).

In this editorial, our aim is to argue for increased attention to the construct of *critical thinking*, as a response to both the opportunities and the risks posed by GenAI. Critical thinking has been conceptualized in two main ways in prior literature. The first perspective sees critical thinking as the ability to avoid cognitive biases and engage in objective situational analysis and decision-making (Lovelace, Eggers & Dyck, 2016; Priem, 2018). This perspective focuses on the "thinking" part of the term, emphasizing the logic, evidence, and analysis that support claims and belief. The second defines critical thinking as the ability to reflect upon and challenge prevailing social norms (Huber & Knights, 2022). This perspective originates in sociology, and emphasizes the "critical" part of the term, as it focuses on challenging orthodoxies and illuminating injustice. For simplicity, we will refer to these two views of critical thinking as "individual" and "social," respectively.

The remainder of this FTE first delves briefly into these perspectives on critical thinking, and then proceeds to discuss the link between GenAI and critical thinking in the context of management learning and education (MLE). Finally, we conclude with a research agenda to develop a richer, more rigorous body of research on critical thinking. We argue that this research should engage in questions about the interrelationships between GenAI use and both individual and social critical thinking, and how management education can help students counteract GenAI's threats to critical thinking while also leveraging its benefits. The threats and challenges posed by GenAI make it crucial for us—both as educators and as scholars of teaching and learning—to explore this important relationship.

CRITICAL THINKING: INDIVIDUAL AND SOCIAL

The two perspectives on critical thinking in MLE research—individual and social, as previously indicated—both have roots in Western philosophy. The origin of the practice of thinking reflectively about information, and questioning its underlying assumptions and validity, is commonly associated with Socrates. Philosophers and historians view the disentangling of "supernatural and scientific explanations" (Lau, 2024: 726), along with expressed skepticism of religious and mystical principles as evidence of early critical thought (Connerton, 1976).

The modern construct of individual critical thinking originated in the work of John Dewey (1910)[1] and was further developed by Edward Glaser (1941). Individual critical thinking has been defined as "the ability to thoughtfully analyze and evaluate situations and recommend courses of action that consider stakeholders, implications, and consequences" (Lovelace, et al., 2016: 101), with emphasis on

---

[1] As documented by Lau (2024), others used the term "critical thinking" as far back as the seventeenth century, but these uses do not seem to carry the same meaning or intent as the idea conceptualized by Dewey.

evaluating options using a range of different perspectives (Parks-Leduc, Mulligan & Rutherford, 2021). An important aspect of individual critical thinking is that it has both cognitive and affective components (Glaser, 1941). This is significant, as it implies that successful critical thinking requires not only being able to do the cognitive work but also having the interest and inclination to do so building on reflexivity, embodiment, and emotion (Lindebaum & Fleming, 2024). It is not enough to be able to question; successful critical thinking requires willingness to fully engage in the questioning.

In contrast to individual critical thinking's emphasis on finding objectively valid answers, what has been called social critical thinking involves "reflecting critically upon, and challenging, the status quo of prevailing social and institutional arrangements" (Huber & Knights, 2022: 303). It includes the development of an awareness of social realities, and one's ability to challenge and change these realities (Berkovich, 2014; Colombo, 2023). This sort of "critical thinking requires students to think more humanistically about the impact of their actions as they are learning" (Holmes, Cockburn-Wootten, Motion, Zorn & Roper, 2005: 249; see also Edwards & Küpers, 2024). Social critical thinking pays attention to diversity and power (Hibbert, 2013) to unmask tensions and challenge hegemony (Lamy, 2007).

While there are many different types of critical thinking in the MLE literature, the research on the construct itself is somewhat fragmented, as a result of the two perspectives (Mingers, 2000). To illustrate this fragmentation, we searched the *Academy of Management Learning and Education* (AMLE) archives for all types of articles[2] from 2019 through mid-2024 using the term "critical thinking" anywhere in the text. We acknowledge that other terms not included in our search refer to different aspects of critical thinking. For example, a substantial body of work on "reflexivity" captures elements important in "social" critical thinking (e.g., Cunliffe, 2016; Hibbert, 2013). However, our primary interest is on the construct of critical thinking itself; for that reason, we focused our search on the use of that term.

Of the 273 articles published in this period, 51 included the phrase critical thinking, but only 19 were research articles. Seven of these 19 articles fit within the social critical thinking perspective, while eight took an individual approach, and four were

mixed. Of the 19 research articles, nine mentioned critical thinking just once or twice in the article (usually in a list of desirable pedagogical outcomes), leaving only 10 that deeply engaged with the construct. In other words, one in five AMLE articles published since 2019 mentioned critical thinking, but only one in 25 seriously grappled with the construct, and those few instances were spread across the two quite different perspectives. Since critical thinking is arguably one of the most frequently mentioned goals of management (and higher) education, these numbers suggest that our consideration of critical thinking in recent years may have been more aspirational than actionable. In light of the rapid deployment and use of GenAI as an educational tool, this lack of attention to critical thinking as a topic of utmost theoretical and practical relevance is concerning, as we detail below.

CRITICAL THINKING AND GENERATIVE AI IN MANAGEMENT EDUCATION

The features of GenAI present management educators with a dilemma: while GenAI can help our students access a greater range of perspectives and information (Hyde et al., 2024), the way in which GenAI presents this information—combined with a tendency to confidently communicate false "hallucinations"—leads users to accept it uncritically, thus dampening both individual and social critical thinking (Lindebaum & Fleming, 2024). GenAI can enhance learning and build critical thinking skills—for example, if students are prompted to ask the AI to suggest errors in writing or raise opposing viewpoints to an argument (Hyde, et al., 2024). Some educators are building GenAI tools that engage students in Socratic questioning (Khan, 2024).

However, simultaneously, there is a significant risk that GenAI will inhibit critical thinking. Firstly, GenAI provides answers quickly and authoritatively in a way that can lead people to assume the output is objective and coherent, and to ignore the biases inherent in its training data (Bender, Gebru, McMillan-Major & Shmitchell, 2021; Bianchi et al. 2023). GenAI makes it much easier for students to access information, but yields information of potentially lower or doubtful quality (to the extent that some output is simply wrong; e.g., Hannigan, McCarthy & Spicer, 2024). Students may become less likely to conduct extensive or comprehensive search processes themselves, because they defer to the authoritative and informed tone of the GenAI output. They may be less likely to question—or even identify—the unstated perspectives underlying the

---

[2] Article types include research or reviews, essays (including Exemplary Contributions), book and resource reviews, editorials (From the Editors), and dialogues.

output, failing to consider whose perspectives are being glossed over and the taken-for-granted assumptions informing the claims.

Secondly, GenAI output can display human-like qualities in its syntax, including exhibiting greater empathy and readability than human experts (Chen et al., 2024), and, as a result, can evoke emotional trust in addition to cognitive trust in the user (Glikson & Woolley, 2020). That is, if GenAI mimics (or masks as) a human interlocutor, it excels at this task despite lacking precisely the embodied part of learning and thinking that constitutes human thinking and learning. The result is that the way in which GenAI presents information makes a user less likely to engage in individual critical thinking.

Thirdly, evidence shows that GenAI can engage in behavior that many would describe as unethical, including lying and strategic deception. Such behavior has been observed not only when the models were instructed to be deceptive (e.g., Hagendorff, 2023; O'Gara, 2023; Pacchiardi et al., 2023; Park, Goldstein, O'Gara, Chen & Hendrycks, 2023), but also when they were not instructed to (e.g., Pan et al., 2023; Scheurer, Balesni & Hobbhahn, 2023).

As a result, the consequences of uncritical reliance on GenAI can be significant. Students are more likely to inadvertently use false information, and less likely to seek additional (corroborating or contradictory) sources (e.g., Neumeister, 2023). Additionally, they are more likely to perpetuate the gender, racial, and Western-centric biases inherent in GenAI training data (e.g., Bianchi et al. 2023; Tiku & Chen, 2024). Perhaps more important, however, is the likely consequence of our students' continuing the practice of uncritically accepting GenAI output when they move outside of the academic setting. If we do not teach our students to critically engage with GenAI while they are still with us, they miss out on practicing and experiencing the value of questioning (i.e., a deep engagement with searching and evaluating information). Given that business schools educate future leaders and managers who will assuredly encounter AI-generated output in their work (English, 2023), it is crucial that we take seriously the task of developing critical thinking skills in our students.

CRITICAL THINKING AND GENERATIVE AI: A RESEARCH AGENDA

Despite much discussion and debate in the past two years, the potential of GenAI both to enhance and to undermine users' individual and social critical thinking is as yet inadequately theorized in the context of MLE. We argue that research, particularly longitudinal empirical work, is needed on the relationship between GenAI and both individual and social critical thinking.

GenAI and Individual Critical Thinking

Until recently, the development of human ability to engage in critical thinking has been shaped by social interaction among human beings. However, tools such as GenAI have begun to lead human actors to increasingly treat technologies as social actors (Sundar & Nass, 2000), as outlined by social response theory (Moon, 2000; Nass & Moon, 2000). Humans perceive social cues in technology, which may trigger the (mis)application of interaction scripts learned from human interaction (Kim & Sundar, 2012; Ossadnik, Muelfeld & Goerke, 2023). It is possible that, rather than teaching students to apply critical thinking skills honed for a social environment populated by other human actors, we may need to support them in (perhaps fundamentally) reimagining and refining their interactions with GenAI. When humans seek and critically reflect upon information provided by other humans, their assumptions regarding relevant source-related features (e.g., social boundedness, fallibility, empathy, fairness) are likely to differ compared to their assumptions regarding information received from "traditional" machines. However, GenAI does not fall neatly into either one of these categories (e.g., Kern et al., 2022; Ossadnik et al., 2023; Shulner-Tal, Kuflik, Kliger & Mancini, 2024). With its increased anthropomorphic features masking a lack of embodied coherence, GenAI may require its users to develop a new critical thinking "script."

A second research opportunity focuses on the affective (willingness) aspect of individual critical thinking (Glaser, 1941). This aspect of individual critical thinking has received less attention in the MLE literature to date; yet, if we want to develop students' willingness to engage in individual thinking, we need to better understand the pathways through which they develop this willingness. For instance, is the affective part of critical thinking enabled primarily via curiosity and openness to new experience, or does it also require development of comfort with ambiguity and an ability to tolerate the discomfort that accompanies uncertainty? How can willingness to experience discomfort be developed in an educational setting? Further, can we prompt students to

engage in more reflective use of GenAI by alerting them to the role of emotions in their learning and decision-making (Damasio, 1994) and to the absence of this emotion in GenAI? To what extent would such an approach require teaching students' basic knowledge about the functioning of GenAI and its inherent limitations?

GenAI and Social Critical Thinking

A research agenda for GenAI and social critical thinking could include opportunities to enrich the emancipatory mission of critical management theory. For example, contributions to prospective theorizing and generative scholarship (e.g., Pavez, Godwin & Spreitzer, 2021) have emphasized the potential to cultivate "the creation of desirable futures by imagining, or helping others imagine them in the first place" (Gümüsay & Reinecke, 2024: 3). While it is appropriate that humans retain decision-making power over what is considered *desirable*, could GenAI be used to augment human imagination of what is *possible* (Jarrahi, Lutz & Newlands, 2022)? What instruction would be required to facilitate this? How might values- and ethics-related discussions guide students' development of critical thinking skills that enable them to take action toward desirable futures imagined with the help of AI?

Research should also focus on ways to develop students' social critical thinking related to the larger societal issues raised by GenAI. These include concerns related to the implications of rapid GenAI adaptation for intellectual property rights of inputs needed for, and outputs created by, GenAI (Chesterman, 2024). Similarly, research could study the use of social critical thinking for focusing future leaders on the significant—and as yet unsustainable—environmental impact of the technology (Bashir et al. 2024).

CONCLUSION

We end our call for a research agenda about critical thinking and GenAI with an assertion that both individual and social critical thinking will be essential for students to succeed in the AI era. Students will need individual critical thinking to evaluate GenAI outputs, identifying poor-quality, inaccurate, and confabulated information. Individual critical thinking also can help them interpret GenAI output with an awareness of its potential biases, and, in so doing, reduce the harm of those biases. Finally, individual critical thinking enables students to use GenAI constructively, by taking its output as a *starting point* rather than an ending point, by challenging the AI tool (Mollick, 2024), and improving on its output by exerting their own judgment.

Social critical thinking is also imperative for our students' current and future interaction with GenAI. Social critical thinking will enable our students to identify missing perspectives, marginalized voices, and taken-for-granted societal assumptions in GenAI output. Social critical thinking enables students to be more thoughtful in their use of GenAI outputs, interpreting it with an understanding of the socially constructed nature of norms and values, and questioning seemingly universal truths expressed by the GenAI. Finally, social critical thinking can help students work with an awareness of the potential for institutions—private and public—to misuse GenAI, as well as the potential for GenAI to mislead individuals.

To conclude, the use of GenAI represents a dilemma at the core of recent debates on GenAI and education: GenAI makes information more available, but also makes users less likely to question or expand on the information they are provided. The dilemma highlights the increased importance of developing students' critical thinking skills, which led us to suggest specific avenues for future research about critical thinking, its relationship with GenAI, and how we as management educators can help our students develop critical thinking skills that effectively meet the new challenges posed by GenAI, while still leveraging its benefits.

Barbara Z. Larson 🔸
Northeastern University

Christine Moser 🔸
Vrije Universiteit Amsterdam

Arran Caza 🔸
University of North Carolina Greensboro

Katrin Muehlfeld
Trier University

Laura A. Colombo 🔸
University of Exeter

REFERENCES

Adeshola, I., & Adepoju, A. P. 2023. The opportunities and challenges of ChatGPT in education. *Interactive Learning Environments*, September: 1–14. doi:10.1080/10494820.2023.2253858.

Bashir, N., Donti, P., Cuff, J., Sroka, S., Ilic, M., Sze, V., Delimitrou, C., & Olivetti, E. 2024. The climate and sustainability implications of generative AI. *An MIT exploration of generative AI.* Retrieved from https://mit-genai.pubpub.org/pub/8ulgrckc/release/2?readingCollection=9434a92e.

Bender, E. M., Gebru, T., McMillan-Major, A., & Shmitchell, S. 2021. On the dangers of stochastic parrots: Can language models be too big? *Proceedings of the 2021 ACM Conference on Fairness, Accountability, and Transparency,* 610-623.

Berkovich, I. 2014. Between person and person: Dialogical pedagogy in authentic leadership development. *Academy of Management Learning & Education*, 13: 245–264.

Bianchi, F., Kalluri, P., Durmus, E., Ladhak, F., Cheng, M., Nozza, D., Hashimoto, T., Jurafsky, D., Zou, J., & Caliskan, A. 2023. Easily accessible text-to-image generation amplifies demographic stereotypes at large scale. In *FAccT '23: Proceedings of the 2023 ACM conference on fairness, accountability, and transparency*: 1493–1504. Chicago: Association of Computing Machinery.

Chen, D., Parsa, R., Hope, A., Hannon, B., Mak, E., Eng, L., Liu, F. F., Fallah-Rad, N., Heesters, A. M., & Raman, S. 2024. Physician and artificial intelligence chatbot responses to cancer questions from social media. *JAMA Oncology*, 10: 956–960.

Chesterman, S. 2024. Good models borrow, great models steal: Intellectual property rights and generative AI. *Policy and Society*, puae006. doi:10.1093/polsoc/puae006.

Colombo, L. A. 2023. Civilize the business school: For a civic management education. *Academy of Management Learning & Education*, 22: 132–149.

Connerton, P. 1976. *Critical sociology*. London: Penguin.

Cunliffe, A. L. 2016. "On becoming a critically reflexive practitioner" redux: What does it mean to be reflexive? *Journal of Management Education*, 40: 740–746.

Damasio, A. 1994. *Descartes' error: Emotion, rationality and the human brain*. New York: Putnam.

Davis, J. 2024. April 23: A dystopian future for academic freedom? *I by IMD*.

Dewey, J. 1910. *How we think*. New York: Heath.

Edwards, M. G., & Küpers, W. 2024. Feelings for the planet: An alternative vocabulary for incorporating biosphere-focused emotions into management learning and education. *Academy of Management Learning & Education*. Forthcoming.

English, L. 2023. August 31: What are the new must-have leadership skills in today's AI world? *Medium*.

Feuerriegel, S., Hartmann, J., Janiesch, C., & Zschech, P. 2024. Generative AI. *Business & Information Systems Engineering*, 66: 111–126.

Glaser, E. M. 1941. *An experiment in the development of critical thinking*. New York: Columbia University.

Glikson, E., & Woolley, A. 2020. Human trust in artificial intelligence: Review of empirical research. *Academy of Management Annals*, 14: 627–660.

Gümüsay, A. A., & Reinecke, J. 2024. Imagining desirable futures: A call for prospective theorizing with speculative rigour. *Organization Theory*, 5. doi:10.1177/26317877241235939

Hagendorff, T. 2023. Deception abilities emerged in large language models. *arXiv*. Forthcoming.

Hannigan, T., McCarthy, I. P., & Spicer, A. 2024. Beware of botshit: How to manage the epistemic risks of generative chatbots. *Business Horizons*. doi:10.2139/ssrn.4678265.

Hibbert, P. 2013. Approaching reflexivity through reflection: Issues for critical management education. *Journal of Management Education*, 37: 803–827.

Holmes, P., Cockburn-Wootten, C., Motion, J., Zorn, T. E., & Roper, J. 2005. Critical reflexive practice in teaching management communication. *Business Communication Quarterly*, 68: 247–256.

Huber, G., & Knights, D. 2022. Identity work and pedagogy: Revisiting George Herbert Mead as a vehicle for critical management education and learning. *Academy of Management Learning & Education*, 21: 303–317.

Hyde, S. J., Busby, A., & Bonner, R. L. 2024. Tools or fools: Are we educating managers or creating tool-dependent robots? *Journal of Management Education*, 48: 708–734.

Jarrahi, M. H., Lutz, C., & Newlands, G. 2022. Artificial intelligence, human intelligence and hybrid intelligence based on mutual augmentation. *Big Data & Society*, 9. doi:10.1177/20539517221142824.

Kern, C., Gerdon, F., Bach, R. L., Keusch, F., & Kreuter, F. 2022. Humans versus machines: Who is perceived to decide fairer? Experimental evidence on attitudes toward automated decision-making. *Patterns*, 3: 100591.

Khan, S. 2024. *Brave new worlds: How AI will revolutionize education (and why that's a good thing)*. New York: Viking.

Kim, Y., & Sundar, S. S. 2012. Anthropomorphism of computers: Is it mindful or mindless? *Computers in Human Behavior*, 28: 241–250.

Krammer, S. M. 2023. Is there a glitch in the matrix? Artificial intelligence and management education. *Management Learning*. doi:10.1177/13505076231217667.

Lamy, S. L. 2007. Challenging hegemonic paradigms and practices: Critical thinking and active learning strategies for international relations. *Political Science & Politics*, 40: 112–116.

Lau, J. Y. 2024. Revisiting the origin of critical thinking. ***Educational Philosophy and Theory***, 56: 1–10.

Lindebaum, D., & Fleming, P. 2024. ChatGPT undermines human reflexivity, scientific responsibility and responsible management research. ***British Journal of Management***, 36: 566–575.

Lindebaum, D., & Ramirez, M. F. 2023. "Negative" resource review: On the essay-writing algorithm Essay Genius at https://essaygenius.ai/. ***Academy of Management Learning & Education***, 23: 343–345.

Lovelace, K. J., Eggers, F., & Dyck, L. R. 2016. I do and I understand: Assessing the utility of web-based management simulations to develop critical thinking skills. ***Academy of Management Learning & Education***, 15: 100–121.

Mingers, J. 2000. What is it to be critical? Teaching a critical approach to management undergraduates. ***Management Learning***, 31: 219–237.

Mollick, E. 2024. On the necessity of a sin. ***One Useful Thing***. Retrieved from https://www.oneusefulthing.org/p/on-the-necessity-of-a-sin.

Mollick, E., & Mollick, L. 2023. Using AI to implement effective teaching strategies in classrooms: Five strategies, including prompts. ***SSRN***. doi:10.2139/ssrn.4391243

Moon, Y. 2000. Intimate exchanges: Using computers to elicit self-disclosure from consumers. ***Journal of Consumer Research***, 26: 323–339.

Nass, C., & Moon, Y. 2000. Machines and mindlessness: Social responses to computers. ***Journal of Social Issues***, 56: 81–103.

Neumeister, L. 2023. June 8: Lawyers blame ChatGPT for tricking them into citing bogus case law. ***APNews***.

O'Gara, A. 2023. Hoodwinked: Deception and cooperation in a text-based game for language models. ***arXiv***. Forthcoming.

Ossadnik, J., Muehlfeld, K., & Goerke, L. 2023. Man or machine–or something in between? Social responses to voice assistants at work and their effects on job satisfaction. ***Computers in Human Behavior***, 149: 107919.

Pacchiardi, L., Chan, A. J., Mindermann, S., Moscovitz, I., Pan, A.Y., Gal, Y., Evans, O., & Brauner, J. 2023. How to catch an ai liar: Lie detection in black-box llms by asking unrelated questions. ***arXiv***. Forthcoming.

Pan, A., Chan, J. S., Zou, A., Li, N., Basart, S., Woodside, T., Zhang, H., Emmons, S., & Hendrycks, D. 2023. Do the rewards justify the means? Measuring trade-offs between rewards and ethical behavior in the Machiavelli benchmark. In A. Krause, E. Brunskill, K. Cho, B. Engelhardt, S. Sabato, & J. Scarlett (Eds.), ***International conference on machine learning***, 202: 26837–26867. Honolulu, HW: Proceedings of Machine Learning Research.

Park, P. S., Goldstein, S., O'Gara, A., Chen, M., & Hendrycks, D. 2023. AI deception: A survey of examples, risks, and potential solutions. ***arXiv***. Forthcoming.

Parks-Leduc, L., Mulligan, L., & Rutherford, M. 2021. Can ethics be taught? Examining the impact of distributed ethical training and individual characteristics on ethical decision making. ***Academy of Management Learning & Education***, 20: 30–49.

Pavez, I., Godwin, L., & Spreitzer, G. 2021. Generative scholarship through prospective theorizing: Appreciating the roots and legacy of organization development and change to build a bright future. ***Journal of Applied Behavioral Science***, 57: 459–470.

Priem, R. L. 2018. Toward becoming a complete teacher of strategic management. ***Academy of Management Learning & Education***, 17: 374–388.

Ratten, V., & Jones, P. 2023. Generative artificial intelligence (ChatGPT): Implications for management educators. ***International Journal of Management Education***, 21: 100857.

Scheurer, J., Balesni, M., & Hobbhahn, M. 2023. Technical report: Large language models can strategically deceive their users when put under pressure. ***arXiv***. Forthcoming.

Shulner-Tal, A., Kuflik, T., Kliger, D., & Mancini, A. 2024. Who made that decision and why? Users' perceptions of human versus AI decision-making and the power of explainable-AI. ***International Journal of Human-Computer Interaction***, May: 1–18.

Sundar, S. S., & Nass, C. 2000. Source orientation in human-computer interaction. ***Communication Research***, 27: 683–703.

Tiku, N., & Chen, S. Y. 2024. May 31: What AI thinks a beautiful woman looks like. ***Washington Post***.

UNESCO. 2021. Understanding the impact of artificial intelligence on skills development. Retrieved from https://unevoc.unesco.org/pub/understanding_the_impact_of_ai_on_skills_development.pdf

———————⋀⋀———————