Reconceptualising Research Methodology Teaching in the Age of AI to Rethink How Researchers Are Formed

Melisa M. Chawaremera and Joshua Kretzschmar
Independent Institute of Education, Emeris, Faculty of Law and Independent Institute of Education, Emeris, Faculty of Commerce, Johannesburg, South Africa

mchawaremera@emeris.ac.za
jkretzschmar@emeris.ac.za

Abstract: The rapid integration of artificial intelligence into academic research practices has begun to unsettle long-standing assumptions about how research methodologies are taught in education. While existing scholarships largely frame AI as a technical tool to be regulated or mastered, far less attention has been given to its implications for the teaching of research methodology itself. This conceptual paper argues that AI necessitates a fundamental shift in methodological education, from transmission of procedural research skills to the cultivation of methodological judgement. Drawing on methodological theory and contemporary debates on AI-mediated knowledge production, this paper reconceptualises AI, not merely as a support mechanism for research activities, but as a methodological actor that reshapes decisions relating to research design and theoretical development. It is contended that traditional pedagogical approaches, which emphasise method selection and procedural compliance, are increasingly inadequate in AI-augmented research environments. Rather than treating AI as a pedagogical concern, this paper situates it within the core of methodological education and argues for a recalibration of what it means to teach research methods not only in business and management studies but beyond. It advances the notion of methodological judgment as a central pedagogical aim in AI–mediated research environments. This is done through emphasis on the importance of epistemic awareness and critical engagement with AI-assisted research processes. It is the aspiration of this paper to offer a conceptual lens through which research methodology curricula may be reoriented towards cultivating researchers capable of exercising informed methodological discretion in increasingly AI-augmented contexts.

Keywords: Research Methodology Education, Artificial Intelligence, Methodological Judgment, AI-Mediated Research, Research Methods Pedagogy

1. Introduction

Research methodology is no longer defined by the methods we use, but by the judgments we make in using them. The contemporary higher education landscape is currently navigating a period of profound instability which is characterised by the emergence of artificial intelligence (AI) as a disruptive force that is reshaping research practice at a pace that far outstrips the evolution of research methodology curricula (Al-Mughairi & Bhaskar, 2025). Historically, technological shifts in education ranging from the introduction of the personal computer to the rise of the internet have been treated as sustaining technologies that complement existing paradigms (Brooks, 2014). However, generative AI represents a qualitative break from these predecessors (Al-Mughairi & Bhaskar, 2025). It is not merely a tool for optimisation, but rather, it is also a catalyst for an epistemological discontinuity that eliminates traditional authorship and renders standardised assessment paradigms as irrelevant (Simbolon et al., 2025). A significant conceptual gap exists in current academic discourse. This is that AI is frequently treated as a technological tool that is akin to a more sophisticated calculator or search engine rather than a methodological disruptor that alters the epistemic foundations of inquiry (Galmarini & Lucius, 2020). When AI is relegated to the status of a "support tool", the deeper shifts in how knowledge is constructed and interpreted are often ignored (Vermeulen, 2019). As AI systems begin to participate in the development and dissemination of knowledge, they function as active co-creators within the scholarly process, which necessitates a shift from transmission models of pedagogy to models of symbiotic intelligence (Prather et al., 2025 and Morello & Chick, 2025). The necessity of revisiting methodology teaching stems from the risk of producing researchers who are over reliant on automated processes or who lack the critical engagement required to interrogate AI-mediated knowledge. Surveys indicate that while over 75% of researchers across disciplines now regularly interact with AI systems, fewer than 30% report feeling adequately prepared for effective collaboration (Morello & Chick, 2025). This preparedness gap highlights a failure in current pedagogical models to address the onto-epistemic shift occurring in the academy, where knowledge is increasingly understood as distributed across individuals and AI systems rather than concentrated in human cognition alone (Morello & Chick, 2025). This current pedagogical vacuum reflects growing concerns about the loss of the human dimension and the potential erosion of critical thinking skills (Chawaremera, 2025). If methodology teaching remains focused on the "how to" of specific techniques, it risks obsolescence as those techniques become increasingly automated. A reoriented curriculum must therefore focus on the formation of researchers who can exercise informed methodological discretion in increasingly AI-augmented contexts. This requires moving

beyond teaching methods and more towards educating methodological thinkers who can navigate the ethical and epistemic complexities of human and AI partnerships. The disruptive impact of AI is not limited to the technical execution of research. It actually extends to the very identity of the researcher. The phenomenon of the disruption being disrupted illustrates how even early innovators are now compelled to adapt to changes that fundamentally transform traditional working models (Gede et al., 2025). In the context of doctoral training and professional researcher development, this necessitates the acquisition of new competencies that go beyond digital literacy to encompass epistemic awareness, which entails a deep understanding of the nature, source, and justification of knowledge in an AI-mediated environment. This paper contributes to the emerging literature on AI and research methodology by reconceptualising AI as a methodological actor and advancing methodological judgment as the central pedagogical aim of research methodology education in AI-mediated environments.

2. Research Methodology

This paper adopts a conceptual research design that is grounded in critical analysis of existing scholarship on research methodology, AI and Higher Education pedagogy. It does not present empirical findings, but instead, it advances a theoretically informed argument regarding the orientation of methodology teaching in AI-mediated contexts. The approach is interpretive and analytical as it draws on interdisciplinary literature to develop the notion of methodological judgments as a central pedagogical aim.

3. Research Methodology as Pedagogy: Dominant Assumptions and Their Limits

To argue for methodological judgements, one must first examine how research methodology is currently taught. For decades, advanced research training in higher education has relied on the apprenticeship model (Felce, 2019). Doctoral students learn under supervision and methods are often acquired through immersion (Felce, 2019). Knowledge is also often tacit, while competence is assumed to develop naturally through practice (Nind et al., 2018). The emphasis falls on doing research rather than on explicitly teaching how methodological decisions are made (McCarthy et al., 2017). As research capacity became a strategic priority for higher education institutions, this model was supplemented by formal coursework and structured modules in research methods were introduced (McCarthy et al., 2017). The underlying assumption shifted to that, if students complete method courses, they will then become methodologically competent, and as a result, methodology is framed as a set of transferable skills (Nind et al., 2018). Less attention is given to the philosophical and epistemic foundations of inquiry and reflexivity is often secondary and judgement is assumed rather than cultivated (Mortari, 2015).

3.1 The Limits of Proceduralism

A central limitation of contemporary methodology pedagogy is its increasing tendency toward proceduralism (Nind et al., 2018). In many institutions, formal procedures have come to stand in for intellectual legitimacy (Lamaro et al., 2025). Research design is often reduced to templates and standardised stages of execution (Nind et al., 2018). This orientation is not accidental. Higher Education Institutions operate within metric-driven environments (Lamaro et al., 2025). Accreditation bodies also require measurable outputs. Often, one will find that funding agencies also demand structured reporting and global ranking systems privilege quantifiable indicators of research productivity and impact (Lamaro et al., 2025). In response to these pressures, methodology teaching often emphasises compliance and standardisation. Unfortunately, what is less emphasised is then the interpretive and evaluative dimension of research decision making. It goes without saying, that under this set up, the result is a culture of performativity and methodological competence becomes synonymous with procedural correctness. However, students are seldom encouraged to interrogate the epistemic assumptions that underlie those formats and inquiry becomes something to execute rather than something to reason through (Lamaro et al., 2025). Often, students are described as lacking skills or technical aptitude, and the response is typically remedial training in methods rather than deeper engagements with the methodological reasoning (Rana, Verhoeven and Sharma, 2025). This intricate relationship between ontology, epistemology and method is obscured by curricula that present research as a linear, step by step process (Lamaro et al., 2025). These limitations become particularly visible in AI-augmented environments. If methodology is taught primarily as procedural skills, then AI's capacity to automate many research procedures exposes the fragility of that model. Dehaerne et al. (2022) argue that tasks such as coding, summarisation, pattern recognition and even draft generation can now be executed efficiently by machine systems. When research training focuses narrowly on the mechanical execution of such tasks, it risks producing researchers

whose distinctive intellectual contribution is easily displaced. The problem is not automation itself, but rather, the problem lies in equating methodological competence with technical performance.

3.2 Metric Driven Environments and Researcher Formation

Proceduralism is further reinforced by the bureaucratisation of research governance. Ethics review systems, quality assurance processes and institutional compliance frameworks play an important protective role (Lamaro et al., 2025). However, they also shape how research is learned and practiced. Lamaro et al. (2025) submit that increasingly, students are trained to anticipate procedural scrutiny, and they learn to avoid administrative error, and internalise the logic of documentation and approval. While procedural awareness is necessary, it can overshadow substantive ethical reasoning. In this context, ethical reflection risks being reduced to procedural compliance rather than substantive moral deliberation. Students may become adept at navigating institutional processes without developing independent methodological judgment. As a result, inquiry is framed as the selection of approved methods rather than context-sensitive evaluation, which reorients the researcher's role toward compliance rather than interpretation. These dynamics are intensified in metric-driven environments. In parts of the Global South, standardised indicators often fail to reflect local epistemic realities which shift research agendas toward what is measurable rather than meaningful (Buchanan, Byers and Mansveld, 2018). This constrains innovation and narrows methodological imagination, while the intellectual labour of engaging with uncertainty remains insufficiently theorised in pedagogy.

3.3 Fragmentation and the Instrumentalisation of Method

Another significant limitation of current methodological pedagogy lies in curricular fragmentation. Research methods are frequently divided into qualitative and quantitative streams (Firdaus et al., 2021). Students are then socialised into methodological "camps" and they are encouraged to identify with techniques or paradigms. Mixed-method approaches are then introduced as a technical combination of tools, rather than as an integrative epistemic stance that requires careful philosophical and theoretical alignment (Firdaus et al., 2021). This fragmentation cultivates an uncritical attachment to preferred methods, irrespective of whether they are genuinely suited to the research question at hand. Method becomes identity while technique becomes loyalty in some sense. In such environments, students may begin with a tool and search for a problem it can solve instead of beginning with a problem and determining what methodological approach is most appropriate. Alongside this tendency is an increasing conflation of technical proficiency with methodological sophistication. Competence in software, statistical packages, analytical platforms or more recently AI systems, is often treated as evidence of methodological maturity. While technical literacy is important, it does not in itself constitute methodological depth. A researcher may operate complex tools without fully understanding the epistemic assumptions embedded within them. When technical execution is mistaken for intellectual judgement, the tool subtly begins to shape the contours of the inquiry. If pedagogy remains anchored in these divisions, it fails to prepare researchers for environments in which human reasoning and machine-generated outputs intersect and co-evolve. Researchers must be equipped to navigate hybrid forms of evidence and critically evaluate how AI systems restructure analytical processes. This paper submits that a fragmented curriculum limits preparation for this task.

4. AI as a Methodological Actor

AI has been established to be competent to search and screen literature, code and classify text, find patterns in large datasets, and even come up with tentative interpretations (Sandoval and Redondo, 2016). According to Kitchin (2019) this shift argues that algorithms are shaped by society, embedded in systems, and they shape reality in return. Traditional methodological literature treats AI as an instrument for statistical software or qualitative coding and can perform various actions and interpret data patterns. However, epistemic judgement is still the responsibility of the human researcher and AI is therefore positioned as an "efficiency-enhancing extension" of existing methodological practices. Emerging literature challenges this reductionist framing by conceptualising AI as a methodological actor rather than a neutral tool. Large language models (LLMs) are classified as a deep learning system built upon machine learning architectures. They use statistical representations learned from large training datasets that generate outputs based on identified patterns while AI offers efficiency gains but can make mistakes (Nguyen & Welch, 2026). This is strengthened by Messeri and Crockett (2024) who argue that AI can create "illusions of understanding" and students may overestimate its power. Syriani, David, and Kumar (2024) proved that AI has its uses such as screening articles and that ChatGPT

can achieve an 82% accuracy and outperforms some traditional classifiers, which improves efficiency in methodological practices.

In quantitative research AI is used to generate variables and predict model outcomes, however Yang et al. (2018) cautioned that these variables can contain errors and if ignored can lead to bias and that AI-generated variables should not be treated as raw data. AI has its advantages and in supervised machine learning, but the researcher has control over the model choice and the exploratory data analysis which influence the outcome, allowing for some partnership between researcher and AI (Miric, Jia & Huang, 2022). In the workplace, automation and annotation tasks are increasingly incorporating AI, according to Gilardi, Alizadeh, and Kubli (2023) ChatGPT can outperform crowd workers and reduce business costs. Therefore, researchers can use AI tools to pick up any coding errors but be mindful of ethics and what policy says and this is where methodological actor becomes salient, it also changes the epistemic path. Methodological competence in AI-mediated environments requires active human governance and critical oversight because it is an emerging area to develop students' epistemic awareness.

5. Methodological Judgement as a Pedagogical Aim

In response to the limitations of proceduralism and the disruptive influence of AI, this paper argues for methodological judgment to be placed at the centre of researcher formation. Methodological judgment is not merely the ability to select the "correct" method from a pre-defined list. It is a sophisticated form of practical wisdom, or phronesis, that allows a researcher to make defensible decisions in complex environments (Houze, 2025). It typically involves the integration of epistemic awareness and sustained scientific reasoning. The concept of methodological judgment draws upon ancient intellectual virtues of nous (understanding), phronesis (practical wisdom) and praxis (virtuous action). In the context of research, phronesis can be argued to represent the ability to apply general methodological principles to specific, contextualised problems in a way that is ethically grounded and scientifically rigorous. This is distinct from techne, or technical skill, which is easily automated or performed by probabilistically plausible AI systems (Houze, 2025). Methodological judgment requires the researcher to act as an interpretive filter who takes responsibility for the reflective and evaluative aspects of the research process (Gorard, 2006), even when using AI support. It involves moving beyond the "brute facts" to an appraisal of how value judgements and theoretical commitments shape the construction of evidence (Gorard, 2006). This paper submits that methodological judgment, in the age of AI, is the capacity to recognise the boundaries of AI-generated evidence and to ensure its structural coupling with external reality.

5.1 Epistemic Awareness and Critical Engagement

A central component of methodological judgment is epistemic awareness. This is the researcher's understanding of the nature, source and justification of knowledge. This paper submits that students' epistemic beliefs significantly shape how they interact with AI tools and those with naïve beliefs may passively accept AI outputs as authoritative while the critical evaluators interrogate the logic and evidence provided by the system. Pedagogically, this paper further submits that it means methodology curricula must move away from standardisation and more toward co-creation. This will require strategies such as argumentative based learning and metacognitive scaffolding to cultivate critical digital literacy. This paper also submits that researchers must be formed to see themselves as agents who steer AI behaviours while maintaining ownership of the resulting ideas (and not as operators of automated processes). This ownership is closely tied to scientific accountability which submits that researchers must be able to defend, validate and ethically stand behind their work and this is a burden that AI certainly cannot shoulder.

5.2 Cultivating Discretion in AI- Mediated Environments

The cultivation of methodological discretion is particularly vital in the construction of research projects where ad hoc premises and assumptions often go unexamined. In an AI-augmented environment, the researcher's role must shift toward epistemic mediation to bridge the gap between automated data processing and meaningful scientific discovery. This involves navigating the "trade-offs" between LLM creative assistance and human effort which ensures that the researcher's sense of ownership is preserved. To counteract this, educators must implement strategies that promote active engagement and cognitive integrity. This requires a shift from teaching methods to educating methodological thinkers who can articulate why a particular approach is robust and under what conditions its results might be an artifact of heuristic simplification. The formation of such thinkers depends on a pedagogical culture that encourages an exchange of ideas within a climate of systematic

debate. This paper submits that this culture must move beyond the failed arms race of LLM detection and more towards a system for cultivating intellectual virtues that are essential for genuine scholarship.

6. Implications for Teaching Research Methodology in Business and Management

The methodological actor perspective is important to incorporate in business and management because students are learning research methods as well as forming habits of epistemic reliance and need to learn what counts as valid research but how to use AI during the process. Many will complain about sensible AI usage and that generative AI may counter negative learning effects (Valcea, Hamdani & Wang, 2024). Universities and industry remain uncertain in terms of how to control AI, but it is evident that AI adoption is growing. Changalima, Amani, and Ismail (2024) researched the social influence and intentions to use ChatGPT among business students, and these students treat and use AI tools as reliable and especially if endorsed by peers. This paper argues that AI adoption must be interrogated in the curriculum because if students collectively perceive AI as "good enough" they form a reliance before critical thinking and engagement can be implemented. Management students in India have positive attitudes towards AI and certain factors indicate that generative AI is not optional but a useful and accessible innovation to support them with studies (Abdalla et al., 2024). AI is then treated more as a social norm because it is perceived as useful and easy for business students to use but moral considerations may constrain adoption. Students and lecturers' decisions vary whether to adopt and how to use AI because of integrity concerns, however in teaching research we need to build an epistemic reliance and to be critical thinkers to still allow a voice to be heard and must be truthful. Bhuiyan et al. (2025) states that transparency shows a positive relationship with adoption and all students' perceptions may reinforce epistemic reliance but still follow a methodical practice. These studies and this paper suggest that business and management students will not merely use AI tools but be able to critically engage and learn how to coordinate research and teaching students how to interrogate AI-mediated outputs, question their assumptions, and justify methodological discretion under uncertainty.

7. Towards a Reoriented Research Methodology Curriculum

The transition toward methodological judgments as a pedagogical aim requires a fundamental reorientation of the research methodology curriculum. Rather than treating AI as a pedagogical concern that needs to be managed through academic integrity policies, this paper argues for its situating at the very core of methodological education. The traditional focus on methodology courses has been on what to teach and how to teach. A reoriented curriculum must instead focus on how learning to do research occurs by attending to the social, emotional, active and reflective nature of the methodological struggle. This inherently involves a shift from transmission models of knowledge to models of transformation where the central aim is the formation of researchers who can exercise informed methodological discretion. A forward-looking conceptual framework for methodology curricula should offer principles of reorienting this educational experience. Firstly, this paper submits that curricula must emphasise judgement over procedure. Researchers should be trained not only to follow methods but to understand the underdetermination of solutions and to use "meta-heuristics" to evaluate if a method is suited for a specific problem. This specifically involves the search for accurate and appropriate evidence. Secondly, this paper submits that the curricula must prioritise reflexivity over automation. As AI automates the mechanical aspects of research, the researcher's role in interpretation and synthesis becomes even more critical. Reflexivity involves a conscious awareness and how one's epistemic beliefs and cultural context shape interactions with AI. It requires metacognitive scaffolding to ensure that learners do not succumb to cognitive disengagement. It goes without saying that in all this, critical engagement must replace uncritical tool adoption.

It is essential to note that while many of the examples in this paper are drawn from business and management studies, the move toward methodological judgment has broad applicability across all research disciplines. This requires institutional adaptation and sound ethical frameworks to ensure that the authoritative status of knowledge is not surrendered to ungrounded algorithmic outputs. This paper submits that, this way, higher education can ensure that the most ancient wisdom, which is human judgment, remains the most reliable guide for navigating our future with technology.

8. Conclusion

The integration of AI into the research landscape marks a paradigm shift that is comparable to the digital revolution. It fundamentally challenges traditional assumptions about knowledge creation and intellectual discovery. This paper's analysis has contended that the current technological disruption has forced reconsideration of how research methodology is taught, which moves away from procedural compliance and more towards the cultivation of methodological judgment as a central pedagogical aim. The limitations of dominant pedagogical assumptions, whether anchored in the apprenticeship model or the modular competency model, have been exposed by AI's capacity to automate procedural skills. The prevailing proceduralism in Higher Education risks producing researchers who are over reliant on automated processes and lack the epistemic awareness that is necessary to critically interrogate AI-mediated evidence. In contrast, the cultivation of phronesis and methodological judgment offers a path toward researcher formation that is resilient to technological disruption. Reconceptualising AI as a methodological actor and active co-creator allows for a model of symbiotic intelligence whereby human intellect and machine intelligence engage in a reciprocal evolution. This therefore requires a curriculum that is reoriented around the formation of researchers who can exercise informed methodological discretion and maintain scientific accountability for co-constructed knowledge. The value of methodological judgement lies in its ability to bridge the gap between AI's analytical power and the human need for meaningful and ethically grounded findings. For the future of doctrinal training and researcher development, this shift signifies that methodology education can no longer be a pedagogical concern that needs to be managed through regulation. It must be situated at the core of the scholarly enterprise that is focused on developing the intellectual virtues and methodological thinkers necessary to lead in an increasingly AI-augmented academy. The fact remains that the stakes are nothing less than the epistemic integrity of the research process and the continued relevance of the human researcher in an age of intelligent machines. Therefore, if AI can execute methods, then the future of research does not depend on better technique, but on better judgment, and it is precisely this that methodology education must now learn to teach.

Ethics Declaration

The authors declare that ethical clearance was not required for this conceptual paper, as it relies solely on the analysis of existing, publicly available academic literature and does not involve primary data collection from human or animal subjects. However, formal waiver of ethical clearance was received from the institution to which the authors are affiliated.

AI Declaration

Zotero was used for the purposes of managing sources and generating the in-text references and reference list. In addition, one co-author used Grammarly to edit their drafted sections in the manuscript for language refinement and for some coherence. No generative AI tools were used in the substantive drafting or development of the academic content.

References

Abdalla, A. A., Bhat, M. A., Tiwari, C. K., Khan, S. T. and Wedajo, A. D., 2024. Exploring ChatGPT adoption among business and management students through the lens of Diffusion of Innovation Theory. *Computers and Education: Artificial Intelligence*, 7, 100257.

Al-Mughairi, H. and Bhaskar, P., 2025. Exploring the factors affecting the adoption AI techniques in higher education: insights from teachers' perspectives on ChatGPT. *Journal of Research in Innovative Teaching & Learning*, 18(2), pp.232–247.

Bhuiyan, M. A., Rahman, M. K., Basile, V. and Ping, H., 2025. Adoption of ChatGPT for students' learning effectiveness. *The International Journal of Management Education*, 23(3), 101255.

Buchanan, R., Byers, K. and Mansveld, K., 2018. 'What gets measured gets done': exploring the social construction of globalized knowledge for development. In *Research Handbook on the Sociology of International Law* (pp. 101-121). Edward Elgar Publishing.

Brooks, B., 2014. *Major advancements in personal computing*.

Changalima, I. A., Amani, D. and Ismail, I. J., 2024. Social influence and information quality on Generative AI use among business students. *The International Journal of Management Education*, 22(3), 101063.

Chawaremera, M.M., 2025. Algorithmic teaching, fading thought? Rethinking engagement in the AI era. In: *Proceedings of the 2nd International Conference on Education Research*. Academic Conferences and Publishing Limited, January.

Dehaerne, E., Dey, B., Halder, S., De Gendt, S. and Meert, W., 2022. Code generation using machine learning: A systematic review. *Ieee Access*, *10*, pp.82434-82455.

Felce, A., 2019. Managing the quality of higher education in apprenticeships. *Higher Education, Skills and Work-Based Learning*, 9(2), pp.141–148.

Firdaus, F., Zulfadilla, Z. and Caniago, F., 2021. Research methodology: Types in the new perspective. *Manazhim*, 3(1), pp.1–16.

Galmarini, C.M. and Lucius, M., 2020. Artificial intelligence: a disruptive tool for a smarter medicine. *European Review for Medical & Pharmacological Sciences*, 24(13).

Gede, I.G.K.G., Wirga, I.W., Sanjiwani, I.G.A.M., Widiadnyani, I.G.A., Marhaeni, K.E. and Wijayati, N.L.M., 2025. Disruptors disrupted by artificial intelligence: A study on the preferences of Politeknik Negeri Bali students. In: A.A.N.G. Sapteka et al. (eds.) *Proceedings of the International Conference on Sustainable Green Tourism Applied Science – Social Applied Science 2025 (ICOSTAS-SAS 2025)*. Advances in Social Science, Education and Humanities Research, Vol. 964. Atlantis Press, pp.132–140.

Gilardi, F., Alizadeh, M. and Kubli, M., 2023. ChatGPT outperforms crowd workers for text-annotation tasks. *Proceedings of the National Academy of Sciences of the United States of America*, 120(30), e2305016120.

Gorard, S., 2006. Towards a judgement-based statistical analysis. *British Journal of Sociology of Education*, 27(1), pp.67–80.

Houze, W.C., 2025. *Virtue-based LLM integration in academic scholarship: A dramatic historical perspective—Bridging the implementation gap through Aristotelian ethics*. Version 13. SSRN, October.

Lamaro, G., Ndyomugyenyi, E.K. and Openjuru, G.L., 2025. Performing quality or chasing rankings? Rethinking compliance-driven quality assurance in universities through the TESCEA transformative approach. *African Educational Research Journal*, 13(4), pp.472–485.

Kitchin, R., 2019. Thinking critically about and researching algorithms. In *The social power of algorithms* (pp. 14-29). Routledge.

McCarthy, M.A., Palmer, I. and Prebil, M., 2017. *Connecting apprenticeship and higher education*. New America, December.

Messeri, L. and Crockett, M. J., 2024. Artificial intelligence and illusions of understanding in scientific research. *Nature*, 627, pp.49–58.

Miric, M., Jia, N. and Huang, K. G., 2022. Using supervised machine learning for large-scale classification in management research: The case for identifying artificial intelligence patents. *Strategic Management Journal*, 44(2), pp.491–519.

Morello, L.T. and Chick, J.C., 2025. Human-AI symbiotic theory (HAIST): Development, multi-framework assessment, and AI-assisted validation in academic research. *Informatics*, 12(3), p.85.

Mortari, L., 2015. Reflectivity in research practice: An overview of different perspectives. *International Journal of Qualitative Methods*, *14*(5), p.1609406915618045.

Nguyen, D. C. and Welch, C., 2026. Generative Artificial Intelligence in Qualitative Data Analysis: Analyzing—Or Just Chatting? *Organizational Research Methods*, 29(1), pp.3-39.

Nind, M., Holmes, M., Insenga, M., Lewthwaite, S. and Sutton, C., 2018. Student perspectives on learning research methods in the social sciences. *Teaching in Higher Education*, 23(8), pp.1043–1059.

Prather, J., Leinonen, J., Kiesler, N., Gorson Benario, J., Lau, S., MacNeil, S. and Zingaro, D., 2025. Beyond the hype: A comprehensive review of current trends in generative AI research, teaching practices, and tools. *2024 Working Group Reports on Innovation and Technology in Computer Science Education*, pp.300–338.

Rana, V., Verhoeven, B. and Sharma, M., 2025. Generative AI in design thinking pedagogy: Enhancing creativity, critical thinking, and ethical reasoning in higher education. *Journal of University Teaching and Learning Practice*, *22*(4), pp.1-22.

Simbolon, L., Manugeren, M. and Barus, E., 2025. Does AI know things? An epistemological perspective on artificial intelligence. *Journal of English Language and Education*, 10(5), pp.1022–1028.

Vermeulen, A.F., 2019. *Industrial machine learning: Using artificial intelligence as a transformational disruptor*. Apress.

Sandoval, A.M. and Redondo, T., 2016. Text analytics: the convergence of big data and artificial intelligence. *IJIMAI*, *3*(6), pp.57-64.

Syriani, E., David, I. and Kumar, G., 2024. Screening articles for systematic reviews with ChatGPT. *Journal of Computer Languages*, 80, 101287.

Yang, M., Adomavicius, G., Burtch, G. and Ren, Y., 2018. Mind the Gap: Accounting for Measurement Error and Misclassification in Variables Generated via Data Mining. *Information Systems Research*, 29(1), pp.4–24.

Valcea, S., Hamdani, M. R. and Wang, S., 2024. Exploring the impact of ChatGPT on business school education: Prospects, boundaries, and paradoxes. *Journal of Management Education*, 48(5), pp.915-947.