A Young Researcher's Dual Lens: A Twofold Autoethnographic Exploration of Generative AI in the Realms of Doing Research and Teaching Computer Science and Media Design Education

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Abstract: This research paper unfolds the narrative journey of a young researcher immersed in the world of generative artificial intelligence (GenAI) tools. This autoethnographic study explores a PhD candidate's experiences in STE(A)M education by balancing teaching and research roles while integrating GenAI tools to streamline workflows, create teaching materials, and support educational processes. Findings reveal the transformative potential of AI in addressing challenges faced by educators and researchers, from time management to language barriers, while also emphasizing the importance of ethical considerations and ongoing professional development. Set in an Austrian university and vocational high school, the study examines AI's transformative impact on teaching and research. Methodologically, the study adopts an autoethnographic framework, providing an immersive exploration of the challenges, benefits, and evolving experiences encountered while integrating GenAI-powered tools in academic endeavors. The findings underscore the transformative impact of GenAI on literature research, methodological planning, and the drafting process, shedding light on the potential of GenAI to support young researchers in STE(A)M fields. However, the study also reveals challenges, such as the risk of hallucination by AI tools and deskilling, prompting a call for a balanced integration of AI tools. The narrative concludes by discussing the implications for young researchers in the STE(A)M domain and the broader educational landscape. Emphasis is placed on the importance of continuous improvement and teacher training in the ever-evolving digital education landscape.

1 INTRODUCTION

As a young researcher pursuing a PhD, you face significant challenges, from mastering diverse research methodologies to navigating thousands of academic papers and receiving critical feedback from peers. The advent of generative AI tools, such as ChatGPT, offers a potential solution to these obstacles, transforming how researchers and educators approach their work (Cooper, 2023).

The rapidly evolving landscape of STE(A)M education has seen increasing adoption of AI-powered tools, significantly impacting both research and teaching. These tools present opportunities to streamline workflows and enhance learning, but they also introduce challenges, such as reliance on AI and ethical concerns (Cooper, 2023). While prior research highlights the benefits and drawbacks of AI in education, studies on the personal experiences of PhD researchers and teachers remain limited. To address this gap, this study explores the research question: What are the opportunities and challenges associated with the early adoption of Generative AI in vocational and higher education settings?

At the College for Higher Vocational Education (levels 9-13) where I work, the implementation of AI has emerged as a key innovation, addressing the dual demands of vocational training and pedagogical excellence. AI tools streamline lesson planning, student engagement, and administrative tasks, alleviating the heavy workload of teaching and fostering success for both students and educators. While a supplementary paper presented at an international conference in 2024 addressed this topic, this paper focuses on summarizing key insights and exploring previously underexplored aspects such as teacher development.

As a research assistant and doctoral candidate, I navigate the intersection of AI in education, where

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theoretical frameworks meet practical application. My dual roles as teacher and researcher offer a unique perspective, bridging scholarly discourse with the lived experiences of educators. This autoethnography reflects on the synergy between these roles, exploring how classroom experiences inform research and vice versa, while highlighting the connections between theory, practice, and innovation.

This paper provides an autoethnographic account of a researcher's experiences with AI tools in STE(A)M education, focusing on their integration into teaching and research. Section 2 reviews related work PhD challenges, AI terminology, and vocational education. Section 3 outlines the autoethnographic methodology and its application in this study. Section 4 highlights generative AI's transformative potential and limitations through a narrative approach that combines personal experiences with analytical insights. Finally, the conclusion discusses implications for educators and researchers, offering recommendations for ethical and effective integration of AI in education.

2 RELATED WORK

Undertaking a PhD, particularly in a foreign context, presents a myriad of academic and non-academic challenges (Elliot et al., 2016). For PhD students concurrently fulfilling teaching responsibilities, the dearth of resources and support underscores the imperative for enhanced communication and collaboration between learning developers and doctoral candidates (Kantcheva and Sum, 2023). The dual role of a PhD student and teacher engenders a unique blend of challenges and opportunities throughout the doctoral journey (Wolstenholme, 2008). The discourse surrounding the value of teaching experience during postgraduate study remains contentious, with divergent perspectives positing it as either a valuable asset or an encumbrance (Homer, 2018).

Within the expansive realm of technological evolution, the terms AI (Artificial Intelligence), ML (Machine Learning), and DL (Deep Learning) delineate interconnected yet distinct facets of computational intelligence. AI embodies the overarching concept of endowing machines with the ability to simulate human intelligence, engaging in tasks ranging from problem-solving to natural language understanding. ML, as a subset of AI, concentrates on systems that learn and improve from experience without explicit programming, adapting their performance based on data input. DL further refines the scope, representing a specialized form of ML that involves neural networks with multiple layers, enabling the processing of intricate data for more sophisticated tasks (Lalitha, 2021).

Inside this complex technological landscape, Generative AI emerges as a pivotal player. Positioned within the broader AI landscape, Generative AI refers to systems capable of producing new content autonomously, transcending mere data analysis to foster creativity and innovation. Specifically, Large Language Models (LLMs) represent a notable subset of Generative AI, excelling in comprehending and generating human-like language. Their capacity to understand context, nuances, and linguistic structures empowers them to contribute to a spectrum of applications, from content creation to conversational interfaces.

Additionally, within the scope of Generative AI, Generative Adversarial Networks (GANs) hold prominence. GANs operate on a unique adversarial training paradigm, involving two neural networks – a generator and a discriminator – working in tandem (Goodfellow et al., 2014). This dual-network structure enables GANs to generate realistic content, bridging the gap between data-driven algorithms and the creative potential of AI.

The rise of Generative AI has prompted a critical reevaluation of lifelong learning and education. It also raises concerns regarding the current educational paradigm, which is often centered around disposable knowledge (Class and De la Higuera, 2024). The integration of AI tools, such as ChatGPT, into lifelong learning offers both opportunities and challenges, highlighting the need for a balanced approach (Tomaszewska, 2023). As education transitions towards Education 5.0, Generative AI is expected to transform the learning landscape by democratizing access to knowledge and enhancing human capabilities (Gowda, 2023). Nevertheless, the responsible development and implementation of AI are essential to fully harness its benefits while mitigating potential risks. Collectively, the literature emphasizes the significance of continuous self-development, ethical AI usage, and a shift towards deeper, more meaningful learning in the context of Generative AI.

3 METHODOLOGY

3.1 Autoethnography as Method

Adopting an autoethnographic framework (Cohen et al., 2018), this study merges personal experiences and scholarly analysis, allowing for a holistic exploration of the impact of generative AI on research and

educational practices of a young academic. The autoethnographic approach involves an introspective examination of the researcher's interactions and engagements with the AI tools, blending subjective experiences, reflections, and interpretive analysis. The data collection process encompasses interaction logs, personal reflections, and reflexive narratives, capturing the researcher's encounters with GenAI tools such as ChatGPT across various research stages. This methodological choice aims to provide an in-depth, situated understanding of the influence of AI on the researcher's workflow, enabling the contextualization of personal encounters with generative AI within broader educational and research landscapes. Ethical considerations regarding the use of AI, as well as the subjectivity and biases inherent in the autoethnographic approach, will be critically examined throughout this study.

3.2 Process of Data Collection

The data collecting process is depicted in Figure 1. The duration of the study was three months in which all observations and reflections were noted in the form of a journal. Observations were frequently recorded in concise keywords, capturing immediate insights. However, at the conclusion of each week and again following each month, a more comprehensive reflection was undertaken to delve deeper into the observations and experiences. The ideas and thought processes underwent regular review at the end of each week and month, aiming to assess their alignment with existing research on the topic and their resonance with the researcher's own experiences. Furthermore, screenshots were taken and added to the journal.

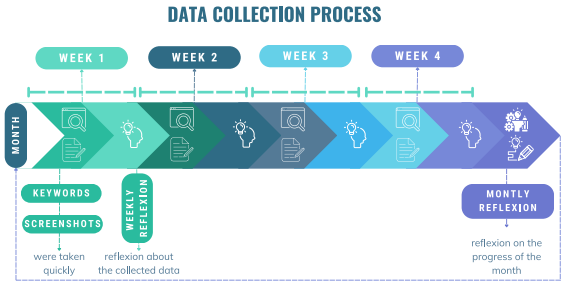

Figure 1: Data Collection Process of One Month.

3.3 Data Analysis and the Formation of the Narrative

These items constituted the primary dataset for the study, facilitating an in-depth examination of the researcher's experiences through both narrative and visual analyses. Initially, the analytical process involved identifying common tasks and challenges encountered by young researchers. Subsequently, focus shifted to delineating areas where GenAI tools could provide support, exemplifying the evolution of research practices from traditional to AI-infused workflows. Employing this methodological approach, the study aimed to offer a nuanced understanding of how GenAI tools are integrated and utilized within academic contexts. The findings are presented in line with the convention of autoethnographic studies (Cluxton-Corley, 2017; Cohen et al., 2018) as a narrative, in which literature is seamlessly integrated throughout the narrative. Moreover, various visual aids, including workflow graphics, were generated to visually depict specific research aspects.

4 THE YOUNG RESEARCHER'S LENS

4.1 Obstacles Young Researchers Face

The outcome of the reflection process at the end of the initial month of the study was a mind map of obstacles and challenges young researchers face. The findings of this introspection can be substantiated by relevant literature. Although there are hardly any studies that deal with the difficulties young researchers in Europe are facing, especially from a young researcher's perspective, global studies support this subjective impression and list difficulties such as lack of mentoring, funds, heavy workload (Kumwenda et al., 2017), academic writing skills (Chatzea et al., 2022; Kumwenda et al., 2017), insufficient research skills and uncertainties (Kumwenda et al., 2017; Alarcão, 2017), stress and time management (Bocar, 2009), and job instability (Ameen et al., 2019). The findings of the study were assembled into a metaphorical house as can be seen in Figure 2.

The foundation for stability and growth in a PhD journey relies on robust mentorship, a strong supervisor relationship, effective time management, and proficiency in both EFL and academic English. Key pillars support this structure: the research process (methodologies, data analysis, and defining research goals), publishing research (writing, citations, and tools like LaTeX and Mendeley), and lecture preparation (planning, organization, and digital skills). Presentation skills unify these elements, crucial for sharing findings, securing funding, and teaching. Together, these components form a metaphorical house, with the PhD as its pinnacle, representing the challenges faced by young researchers in achieving doctoral success.

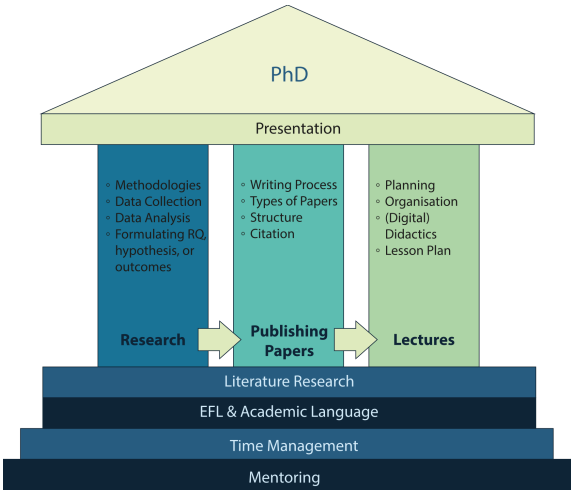

Figure 2: Challenges of a PhD.

Based on this analysis the researcher proceeded to identify specific stages within the research process where the integration of GenAI could offer assistance and streamline workflows which is discussed in the next chapters.

4.2 Impact on Research Workflow – from Traditional to AI-Infused

Every PhD journey begins with literature research, traditionally relying on platforms like Web of Science, Google Scholar, and Scopus. AI tools such as Elicit, Perplexity, Scite, Research Rabbit, and SciSpace have transformed this process by streamlining workflows, improving citation practices, and enhancing academic language proficiency, particularly for EFL researchers. These tools accelerate literature reviews and deepen content understanding, as evidenced by the contrast with previous scoping reviews conducted without AI, highlighting their efficiency gains in scholarly endeavors.

Research involves meticulous planning, including methodology, data collection, and analysis, to formulate precise questions, hypotheses, and outcomes. During the literature review, ChatGPT was used as both a linguistic resource and an ideation collaborator, clarifying terminology and offering suggestions for research design and potential questions. While not blindly adopted, these insights provided a foundation for refinement, showcasing the synergy between human expertise and AI in enhancing research depth and scope.

The shift from a traditional to AI-infused literature workflow can reshaped how researchers conduct and engage with academic research. The term "AI-infused" reflects integration with AI as a complementary component, whereas "AI-powered" suggests a primary reliance on AI, emphasizing a nuanced approach to its integration in research workflows. The traditional workflow relied on platforms like *Google Scholar*, *Scopus*, *Web of Science*, and similar academic databases for literature searches. However, young researchers and students were often left to navigate the challenges of reading and comprehending academic papers and writing in academic language with little support. The AI-infused approach incorporates additional tools early on, such as *Elicit*, *SciSpace*, and *Research Rabbit*, which automate aspects of researchers' workflows, enhancing literature searches, comprehension, and academic vocabulary while illustrating seamless integration of references.

While these tools streamline research, researchers, particularly novices, must maintain academic integrity by cross-referencing AI-generated summaries with original sources. Tools like *ChatPDF* and *AskYourPDF* facilitate deeper engagement with content, enabling comprehension and validation to ensure accurate interpretations.

Beyond research, tools like *Grammarly* and *QuillBot* enhance language proficiency by improving grammar, vocabulary, and clarity. Their integration with Elicit creates a comprehensive support system, helping researchers refine written content and maintain high linguistic standards in their scholarly work.

4.3 Supporting Young Researchers Through GenAI

In the journey of conducting an autoethnography research, the researcher integrated ChatGPT as a valuable tool to engage in thoughtful discussions about the research topic. Armed with a broad conceptualization of their research goals, ChatGPT proved instrumental in the iterative process of refining their ideas. Beyond serving as a mere conversational partner, it became an active contributor to their research endeavors. As the researcher navigated the terrain of their research topic, the interactions with ChatGPT led to the discovery of additional research ideas, unveiling unexplored dimensions of their chosen subject. Moreover, the tool played a pivotal role in the identification of suitable research methods, offering insights and explanations about methods previously unknown. ChatGPT acted as a collaborative brainstorming partner, offering creative input for research paper titles and enriching the scope of the autoethnography. It also proved valuable in preparing lectures, workshops, and lesson plans, enhancing both research and teaching processes. The researcher used tools like Elicit and Perplexity to navigate academic litera-

ture and facilitate the literature review process. While these tools aided in identifying relevant papers and expediting the review, distinguishing between high-quality and substandard contributions remained a significant challenge, especially for novice researchers. The researcher explored generative AI's potential to produce nuanced and original content. While current technology falls short of high-quality research papers, it shows promise in drafting well-structured paragraphs, particularly for introductions and foundational discussions. AI chatbots like ChatGPT can also act as a devil's advocate, generating rebuttals and novel perspectives that stimulate critical thinking and paper refinement. These tools conserve intellectual effort by enabling researchers to focus on core research questions. For young researchers, especially non-native English speakers, ChatGPT and tools like DeepL and QuillBot offer valuable support with grammar, vocabulary, paraphrasing, translation, and citations, addressing key linguistic challenges and streamlining the writing process.

4.4 Integrating Research and Teaching

As a PhD candidate, delivering lectures independently requires pedagogical expertise to effectively present complex topics. Generative AI tools support key teaching tasks, including designing adaptable lesson plans, generating supplementary materials like quizzes and case studies, providing constructive feedback based on student patterns, and streamlining organizational tasks such as refining texts for communication. Additionally, GenAI aids in integrating relevant research frameworks into courses, connecting foundational topics with contemporary insights. This synergy between research and teaching, enabled by GenAI, enhances the educational experience by fostering relevance and forward-looking innovation.

4.5 Generative AI in Qualitative Analysis

Generative AI tools have the potential to enhance qualitative research by facilitating thematic analysis and efficiently identifying patterns and emergent themes in complex datasets. These tools streamline workflows by assisting in data coding, categorizing participant responses, and synthesizing literature to contextualize findings. Practical applications include summarizing themes, suggesting relevant codes, drafting initial research reports, and transcribing recorded interviews for analysis. Despite these advantages, rigorous validation is necessary to ensure reliability and mitigate ethical and methodological challenges. Researchers must adopt a critical perspective, ensuring ethical use and methodological transparency when integrating AI tools into their processes.

4.6 Challenges and Limitations of GenAI Tools for Researchers

The utilization of generative AI tools in research introduces a spectrum of challenges and limitations. One prominent issue involves the potential for hallucination, where the generated content may deviate from factual accuracy, posing a risk to the reliability of research outcomes. Furthermore, there is a concern about deskilling, as over-reliance on automated tools might diminish researchers' skills in critically evaluating and synthesizing information. Another challenge is the risk of researchers becoming complacent and developing a dependency on AI-generated content, potentially leading to a reduced inclination to thoroughly read and comprehend academic papers. These challenges underscore the need for a balanced integration of generative AI tools, emphasizing the importance of maintaining a researcher's core skills and critical engagement with the scholarly literature. The authors encountered similar challenges, exemplified by a notable instance of hallucination illustrated in Figure 3, specially translated for this paper. The figure depicts ChatGPT's response to an inquiry regarding the release dates of different versions of DigComp – a European digital competency model. The statement falsely asserts the existence of a third version currently in development. Despite no ongoing work on a third version, the misconception could be rationalized, considering the frequency with which new iterations of models and products are typically under development.

The emergence of GenAI tools has provoked intricate discussions concerning their potential ramifications for academic integrity, particularly within the domain of scholarly writing (Hörmann et al., 2024). Despite the prolonged availability and widespread use of AI-powered language assistance tools such as Grammarly (2009), DeepL (2017), and QuillBot (2017), questions have rarely been raised regarding their legitimacy. The majority of research on scholarly writing tools has yielded positive results, emphasizing their role in providing assistance with grammar, punctuation, spelling checks, synonym suggestions, and paraphrasing. These tools have proven particularly beneficial for non-native English speakers in crafting scientific content, leading to notable improvements in machine translation accuracy. By facilitating the overcoming of language barriers, they con-


ChatGPT

The DigComp framework was first published by the European Commission in 2013. Since then, several versions have been developed to meet the changing requirements and developments in the field of digital competences and to reflect progress in this area. Here are the main versions:

1. DigComp 1.0 (2013): The first version of the DigComp framework was published in 2013, laying the groundwork for the definition and description of digital competences.
2. DigComp 2.0 (2016): This revised version was published in 2016 and included some updates and additions to better meet the changing requirements for digital competences.
3. DigComp 2.1 (2017): A minor update to DigComp 2.0, released in 2017. It included some minor adjustments and clarifications.
4. DigComp 2.1 (2018): Another update, released in 2018, to further refine the framework and adapt it to current developments in the field of digital competences.
5. DigComp 3.0 (in development): It is expected that a new version, DigComp 3.0, will be developed to meet current and future requirements for digital competences. This version is likely to include further updates and adjustments to meet the constantly changing digital landscapes and new requirements for digital competences.

Each version of the DigComp framework is based on research findings and a broad consensus of experts in the field of digital competences. It is regularly updated to ensure that it remains relevant and applicable.

Figure 3: DigComp overview according to ChatGPT (translated from German by the author).

tribute significantly to enhancing the efficiency and quality of writing for researchers (Bhatia, 2023; Liu, 2023). Moreover, the conventional expectation that scientific manuscripts undergo scrutiny by native English speakers or professional editing services prior to publication has long presented a formidable financial barrier for many researchers. Consequently, the integration of GenAI tools into the writing process has emerged as a practical solution, democratizing access to language refinement and editorial support. However, it is imperative to delve deeper into the multifaceted implications of employing such tools. While they undeniably streamline the writing process, they also prompt a reevaluation of traditional notions of authorship and scholarly rigor. While AI tools can facilitate drafting outlines and composing papers, high-quality scientific publications still require significant human input for depth and originality (Hörmann et al., 2024). Moreover, it is essential to recognize that the process of writing a paper represents just one phase in the broader research endeavor, following extensive preparatory work including formulating research questions, collecting and analyzing data. The publication stage serves to communicate findings effectively to the scientific community, and GenAI tools can greatly facilitate this process without diminishing the researcher's efforts. However, it is crucial to establish criteria for the ethical use of GenAI tools in research. A methodical workflow is imperative, involving thorough scrutiny of resources, ensuring generated text aligns with the author's intended message, and seeking feedback from colleagues. These steps are more vital than ever to uphold academic integrity amidst the increasing accessibility of AI-driven writing assistance. Moreover, the seamless integration of AI-generated text within scholarly discourse raises questions about the delineation between human and machine contributions, as well as the ethical responsibilities inherent in scholarly communication. Thus, while GenAI tools offer undeniable benefits in terms of efficiency and accessibility, their utilization necessitates a nuanced understanding of their ethical (such as plagiarism or bias) and epistemological implications (how knowledge is produced and validated) within the context of academic research and publication.

5 THE TEACHER'S LENS

A supplementary paper on this subject matter was presented at the CSEDU conference in 2024. Here, a short summary is provided focusing on the key aspects covered in that paper. Additionally, we offer a closer examination of topics that were not extensively addressed, including the aspect of teacher development.

5.1 Summary of Findings

The autoethnographic study yielded key insights into the impact of generative artificial intelligence (GenAI) on teaching and research practices in education:

Hidden Workload. Educators devote significant time to tasks beyond classroom instruction, such as material preparation and professional development. This shared sentiment, particularly evident in language classrooms, underscores the substantial workload educators face.

Transformative Impact. GenAI revolutionizes classroom dynamics, easing workloads, and reshaping teaching and research practices in education.

Enhancing Student Assessment. While GenAI shows promise in improving student assessment, caution is warranted due to ethical and practical considerations, necessitating a balanced approach in educational settings.

Challenges and Concerns. Concerns arise regarding content inaccuracies, potential deskilling of writing abilities, and the risk of reduced teacher involvement with overreliance on AI. Striking a balance between leveraging AI benefits and preserving the teacher's role is essential.

Implications for Education. Effective integration of GenAI in education demands evidence-based guidelines and policies to ensure responsible usage. Educators must impart the importance of foundational skills alongside technological tools to students.

These findings underscore AI's transformative potential in education while highlighting the importance of ethical considerations, balanced approaches, and ongoing research to navigate its evolving integration into educational practices Kuka and Sabitzer (2024).

5.2 Professional Teacher Development

As a PhD student holding a Pre-Doc position, delivering lectures is among the multifaceted responsibilities. Throughout various conversations regarding professional teacher development, recurring feedback underscores the challenge of staying abreast of current knowledge as an educator. Despite possessing academic backgrounds and familiarity with scholarly literature, many teachers encounter difficulties comprehending complex academic content. Factors such as the English language barrier and the passage of time since their formal education contribute to this challenge. Following workshops hold by the researchers demonstrating the functionalities of tools like Elicit, SciSpace, DeepL, and ChatPDF, participants expressed a sense of relief and demonstrated positive attitudes towards these technological aids. The ease of use and perceived usefulness of such tools emerged as pivotal factors influencing their adoption (Gloria and Oluwadara, 2015; Eksail and Afari, 2019; Chong, 2012; Kurian et al., 2019). By effectively addressing users' needs, providing intuitive interfaces, and little to no prior knowledge of how to use these tools, they align with the criteria deemed essential for integrating new technologies into practice. Their ability to streamline tasks and enhance productivity resonates with educators, fostering a welcoming environment for the incorporation of innovative tools in their professional endeavors. These technological aids may hold great potential in bridging the gap between teachers' existing knowledge and the demands of academic discourse, ultimately facilitating continuous professional growth and development.

5.3 Teaching Material and Generation of Tasks

In the realm of teaching, the absence of standardized textbooks often prompts educators to craft their own teaching materials, a necessity particularly pronounced in rapidly evolving fields like computer science and media design. Given the swift pace of advancements in these disciplines, teaching materials and tasks must continually adapt to remain current while also elucidating foundational principles. GenAI emerges as a valuable ally in this endeavor, aiding educators in formulating lesson content, generating images, and sourcing compelling examples and metaphors tailored to the specific context of their class, school, or specialization. The collaborative synergy between educators and AI tools not only simplifies the process of creating teaching materials but also guarantees their pertinence and efficacy in captivating students with contemporary trends while reinforcing fundamental concepts.

6 CONCLUSION AND OUTLOOK

In conclusion, this autoethnographic study offers a distinctive perspective on integrating generative AI tools in both teaching and research, particularly within vocational high school contexts. By examining practical applications – such as refining literature research with ChatGPT and enhancing student assessments – the researcher demonstrates how AI can meaningfully enrich educational practices. The study thoroughly addresses the ethical dimensions of AI usage, emphasizing the need to uphold academic standards and remain mindful of potential biases. It further argues for a thoughtful balance between innovative AI solutions and the indispensable roles of educators and researchers. As the lines between these roles continue to blur in an increasingly digital academic landscape, the narrative underscores both the challenges and benefits of AI implementation. Ultimately, this work reveals AI's significant potential in personalized learning, adaptive assessment, and advanced research tools.

However, the ongoing development and integration of AI must be accompanied by sustained ethical vigilance and professional support for educators. This balanced approach – rooted in continuous research and responsible adoption – will allow AI to fully support burgeoning researchers in STE(A)M fields, while preserving the pedagogical and ethical cornerstones essential to meaningful education.

While this study provides insights into the integration of generative AI tools in research and teaching, it is limited by its autoethnographic approach, which focuses on a single researcher's experiences and may not capture the broader diversity of academic contexts. The rapid evolution of AI tools also challenges its long-term relevance. Future research should examine diverse perspectives, long-term impacts on academia, and ethical issues such as dependency, bias, and integrity. Interdisciplinary studies can provide practical strategies for leveraging AI while upholding ethical and pedagogical standards.

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