GENERATIVE AI AND PHD SUPERVISION: A COVERT THIRD WHEEL OR A SEAT AT THE TABLE?

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The advent and adoption of GenAI tools has pedagogical implications for Researcher/Supervisor dynamics both within Construction Management and in the wider academic context. Unless both parties understand these implications, GenAI tools have the potential to disrupt the traditional balance of power and trust between Researcher and Supervisor, potentially impacting both the rigour of PhD training and research outcomes. Rather than exploring the technical competence and reach of GenAI tools, this scoping study explores Researcher/Supervisor relationships pre-and post-GenAI and sets out avenues for further research. Informed by structuration theory, and using reflective ethnography and semi-structured interviews, the research maps changes in agency and structure and identifies several important issues. Findings highlight that fear and suspicion surrounding the use of GenAI confer undue agency on the technology, which further conceals its use. Opportunities to develop critical analytical skills are missed and this can threaten the integrity of research outputs. The study concludes that GenAI tools should be more than a covert "third wheel" in the relationship. Instead, the technology could be openly incorporated into supervision frameworks in a transparent, integrated approach.

Keywords: Artificial Intelligence; ChatGPT; pedagogy; PhD supervision; relationship dynamics

INTRODUCTION

Background

This study does not attempt to evaluate benefits, potential or inadequacies of Generative Artificial Intelligence (Gen AI tools) per se, instead it explores the impact of GenAI tools on PhD Researcher/Supervisor relationships and the potential resulting impact on research quality and integrity. It also scopes a developing research agenda.

GenAI refers to artificial intelligence (AI) tools and techniques which search and synthesize data, images and text from existing datasets/databases to produce human-like, contextually relevant outputs in response to user prompts. These prompts can vary from simple commands to more complex prompts which can be nuanced and extended. It is GenAI's ability to contextualise and synthesize data which allows its use in many areas of PhD research and sets it apart from more standard search engines like Google or Bing. Different forms of GenAI now offer targeted tools for literature reviews, data analysis and modelling which offer Doctoral researchers a panoply of tools to assist them with their research. ChatGPT is one of the most widely used tools

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with different generations on offer ChatGPT 3.5 is the most advanced free version, whilst ChatGPT 4 sits behind a paywall, but offers greater processing power and wider up to date data sets.

Academic discussion around the use of GenAI centres largely around concerns of plagiarism and poor academic practice (Huallpa, 2023), with some debate around considerations of bias and reliability and accuracy of outputs (Rane *et al.,* 2023), although its use and impacts in higher education are gaining traction for pedagogic research agendas. PhD researchers and their academic supervisors are engaged in a unique, delicate dance of developing the craft of academic and critical thinking, synthesising large amounts of data and conducting original research to contribute to the body of academic knowledge and discourse. Traditionally the supervisor guides the researcher through a maze of literature and methodology, developing skills in critical analysis and debate to enable the researcher to become autonomous and expert in their chosen field of study. This process requires resilience, respect and flexibility from both parties, and it is into this complex mix that GenAI is inserted.

Context

The PhD supervisory process has been widely acknowledged as being complex and requiring a rich mixture of skills from supervisor, (Jackson *et al.,* 2021) and researcher (Sambrook *et al.,* 2008). It is generally acknowledged that learning on the PhD journey involves both the acquisition of specialist subject knowledge and personal learning and development, with the former often taking precedence (Lindén *et al.,* 2013), however this personal learning is also widely acknowledged as being stressful (Baptista, 2014). The giving and receiving of direction, the development of academic debate and the acquisition of research skills all require delicate balancing and a skilful two-way relationship (Ribau, 2020; Wichmann-Hansen *et al.,* 2012).

Research on Researcher/Supervisor relationships often focus on what supervisors should do in terms of skill, with less emphasis on the process of developing the relationship (Buirski, 2022). The importance of mentorship and trust in doctoral supervisory relationships is stressed (Hemer 2012; Robertson, 2017), although an over-emphasis of the importance of mentoring is thought to mask the important dynamic of power in supervision relationships (Manathunga, 2007). The sensitivity and importance of power and emotion within Researcher/Supervisor relationships has been extensively recognised and variously described, in terms of relational power (McNamee and Tilson, 202); hierarchical power (Robertson, 2017); and institutional power (Jones and Blass, 2019).

New technology brings a challenge to the status quo and the possibility of disruptive change. GenAI is a developing technology, with its impact on academic research pedagogy only coming to the fore over the last two years. Already two major streams of research are emerging: academic integrity and limitations of the technology in research; and the potential positive impact of the technology on PhD research. Literature encompassing academic integrity and the ethical implications of the use of GenAI on PhD research centres on the need for guidance on acceptable use of GenAI in academia (Atlas, 2023) and the opportunities for misuse (Huallpa, 2023). Limitations in the data and synthesis carried out by GenAI resulting from bias and rules imposed by human trainers of the technology are also studied (Kocoń *et al.,* 2023; Megahed *et al.,* 2024). Other concerns centre around issues of accountability and the dissemination of misinformation (Rane *et al.,* 2023). In contrast, there is an emerging body of research which points to the potential benefits of GenAI in research.

These include benefits in time and quantity of materials processed, positive impacts on researcher self-esteem and reduced stress (Bin-Nashwan *et al.,* 2023). Reflecting on the broad implications of GenAI on supervision relationships in terms of normative practice and the possibility of shifts in roles and responsibilities within PhD supervisory relationships, Cowling *et al.,* (2023) argue that the use of GenAI can lead to improved psychological need fulfilment, and student autonomy, whilst Dai *et al.,* (2023) point to possibilities of GenAI accelerating research.

To understand the fragmented nature of the dissemination of GenAI knowledge and application, it is useful to understand the types of knowledge groups forming around the tools and the tools themselves. At present, the knowledge groups surrounding the application and use of GenAI centre around focused web-based groups that demonstrate and suggest the latest techniques and tips to optimise the use of GenAI. These include AI stack exchange (questions and answers site), Quora (AI topics or experts), and LinkedIn AI-related groups. There are also dedicated platforms and websites such as Hugging Face (platform to discuss research and projects), and Kaggle (hosts forum kernels), with conferences and "Meet ups" also gaining traction (e.g., meet up.com, GitHub, and open source, discord and slack channels).

Gen AI tools are constantly developing and specialising and at present there are several tools particularly focused at researchers. Examples of these include Litmap (reviewing literature); Rayyan and Evidence (systematic reviews), Iris.ai (explores scientific research), Scholarly (reads and summarises), Quillbot (rephrases text), Data Robot (builds and deploys predictive models more efficiently), Roam Research (note taking), Jenni AO (write, cite and edit) and Zapier (streamlines repetitive tasks). Given that these tools are increasingly targeted to service specific skill sets required by researchers, and that the doctoral supervisory relationship is intricately bound up in developing these skill sets, it seems inevitable that GenAI tools will have an impact on the doctoral research supervisory relationship. By mobilising a joint approach using ethnography to unfold this complex issue and structuration theory as lens to understand some of the dynamics involved, this study aims to understand how GenAI tools might impact the process of developing supervisory relationships and highlight future directions for the emerging research agenda.

METHOD

The use of GenAI in doctoral research is a complex and sensitive area. Both researchers and supervisors can find the subject difficult to talk about as it can touch on issues of trust, knowledge and experience. Because of this sensitivity, this study uses a combined approach of ethnographic exploration (to unfold experiences and develop emerging themes) and structuration theory to analyse those themes. This lens is used to obtain greater clarity on the issues involved with a view to seeing the possible landscape of future research agenda in this area.

The ethnographic approach has two parts: the diarised notes from a PhD researcher's six-month journey to actively use GenAI, and a series of semi-structured interviews with both PhD researchers and academic supervisors. The diarised data gives a longitudinal and detailed study which allows for in-depth analysis of the issues involved. To balance this single source of data, the semi structured interviews give greater range and experiences of the use of GenAI. In total, six academic supervisors and five PhD researchers from varied UK institutions were interviewed in fifty-minute sessions. Academic supervisors were interviewed in two group sessions which generated much discussion and reflection amongst the interviewees. PhD Researcher

interviews began as single interviewee events, but these evolved into group interviews as participants voiced a desire to share experiences and thoughts with each other. For both sets of ethnographic data, analysis centred around the exploration of emergent themes.

As this research is concerned with the changing doctoral supervision relationships in terms of power, trust and knowledge, structuration theory (in terms of structure and agency) (Giddens, 2014) has been used to inform both development of the structured interviews and analysis of the emergent themes. Structure (those structures holding the practice) is considered in terms of domination/power; signification/meaning of the practice; and legitimation/norms. Agency is considered in terms of consciousness/reflexivity of the actors involved in the practice (both practical and discursive knowledge); and capability constraints (e.g., age/cognitive ability, physical location) (Stones, 2017). The emergent themes are presented in the findings section and the analysis of these themes using structuration theory is presented in the reflections section. This is followed by the concluding section which uses these reflections to point to the resulting challenges and opportunities for both parties and to highlight future directions for the emerging research agenda. The research was conducted in line with the authors' institution ethics policies.

FINDINGS

This section sets out the emergent themes from the ethnographic analysis of both the diary entries and the semi structured interview transcripts before leading into reflections of these themes using the lens of structuration theory.

Diarised Ethnographic Analysis

GenAI as a supervisor
The researcher underscored how encounters with busy and non-communicative supervisors highlighted the missing but critical role of effective supervision and mentorship and the significance of guidance in navigating academic challenges. A pivotal turn in academic study, came from using GenAI tools for academic support and helped to fill the gaps left by less-than-ideal supervision.

GenAI as an Academic Interlocutor
Engagement with ChatGPT 4 transformed the research approach, offering a private, judgment-free platform to act as a sounding board when exploring complex research questions. This interaction not only facilitated a deeper understanding of the research area but also alleviated the isolation often experienced in PhD studies. ChatGPT 4 served as a digital interlocutor, aiding in the conceptualisation and refinement of the research focus, and offering fresh streams of ideas and literatures.

Methodological Considerations, Theoretical Frameworks and Research Trajectory
Insights gained from interactions with GenAI were instrumental in defining the research trajectory. Dialogue with ChatGPT 4 facilitated an understanding of methodological designs and allowed methods to be investigated without the supervisor knowing or 'restraining'. These conversations underscored the importance of a comprehensive and inclusive approach to research, to ensure representation of diverse experiences and perspectives.

Ethical Considerations and Future Directions
Engaging with ChatGPT 4 prompted reflections on ethical considerations in research, emphasising the necessity of informed consent, confidentiality, and the avoidance of harm. The insights derived from this unique GenAI engagement have both informed

methodological and theoretical orientations and reinforced the significance of ethical research practices.

Limitations of GenAI in Research

While ChatGPT 4 offers considerable advantages, it took considerable time and application to develop prompts, cross check information and critically think about responses. The researcher acknowledged the absence of real-time updates, critical thinking, and emotional intelligence and understood that recognising these constraints is essential to judiciously integrating GenAI tools within the research process. In summary, themes emerging from this longitudinal diarised data set show the complex landscape of GenAI in the doctoral supervision relationship. On the one hand, GenAI provided freedom and resource to explore and develop understandings away from judgement or methodological bias of the supervisor. On the other hand, it required meticulous consideration of data generated and constant refining of prompts.

Semi Structured Interviews

PhD Researchers

Supervisor Relationship: Relationships with the supervisors were generally characterised as supportive though occasionally distant. Doctoral researchers valued the skill of their supervisors both in terms of academic guidance and emotional support. Experiences ranged from structured and supportive to minimal and self-directed. Almost all PhD researchers acknowledged that supervisors were often time poor and described them as busy but helpful when available. Meetings intervals depended on supervisors' schedules and time through the PhD journey. The value of meetings with supervisor meetings was underscored, with anxiety before supervisory meetings being a notable issue (stemming from worries about progress made).

GenAI Concerns: PhD researchers expressed a strong apprehension about its rapid development and potential impact. They voiced concern about the authenticity of GenAI-assisted work, fearing a reliance on GenAI for content generation could undermine the integrity of their research. They acknowledged using GenAI for tasks like paraphrasing to improve the presentation of their work. No PhD researchers had considered openly discussing the use of GenAI within their supervisory relationships.

Perceptions of GenAI, its use and potential in Research: PhD researchers displayed very little knowledge and experience of using GenAI and showed very little curiosity about its potential. Despite acknowledging that GenAI can perform certain tasks, such as providing initial overviews on topics or aiding with language and structure, there is a strong view that GenAI lacks the depth and reliability needed for substantive academic work. The discussions revealed a broad scepticism toward GenAI's role in research with a wariness of overreliance on GenAI. There was consensus that GenAI cannot replace the nuanced guidance and feedback provided by human supervisors, nor can it replicate the critical thinking required for PhD-level research. There was some acknowledgement that GenAI might be of value in the early stages of research.

Anxiety and Use of GenAI: PhD researchers' use of GenAI is limited to grammatical and structural checks in writing, with hesitation about leveraging GenAI for more complex tasks due to fears of academic dishonesty and the reliability of GenAI-generated content. Concerns were raised about GenAI's ability to understand and analyse complex academic concepts and its potential to lead to academic dishonesty.

The future of GenAI in research: PhD researchers expressed an appetite for a more open discussion and integration of GenAI in academic supervision. They suggested

that demystifying GenAI and clarifying its potential applications and limitations could enhance the research process and alleviate the current climate of fear surrounding its use.

Academic Supervisors

Supervisory Practices and Researcher Development: Academics discussed their supervisory practices, emphasising the importance of facilitating growth rather than merely transferring knowledge. While GenAI's ability to provide quick information was acknowledged, they were sceptical about its depth and reliability for facilitating academically rigorous work and critical thinking. Participants shared their supervisory experiences, emphasising the importance of clear communication and understanding in fostering productive relationships. Participants noted the increasing use of GenAI and most mentioned concerns about quality, authenticity and detection. The potential of GenAI to assist in the research process was discussed, from aiding in literature reviews to helping non-native English speakers with academic writing. However, concerns were raised about the quality of GenAI-generated content and its ability to truly contribute to academic discourse.

Academic Integrity and Ethics: The interviews touched on concerns about academic integrity with the approach to adoption and integration of GenAI and GenAI detection tools varying across institutions. Participants raised the need for clear policies and guidelines to ensure the responsible use of GenAI in research. Interestingly, participants voiced their trust in their PhD researchers' integrity and judgement regarding self-policing in the use of GenAI. Knowledge, anxiety and stigma surrounding the use of GenAI: Most participants admitted to being very under-informed about GenAI, its capabilities and use. Those participants who had dabbled in the technology had only used the free ChatGPT 3.5 version and admitted to being very time poor when it came to exploring its potential. None of the academic supervisors had considered harnessing the power of GenAI to assist their PhD researchers but one had used GenAI within the context of the critical thinking. Participants tended to refer to GenAI in a dismissive and negative context and had not encouraged its use. Academics also pointed to a broader hesitation within the academic community about discussing or leveraging GenAI for more complex tasks due to fears of derision, loss of standing and mistrust amongst their colleagues.

In summary, these interviews showed the complex landscape of GenAI in academic supervision, marked by cautious interest in its potential benefits but dominated by concerns about academic integrity, the quality of research, and the human elements of mentorship and critical thought. Participants would value a greater understanding and integration of GenAI tools in academic practice, suggesting that while GenAI may offer some efficiencies and insights, it is not a substitute for the depth, rigor, and personalised guidance that characterise the PhD supervision relationship.

Reflections

The findings reflect an understanding by participants of the changing landscape of academic research and supervision in the age of AI. They point towards a future where GenAI could play a significant role in shaping academic practices but also raise important questions about quality, integrity, and the human element in doctoral research. This section presents further analysis of these findings using the lens of structuration theory to offer a more nuanced understandings on the impact of GenAI on doctoral supervision relationships and point to future research agendas.

Structure

Power: PhD researchers acknowledged the authoritative and allocative power of their supervisors in terms of direction setting, expectations and progress, with many suggesting a tapering effect as the PhD progresses. Fear featured in both academic and researcher interviews. PhD researchers fearing the consequences of using the technology and being caught, while Academics fearing their lack of understanding and their academic reputation. Two forms of trust were discussed - personal trust in the integrity of the PhD researchers, and trust in the data generated by GenAI. Researchers were very concerned about breaching trust and staff were very secure in believing in their researchers' integrity (which usually meant not using GenAI). Within the diarised study, power was taken from the normal supervisory structure both in terms of authority and allocation of resource (time). In this case, fear was absent in the relationship as the researcher spent time getting very familiar with driving the tool and trust in the integrity of the tool was developed as an understanding developed of where the limitations of the system lay. These findings on the relationship between trust and power support Manathunga's (2007) ideas on the masking of power behind other constructs.

Signification: Academic supervisors and PhD researchers ascribed clear meanings to supervision relationships and to some extent, were comfortable (or at least resigned) with the time-pressured nature of these relationships. Both parties ascribed even greater significance to the meaning of the relationship because of this. In most cases GenAI was not seen to fit within this meaning, and it was cast by both academics and PhD researchers as an untrustworthy interloper. However, supporting the Bin - Nashwan *et al. (*2023) assertion of the positive impacts of GenAI on researcher growth, the diarised study showed that the experience of using GenAI allowed a re-evaluation of the meaning and value of supervisory relationships.

Legitimation: Supervisors and PhD researchers alike internalised norms and rules surrounding their relationships and were very suspicious of how GenAI might break them. This was demonstrated by the supervisors' approach of deterrent, detection and sanction, and reciprocated by the PhD researchers in their avoidance of and reluctance to use GenAI. tools. Whilst these ideas support views like those expressed by Huallapa (2023), interestingly the diarised case showed that where time was spent understanding and developing new rules of engagement relating to the use of GenAI, a deeper understanding and faster coverage of ground was possible within the ethical permissions of PhD research.

Agency

Reflexive knowledge: PhD researchers relied on supervisors to lead the development for their reflexive knowledge but were also committed to developing their own fund of knowledge through traditional research methods. Except for the diarised case, neither supervisors nor PhD researchers invested time in developing reflexive knowledge around GenAI. For the diarised case, the extensive use of GenAI helped to develop generalised reflexive knowledge about the landscape of research and further supports Cowling *et al. (*2023) assertions on improved student autonomy.

Discursive knowledge: This describes the ability to communicate knowledge. PhD researchers generally found this a hurdle in their supervisory relationships as they had so many new terms and ideas to integrate into their research "vocabulary", whilst striving to appear intelligent. Some supervisors expressed frustration at having to spend precious supervision time on explaining concepts and developing academic writing skills. Some PhD researchers had used GenAI to improve their written work,

although they were very clear that the structure and content of the work had to remain their own. Atlas (2023) suggests the need for how guidance in usage of GenAI tools and this is illustrated in the diarised study where the researcher interrogated ChatGPT relentlessly and systematically to understand concepts and terms and to internalise their understanding.

Constraints: PhD researchers and supervisors in all cases mentioned the impact that lack of time and physical distance had on the relationship. In most cases this meant that the relationships were often stressed by being compressed into bite-sized episodes. Some PhD researchers and academics acknowledged that GenAI might play a role in pushing work further and faster by improving the quality of Researcher/Supervisor interactions, which reflects and supports Dias *et al. (*2023).in their assessment for potential for GenAI to accelerate research.

CONCLUSIONS

This study has a small data set, is limited in its scope and does not focus on the potential applications and reach of AI and its limitations. Whilst important questions on the accuracy, and potential of GenAI remain unanswered, the study brings into focus some clear implications for construction management doctoral research. In exploring GenAI and doctoral supervisory relationships, and by using structuration theory to inform analysis, this research has presents opportunities for the insertion of this technology within PhD supervisory relationships, highlights some difficult issues and points to future directions of the research agenda.

Although currently the established power structures within the relationship remains, GenAI has an unacknowledged presence. Within the relationship GenAI is kept at a distance through fear: supervisors worry about its detection, misuse and abuse, and PhD researcher fear the ramifications of being caught using the technology. This combined strategy only serves to keep the technology as a secret and misses the opportunity to use its processing power as a valuable teaching aid. In effect this imbues GenAI with a rather sinister power behind the scenes. By keeping AI as an unacknowledged source of support, both supervisor and doctoral researcher may be blind-sided by unintentional power shifts as PhD researchers inevitably become more versed in the technology.

The “Deter, Detect, and Sanction” strategy currently espoused by academics has been translated into a complicated legitimation structure which goes under the title of “trust”, and is being replicated in the PhD researcher annals of rules and norms. This ensures that GenAI tools stay in the background with their potential under exploited and their use open to abuse and ensuing potentially blemished research outputs.

Academic stigma associated with the discussion of the use and potential of GenAI tools appears to have stultified conversations and practical progress on the use of GenAI in PhD research within the academic community. The realities of technological progress and the potential of largely untried future generations of tools goes relatively unexplored. Current academic supervisor knowledge is largely based on free versions of tools which do not reflect the current potential of these applications. It is likely that upcoming cohorts of doctoral researchers will be far better versed in the use of GenAI than their academic supervisors.

In terms of agency, both supervisors and PhD researchers are missing a potentially valuable tool to develop reflexivity. One of the main functions of the supervisory relationship is to develop critical thinking and personal growth, and this research has

shown that GenAI could help - particularly in the early stages of the doctoral journey. By bringing GenAI into the supervisory relationship, the academic (re)gains control of the inquiry of GenAI generated information and the PhD researcher benefits from being given examples of how to probe information and how to gauge its accuracy.

Finally, the passing on of GenAI knowledge occurs largely "under the radar" in a fragmented and uncontrolled way. Informal, unaccountable groups on social media push out knowledge (largely aimed at PhD researchers), whilst networks within social circles pass on snippets and tips. This way of dissemination suggests that (perhaps like GenAI itself), PhD researchers and academics alike risk being superficial generalists on this topic and are being left vulnerable to misinformation and bias.

The study points to several interesting opportunities for further research. These include developing practices for legitimising the use of GenAI in doctoral research, exploring the phenomenon of academic stigma associated with GenAI in research and improving understanding of how knowledge about these new technologies can be passed on in more transparent ways.

In conclusion, this study has unfolded the complicated relationships within the doctoral supervision relationship. It points to key areas of concern in the concealment of AI in doctoral research training and research outcomes and shows how researchers and supervisors in the construction management and wider context could benefit by collaboration in the enrolment of GenAI into academic supervision relationships by encouraging its open use.

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