Front. Digit. Educ., 2026, 3(2): 14
https://doi.org/10.1007/s44366-026-0088-9

RESEARCH ARTICLE

Generative AI in Doctoral Dissertation Writing: Applications, Limitations, and the Need for Prompt Literacy

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Abstract The integration of generative artificial intelligence (GenAI) for dissertation writing has sparked debates regarding where it can augment the writing process, which must exclusively have human intelligence at its core, and how to write GenAI prompts that produce effective output. The present study's exploration of this topic is based on qualitative data gathered from a survey of 86 doctoral students and 7 thesis supervisors in the social sciences and humanities disciplines. We applied the AI Assessment Scale developed by Perkins et al. (2024) to evaluate GenAI's role across various stages of doctoral dissertation writing and to explore pedagogical adaptations of GenAI to support dissertation writing in the contexts of the social sciences and humanities. Our findings indicate that GenAI can be fully utilized to improve writing mechanics, including grammar, structure, and coherence, by enhancing clarity and efficiency. GenAI also proves beneficial in analyzing larger datasets by defining a coding frame, identifying trends, and conducting sentiment analyses. GenAI can be utilized in argument structuring by organizing literature, suggesting logical ways to arrange sentences, and generating counterarguments. The participants agreed that exploring these applications saved their time and allowed them to focus on a deeper intellectual engagement. However, they recommended limiting or prohibiting GenAI use in areas that require critical reasoning, originality, and cultural context. Moreover, they underscored that AI-generated content may lack accuracy and contextual depth, thus requiring careful human validation against vague expressions. This study focuses on prompt literacy and provides a scale to utilize GenAI for doctoral dissertation writing.

Keywords AI Assessment Scale, doctoral dissertation writing, human–AI collaboration, ethical use of AI, AI literacy, higher education

1 Introduction

Theses or dissertations are essential academic requirements for completing degrees at Pakistani universities. They serve as testaments to a student's intellectual maturity and ability to transform theoretical knowledge into practical research. Moreover, the process of writing a dissertation promotes critical and creative thinking skills, which are essential for succeeding in the job market and pursuing advanced research. However, students, whose first language is not English, often struggle with writing a flawless doctoral dissertation in English. They frequently commit language-related and technical mistakes. Rafi and Moghees (2023) also noted that structuring a doctoral dissertation in a meaningful, coherent whole requires a significant amount of time, resources, and complex thinking skills.

The emergence of generative artificial intelligence (GenAI) has undoubtedly provided Pakistani doctoral students with transformative opportunities to reimagine the process of dissertation writing. GenAI is a subfield of AI that can generate texts, images, and audio, among others. While engaged in dissertation writing, doctoral students prompt GenAI to brainstorm certain ideas and to generate, edit, and evaluate content. Prompt engineering is a digital inquiry for engaging with algorithmically generated knowledge. Park and Choo (2024) argued that prompt engineering is a process of writing, refining, and optimizing prompts to obtain high-quality desired output from GenAI. Rafi and Amjad (2025) claimed that GenAI is increasingly becoming an important part of doctoral education in Pakistan, arguing that perceived usefulness, perceived ease of use, and user acceptance are important factors in the acceptance of GenAI use for dissertation writing in Pakistan.

Received September 6, 2025; revised December 3, 2025; accepted January 16, 2026

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Given the wider and rapid acceptance of GenAI, Adam and Chowdhury (2024), Bahroun et al. (2023), Ji et al. (2023), and Magesh et al. (2025) raised ethical concerns regarding copyright infringement, hampering writing process, and adversely affecting critical thinking. Rafi and Amjad (2025) argued that doctoral students are increasingly becoming prone to using GenAI to offload linguistic complexities and outsource their learning. Ultimately, the way in which these students engage with GenAI technologies during dissertation writing is questionable, as students do not know where, when, and how to prompt GenAI.

Perkins et al. (2024) have proposed a scale covering full to no application to assist teachers and students on GenAI use in educational assessment. This scale was originally conceived to help address the disruptive changes brought about by GenAI tools in classroom activities, curricula, and assessment in the context of English-as-a-foreign-language (EFL) writing and translation. However, we aim to reconstruct scale to assess the applications and limitations of GenAI integration at various stages of dissertation writing in the social sciences and humanities disciplines. This will allow us to develop prompt strategies for planning and collaborating with GenAI to promote new ways of teaching and learning practices in higher education.

While some areas of doctoral education have benefited from GenAI, others, especially dissertation writing, require hybrid intellectual skills, integrating GenAI with human agency. Therefore, understanding GenAI's applications and limitations is essential, as is finding the best way to equip doctoral students with the essential GenAI literacy necessary to effectively harness the power of language models, as emphasized by Ng et al. (2021).

2 Literature Review

The integration of GenAI into academic writing has increasingly received scholarly attention, with its applications ranging from language support to cognitive augmentation. While many studies highlight the transformative potential of GenAI, its limitations and the need for robust prompt strategies have also been emphasized. In many ways, these strategies ensure that GenAI is used within higher education in an ethical, effective, and context-sensitive manner that promotes human agency.

2.1 | Applications of GenAI

Multiple studies have demonstrated that GenAI clearly improves the writing mechanics of writers who employ the technology. Ekin (2023), Chen et al. (2025), Marvin et al. (2024), and Rafi and Amjad (2025) emphasized that GenAI reliably enhances grammar, style, structure, and coherence. Such affordances align with findings that doctoral students can save cognitive energy by offloading linguistic editing to GenAI, allowing them to focus on higher-order reasoning tasks, such as structuring arguments coherently and data analyses (White et al., 2023). Wei et al. (2022) demonstrated that chain of thought (CoT) prompting improves reasoning transparency, while Yao et al. (2022) showed that reasoning and acting (ReAct), which interleaves reasoning with actions, enhances GenAI's fact verification, and reduces hallucination, in a way that corresponds to the reality. While standard GenAI models generate responses based solely on their internal training data, Klesel and Wittmann (2025) argued that retrieval-augmented generation (RAG) improves factual grounding by incorporating external evidence, making it valuable for literature review and evidence-based argumentation. Such strategies resonate in all doctoral contexts, where relevance, clarity, accuracy, coherence, and evidentiary support are paramount.

GenAI is also useful for generating feedback. Jacobsen and Weber (2025) found that prompt quality determines whether GenAI feedback matches that of expert-level evaluations. A strong prompt elicits detailed and contextually relevant feedback, whereas a weak prompt, lacking specificity or clarity, often leads to generic feedback that fails to align with the specific context. This reinforces the importance of prompt literacy for advanced writing tasks. Similarly, Lancaster (2025) reported that GenAI can scaffold the iterative refinement of doctoral students' drafts, with supervisors encouraging the use of GenAI as a cowriter rather than a ghostwriter.

2.2 | Limitations of GenAI

Despite these affordances, GenAI has several well-documented limitations, including hallucinations and fabricated citations, misinterpretation. Hallucinations and fabricated citations remain persistent risks when users input imprecise prompts (Bahroun et al., 2023; Ji et al., 2023). Even when retrieval-based approaches are applied when prompting GenAI, human validation is essential for ensuring the factual accuracy of the GenAI content (Magesh et al., 2025). Moreover, several cultural and contextual nuances pose challenges for GenAI-assisted dissertation writing (Rafi & Amjad, 2025). Studies in EFL or English-as-a-second-language (ESL) contexts demonstrate that GenAI translations often misinterpret idioms and fail to capture cultural connotations (Lin, 2024; Woo et al., 2025). Similar concerns have been raised in applied studies, where an over-dependence on GenAI has been linked to superficial analyses and produced outputs lacking in critical

thinking skills. Rowland (2023) and Adam and Chowdhury (2024) highlighted several unresolved debates around authorship, attribution, and intellectual property, particularly in high-stakes assessments. Bahroun et al. (2023) emphasized that institutions lack clear policies for balancing GenAI affordances with academic integrity. These limitations underscore the need for supervisory oversight, prompt literacy, and institutional guidelines in doctoral dissertation writing, where originality and critical interpretation are central.

2.3 | Prompt Engineering as a Mediator

A recurring theme in GenAI use has emerged across the literature: prompt engineering as a decisive mediator of GenAI's effectiveness. Moreover, prompt engineering has increasingly been recognized as a 21st-century digital literacy skill (Federiakin et al., 2024; Korzynski et al., 2023). Prompt-generation frameworks, such as PARTS (persona, aim, recipients, theme, and structure), CLEAR (context, language, examples, audience, and request), and REFINE (role, expectation, frame, include, nuance, and evaluate), emphasize clarity, specificity, and contextually embedded prompts for generating the most relevant outputs (Park & Choo, 2024; Schulhoff et al., 2024). Several studies have demonstrated that students with higher GenAI literacy level produce better prompts and thereby achieve higher-quality outcomes that are closely aligned with the tasks (Kim et al., 2025; Knoth et al., 2024).

Prompt design plays an even greater role in GenAI use by EFL or ESL learners. Lin (2024) and Henrickson and Meroño-Peñuela (2025) showed how nuanced prompts mitigate linguistic gaps by scaffolding GenAI responses. Zhu and Duan (2025) extended this argument by applying a prompt-based teaching model of meaning negotiation to emphasize the cultural sensitivity of GenAI-mediated academic writing. Vera (2024) empirically connected student performance in prompt generation with broader GenAI literacy, suggesting that training of doctoral dissertation writing should explicitly incorporate prompt literacy as an assessable competence.

While the literature has provided robust insights into areas for GenAI applications and limitations, most studies are situated in general academic, EFL, or ESL classroom contexts, not in doctoral dissertation writing across social sciences and humanities disciplines. A clear research gap exists in adapting GenAI to the high-stakes writing and culturally situated nature of doctoral research in Pakistani discourse. While Perkins et al.'s (2024) AI Assessment Scale (AIAS) offered valuable guidance to teachers and students regarding diverse GenAI use cases in educational assessment, to the best of students' knowledge, the scale has yet to be empirically examined in the context of doctoral dissertation writing, in which the demands of intellectual originality and disciplinary rigor are paramount. This gap positions the present study to explore where, when, and how GenAI can be used in doctoral dissertation writing while addressing the pragmatic demands of prompt literacy. In addressing this gap, Ng et al. (2021) argued that learners must not only know how to operate GenAI tools but must also remain critically aware of the ethical concerns surrounding GenAI-assisted academic writing across disciplines.

2.4 | Conceptual Framework

This study utilizes the AIAS, developed by Perkins et al. (2024), to conceptualize staged uses of GenAI in doctoral dissertation writing. The modified scale used in this study (no GenAI, GenAI planning, GenAI collaboration, full utilization of GenAI, and GenAI exploration) provides task guidance to doctoral students and aligns with the core of dissertation write-up stages (introduction, literature review, methodology, analysis, discussion, and conclusion) with greater clarity and transparency. This study's modified framework foregrounds two additional constructs, prompt strategies (the ability to craft prompts that produce accurate and context-sensitive outputs), and pedagogical adaptation (the effective integration of GenAI for doctoral dissertation writing), while recognizing that GenAI may have roles that range from full to limited or no role across several stages in the dissertation writing process. We propose that dissertation outcomes (writing quality, originality, and critical reasoning) depend not only on the AIAS level at which GenAI may be used but also on students' prompt literacy and human validation.

Thus, AIAS and prompt literacy are integrated as dual pillars of this conceptual framework. AIAS provides a structural map of where, when, and how to use GenAI across dissertation writing stages. In turn, prompt literacy equips doctoral students to maximize GenAI's affordances at the appropriate levels while safeguarding originality, disciplinary rigor, and cultural sensitivity. By combining AIAS with ready-to-use prompts, this study advances the conceptual framework of AIAS. This alignment positions doctoral dissertations not only as sites for testing GenAI's potential but also as critical arenas for cultivating responsible human–AI collaboration in higher education.

3 Methodology

This study adopts a qualitative exploratory design to investigate the applications, limitations, and prompt strategies of GenAI in the doctoral dissertation writing

process of the social sciences and humanities disciplines. In line with van de Sandt et al.'s (2019) definition of reuse, this study reuses the datasets from our previously published research supplemented by new research questions and changes in theoretical framework, analysis, and impact (Rafi & Amjad, 2025). Pasquetto et al. (2017) noted that such reuse enables the generation of new insights while extending the value of original datasets. Moreover, the reanalysis of the existing datasets makes for a robust approach for exploring emerging areas, such as where, when, and how GenAI should be applied for doctoral education.

3.1 | Data

The dataset comprises contributions from 86 doctoral students and 7 dissertation supervisors from 8 higher education institutions in Pakistan (5 private and 3 public universities), all within the social sciences and humanities disciplines, including business administration, education, English literature, linguistics, management, political science, and psychology. The participants represented diverse stages of the doctoral dissertation writing process, from proposal development to final submission.

Two qualitative instruments, one open-ended questionnaire, and one test from the research of Rafi and Amjad (2025), were adopted in the original data-collection process. Fifteen open-ended questions were designed to elicit perceptions of doctoral students regarding GenAI-assisted dissertation writing, its perceived applications, limitations, and prompt strategies to foster its critical and creative engagement. Before carrying out the actual survey, we conducted a focus group discussion with 3 doctoral students to confirm the content validity of the questionnaire and test. The feedback from this piloting phase played a crucial role in refining and finalizing this open-ended questionnaire and the test.

A task-based linguistic analysis test was administered to 22 doctoral students, who were required to edit their original dissertation excerpts using various prompt strategies and subsequently evaluate the impact of GenAI at different stages of their dissertation writing. Six open-ended questions were adopted from Rafi and Amjad (2025) to probe supervisors' detection strategies, evaluation challenges, and recommendations for responsible GenAI integration.

The raw dataset in this study was coded according to the AIAS framework, which involved mapping participant responses to AIAS levels to identify patterns in where, when, and how GenAI is used in doctoral dissertation writing.

3.2 | Analysis Procedure

We followed a discursive thematic approach to define the coding frame (Rafi & Amjad, 2025). This process involved the following four steps: First, read and reread the dataset to identify indicative excerpts related to GenAI's applications, limitations, and prompt strategies; second, assign each excerpt to one or more AIAS domains (full to no application of GenAI) to define codes; third, link codes with category themes, including prompts to either mitigate or amplify GenAI's limitations; fourth, integrate thematic findings with AIAS theoretical propositions to draw implications for doctoral dissertation writing pedagogy.

This coding frame helped us address dissertation writing areas where full to no application of GenAI was needed. This paved the way for formulating and aligning prompt strategies with different stages of doctoral dissertation writing. The coding frame also indicated spaces in which certain prompt strategies were necessary to explore the use of GenAI in developing critical thinking skills. The coded excerpts from doctoral students were abbreviated as DS, illustrations from their test data as TD, and data obtained from thesis supervisors as TS.

3.3 | Ethical Considerations

The original study received ethical approval from Riphah International University in compliance with *The code of professional ethics and practices* of the American Association for Public Opinion Research (2021). All participants provided informed consent and were assured of confidentiality. This analysis adhered to the same ethical considerations noted by Rafi and Amjad (2025), with additional care taken, including cross-checks of the participants' responses, to ensure that AIAS-based interpretations could not modify or misrepresent participants' intended meanings.

Moreover, we assumed that all doctoral students possessed a uniform level of technical proficiency—a condition that might not be true across diverse doctoral students. Therefore, while analyzing the data, we acknowledged the varying levels of comfort each student has regarding the application of GenAI. We also considered various psychological and temporal factors, such as anxiety, mistrust, cognitive overload, and time constraints, that may influence technology adoption and self-efficacy during draft completion.

4 Results

4.1 | Full Application of GenAI

Table 1 demonstrates that doctoral students engage GenAI in polishing the writing mechanics. The first text in Table 1 corresponds directly to the grammar correction code. The second text aligns with the real-time feedback code. The third text, derived from the observation, corresponds to the voice correction code. Similarly, the participants acknowledged that GenAI

Table 1 Full utilization of GenAI's prompt strategies for improving writing mechanics

Category	Text	Code	Prompt strategy
Improving writing mechanics	AI has been a great help in all the research work, including removing grammatical errors. It adds synonyms and references so elegantly that it takes the document to the next level. (TS)	Grammar correction	Directional stimulus prompting
	AI tools improve writing skills by providing real-time feedback on grammar, style, and structure. (DS)	Real-time feedback	
	AI tools highlight several instances of passive voice and complex sentence structures, which made the text less engaging. (DS)	Voice correction	
	AI-refined content has more advanced and academic word choices, such as "investigate", "reinforce", and "perpetuate", while the human-generated paragraphs opt for simpler terms, such as "aims to investigate" and "ratify." Additionally, AI chatbot incorporates more complex sentence structures, with multi-clause sentences that smoothly integrate methodology, findings, and analysis, creating a cohesive flow. In contrast, the human-generated content has shorter, more direct sentences, often listing the methodology and findings in a straightforward manner. (TD)	Academic vocabulary	
	I use GPT-4 to edit and refine drafts. (DS)	Editing and refining	

Notes. TS: thesis supervisor, DS: doctoral student, TD: test data.

suggests "more advanced and academic word choices, such as 'investigate', 'reinforce', and 'perpetuate'" while improving their writing mechanics.

Sample prompts demonstrate a use of imperatives, such as "review", "suggest", "rewrite", and "polish", which reflects directional stimulus prompting (DSP) to ensure that outputs remain precise. DSP is a method of guiding GenAI's output by providing the structured sample prompts such as:

(1) Review the discussion for grammatical accuracy and correct subject–verb agreement errors without changing meaning.

(2) Suggest more precise academic vocabulary for the literature review on corpus linguistics in my dissertation.

(3) Transform this draft into a formal and academic register appropriate for doctoral-level discourse analysis.

(4) Rewrite the following complex sentences into multiple, clear, and concise sentences suitable for academic prose.

(5) As I draft methodology, provide real-time feedback on cohesion, clarity, and dissertation-style conventions.

(6) Summarize frequency counts from this corpus dataset of discourse markers for inclusion in the results.

(7) Polish this entire section of my dissertation for grammar, style, lexical choice, and logical flow in one integrated edit.

(8) Cross-check the grammatical and stylistic edits you suggest for this dissertation excerpt against APA style (7th edition) guidelines and indicate where your corrections might be debatable.

The above-mentioned sample prompts reflect the use of GenAI for improving writing mechanics. For example, the first sample prompt is direct for grammatical accuracy and correction, while the second sample prompt illustrates an intentional effort to enhance the precision of academic vocabulary. Similarly, the fourth sample prompt operationalizes academic prose, while the seventh sample prompt exemplifies polishing and editing.

4.2 | Exploration of GenAI

Participants adopted 4 strategies (RAG, CoT, ReAct, and DSP) to improve their doctoral dissertations through GenAI, and from the ninth to nineteenth sample prompts (the content in the parentheses needed to substitute), as illustrated below, that helped them brainstorm certain ideations and develop argumentative structures. We analyzed each strategy along with sample prompts:

(9) Based on the theories explored in the attached resources (e.g., website, article, text, or manuscript) related to (the specified topic), what other innovative perspectives can you suggest to bring depth to the theoretical framework for my dissertation (the specified topic)?

(10) Conduct a deep analysis of the attached resources (e.g., data, articles, or policy documents) and identify the emerging trends in the educational policy.

(11) Analyze the attached studies from (inserting the start and end years, e.g., 2020–2025). Based only on this information, write a 200-word synthesis on how this (the specified theory, e.g., L2 motivation) is framed to analyze the data.

(12) Interpret the attached resources (e.g., papers or books) on (the specified topic) for (a) an enriched, multi-dimensional interpretation; (b) thematic analyses, regarding (the specified outcomes of the topic, e.g., identities and cultural narratives in Pakistani English literature).

(13) Generate an efficient, nuanced theoretical comparison of (the specified topic) utilizing the attached resources (e.g., articles or books), synthesizing it in the (desired word limit, e.g., 150 words).

(14) Structure the arguments and counterarguments on the (the specified topic) by generating a detailed breakdown divided into main themes with a logical sequence of patterns that emerge based on a deep reasoning analysis.

(15) Based on the given (the specified topic, e.g., business) strategies, create (the specified number, e.g., 3) simulation(s) on the implementation of these strategies in a(n) (the specified topic, e.g., highly digitalized market) environment. Utilize the results to generate evidence-based conclusions that can be effectively implemented in the modern (the specified topic, e.g., business) industry.

(16) Juxtapose or collocate (the given examples of perspectives or theories, e.g., Scandinavian social democracy with South American leftist movements) and generate a coherent synthesis of (the desired word limit, e.g., 200 words) with diverse perspectives.

(17) Generate a step-by-step guide on the detailed analysis of (resource, e.g., dataset) regarding (resource description, e.g., organizational behavior) for the purpose of (the specified topic, e.g., trends in Pakistani government sectors).

(18) Organize or standardize research outcomes on the (the specified topic) using a step-by-step, clear evidence or framework to enhance credibility and comparability of the present study.

(19) Provide continuous, step-by-step writing support as I draft the introduction by suggesting improvements in clarity, logical flow, and cohesion at each stage.

The coding frame on the exploration of GenAI shows that the participants moved beyond mechanical editing and engaged GenAI to augment their thinking processes, structure arguments, and analyze data. These examples illustrate that GenAI was prompted to identify the emerging trends, provide fresh interpretations, and compare theoretical frameworks. For instance, the second text in the augmenting thinking process corresponds to information retrieval. Sample prompts from the ninth to thirteenth illustrate how RAG prompting was applied to broaden perspectives and build thematic links across the previous studies. Related prompts, such as the tenth and twelfth sample prompts, show that the participants leveraged GenAI to synthesize large volumes of literature into coherent insights.

The fourteenth sample prompt, CoT prompting is evident in cases where participants describe GenAI's role in structuring arguments. The first text in the established argument structure category as shown in Table 2, which indicates logical structuring in the doctoral dissertation writing process. This is reinforced by the fourteenth sample prompt, which exemplifies how CoT prompting transforms abstract reasoning into stepwise clarity.

ReAct prompting was employed when the participants described simulations and comparative syntheses. The second text categorized in the "establishing argument structure", pointed to an action simulation, which is tied to the ninth sample prompt, showing how GenAI was tasked with iterative loops of reasoning and application. Similarly, the third participant categorized in the "establishing argument structure", observed that GenAI enabled the participant to juxtapose Scandinavian social democracy with South American leftist movements, a reflection of ReAct that is operationalized through prompts requesting coherent syntheses of multiple perspectives. DSP is evident in the participants' emphasis on accessibility and independent feedback. The third text, categorized in the "seeking efficient feedback", such as "I can receive feedback at any hour without waiting for my supervisor's response." demonstrates the value that the participants placed on speed and independence. The nineteenth sample prompt, "provide continuous, step-by-step writing support as I draft the introduction by suggesting improvements in clarity, logical flow, and cohesion at each stage", illustrates how DSP was used to elicit real-time guidance.

4.3 | Limited or No Application of GenAI

Table 3 highlights how participants recognized clear boundaries to GenAI's usefulness in the doctoral dissertation writing process. Five illustrations underline the challenges of facing hallucination (i.e., content verification, cultural idiom misinterpretation, stereotype, and historical context loss). The first text categorized in the "facing hallucination" points to the risk of fabricated or inaccurate citations and references. The second text in the same category shows that GenAI cannot capture the geopolitical complexities of Pakistan's local realities.

Table 3 captures the risk of superficial analysis. It demonstrates that GenAI often misses the underlying rationale or context behind key arguments, which can lead to oversimplified interpretation of context-rich data. The first text categorized in the "lack of deep thinking" is coded as the personal insight loss. The second text in the same category is coded as deep analysis limitation. The first text categorized in the "raising ethical concerns" after being processed by AI, raising issues of intellectual property and reciprocity. The third text in the same category mentioned above on the GenAI apprehension to access and potentially manipulate politically sensitive information, suggests the potential danger of distorted or biased outcomes in research where neutrality is crucial.

The participants value their supervisors' ability to offer contextualized insights and depth. The first text categorized in the "formulating prompts" refers to the

Table 2 GenAI's prompt strategies for developing argument structures and analyzing data

Category	Text	Code	Prompt strategy
Augmenting thinking process	AI is instrumental in offering innovative perspectives and ideas, thereby enhancing creativity. (DS)	Creative enhancement	Retrieval-augmented generation prompting (from the ninth to the thirteenth sample prompts)
	AI helped me identify the emerging trends in educational policy reform that were not immediately apparent. (DS)	Information retrieval	
	AI offers new perspectives in literary analysis, especially in modernist literature. It identifies thematic patterns and stylistic features across different works, enriching my exploration of symbolism and narrative techniques in the 20th-century literature. (DS)	Literature synthesis	
	AI gave me fresh interpretations and thematic analyses of post-colonial literature that have enhanced my exploration of identities and cultural narratives in Pakistani English literature. (DS)	Content generation	
	AI recently helped me contrast different theoretical frameworks on post-cold war in the Eastern Europe with unprecedented efficiency. (DS)	Theoretical comparison	
Establishing argument structure	AI tools helped me structure the arguments in my dissertation by identifying key themes and patterns in existing literature and suggesting logical flow and counterarguments. (DS)	Logical structuring	Chain-of-thought prompting (the fourteenth sample prompt)
	I utilized AI-powered simulation tools to demonstrate how different business strategies could play out in a highly digitalized market environment. This application made my arguments stronger and more relevant to current industry practices. (DS)	Action simulation	ReAct (from the fifteenth to eighteenth sample prompts)
	AI has enhanced my ability to synthesize complex political theories, allowing me to integrate diverse perspectives from global political movements more coherently. For instance, it helped me juxtapose Scandinavian social democracy with South American leftist movements in my dissertation. (DS)	ReAct	
Facilitating data analysis	AI helped me analyze a large dataset on organizational behavior trends in Pakistani government sectors, which was manually daunting. (DS)	Step-by-step analysis	
	It also assisted in formalizing the effect methodologies and research outcomes. (TS)	Methodological support	
Seeking efficient feedback	AI can quickly parse through vast amounts of data and highlight key findings saved me considerable time and provided insights I might have otherwise missed. (DS)	Speedy and efficient feedback	Directional stimulus prompting (the nineteenth sample prompt)
	AI feedback is more independent, accessible, and accurate. (DS)	Independent feedback	
	I can receive feedback at any hour without waiting for my supervisor's response. (DS)	Accessibility	

Notes. DS: doctoral student, TS: thesis supervisor, ReAct: reasoning and acting.

skills gap in effective GenAI usage. The second text in the same category, coded with ethical training necessity, calls for training and supervisor guidance to promote academic integrity.

5 Discussion

This study provides a nuanced understanding of how human cognition and machine intelligence converge in doctoral dissertation writing, while also promoting the transparency, reproducibility, and sustainability of the previously existing data (Pasquetto et al., 2017; van de Sandt et al., 2019). By conducting a staged examination of where, when, and how GenAI is employed, this study challenges traditional modes of doctoral dissertation writing while opening new possibilities for creativity, collaboration, and epistemic expansion. This study argues that current scholarship must move beyond a simple disruption narrative toward the development of ethical, pedagogical, and institutional frameworks that integrate GenAI both critically and creatively to ensure that it serves as a tool for deeper inquiry rather than a substitute for intellectual labor.

At the full application stage, as mentioned in Figure 1, participants found GenAI was most effective for improving the writing mechanics across the social sciences and humanities disciplines. They used GenAI for grammar correction, vocabulary enhancement, voice adjustment, and draft refinement. The participants employed DSP to improve their writing mechanics. The analysis mirrors findings by Ekin (2023), Chen et al. (2025), and Marvin et al. (2024), who highlighted GenAI's capacity to reliably improve grammar, style, and structure. White et al. (2023) similarly reported that delegating surface-level tasks to GenAI allows doctoral students to redirect their cognition toward deeper reasoning—a result that aligns with our observation of doctoral students valuing efficiency gains produced by GenAI use. However, our results also echo those of Jacobsen and Weber (2025), who show that the feedback and editing quality provided by GenAI is contingent on well-crafted prompts. This reinforces our call for training in DSP to fully utilize GenAI effectively.

Table 3 GenAI's prompt strategies and human validation for limited or no application

Category	Text	Code	Human validation and prompt literacy
Facing hallucination	I had to verify AI-generated content against academic sources and references, especially. (DS)	Content verification	Citations and references
	I faced challenges contextualizing AI data within the complex dynamics of project, like CPEC. (DS)	Geopolitical contextualization	Cultural data and information
	When AI translates or generates text involving cultural idioms (from Urdu to English), it literalizes these idioms and mostly misses their cultural connotations, leading to cultural misinterpretation or insensitivity. (DS)	Cultural misinterpretation and insensitivity	Structural and lexical choices
	When I used AI tools to analyze psychological trends and disorders, the tools reinforced stereotypes and overlooked cultural specificities; hence, I ended up with flawed or biased conclusions. (DS)	Stereotype reinforcement	Cultural and historical intricacies
	AI's understanding is often based on patterns in data, which could miss the context-specific emotions and historical intricacies vital in partition literature. (DS)	Historical context loss	
Lack of deep thinking	For example, sometimes, due to lack of time, I was overly dependent on AI for analyzing Mohsin Hamid's narrative techniques. In such cases, I think I missed out on important insights that I would have otherwise gained through my personal engagement with the texts. (DS)	Personal insight loss	Self-critical reading and writing
Lack of deep thinking	In my study of post-colonial narratives, my overdependence on AI for thematic analysis could have limited my deep, interpretative examination of the texts essential to the literature. (DS)	Deep analysis limitation	Self-critical reading and writing
Raising ethical concerns	I, sometimes, fear that my research ideas and the cues that I provide to the tools might be leaked. (DS)	Reciprocal ethics concern	
	If I am using someone's work (unethically, via AI tools), others will be using mine one day. (DS)		
	My apprehension lies in GenAI's ability to access and potentially manipulate politically sensitive information, which could skew my research outcomes. (DS)	Political information manipulation	
Seeking supervisors' assistance	My supervisor excels at offering contextualized insights, particularly on consumer's behavior in South Asian markets, which AI tools lack. (DS)	Regional expertise superiority	
	My supervisor's feedback often challenges me to think more critically and deeply about my arguments…… Moreover, the personalized mentorship and guidance from my supervisor extend beyond the doctoral dissertation, as my supervisor aids me in my overall professional development and pursuit of my career trajectory. (DS)	Critical mentorship value	Seeking feedback from supervisors
	I generally advise my supervisees to read material; accept help, but don't copy and paste. (TS)	Academic integrity guidance	
Formulating prompts	A strong foundation is how to write AI prompts and guide its outputs. (DS)	Prompt literacy need	Prompt literacy
	AI tools can be complex and may require specific skills to use effectively. Providing training sessions or workshops for students on how to use AI tools ethically and efficiently can be immensely beneficial. (DS)	Ethical training necessity	
	Training is required on supervisors' end to detect the copied and pasted materials and to evaluate the accuracy. (TS)	Supervisor detection training	
	Ethics should be inculcated in the minds of the students so they may come up with a balance. (TS)	Ethical balance development	

Notes. DS: doctoral student, TS: thesis supervisor, CPEC: China–Pakistan Economic Corridor.

The analysis also underscores the need to validate GenAI outputs against academic standards in a way that discourages doctoral scholars from outsourcing their learning to GenAI.

At the exploration stage, the participants extended GenAI's application beyond mechanics to higher-order thinking tasks, such as structuring arguments, synthesizing literature, and analyzing datasets. Participants adopted 4 strategies (RAG, CoT, ReAct, and DSP) to improve their work with GenAI. These findings support the work of Wei et al. (2022) who showed that CoT prompting enhances reasoning transparency. The findings of Yao et al.'s (2022) work showed that ReAct prompting reduces hallucination by combining reasoning with retrieval actions. Similarly, Klesel and Wittmann (2025) argued that RAG fosters factual grounding by integrating external data. However, as Lancaster (2025) noted, in the supervised case studies, supervisors must remain actively involved to ensure that GenAI-structured arguments align with disciplinary frameworks. Our findings resonate with this concern, as doctoral students in our study still required supervisory validation to confirm that GenAI outputs were coherent within their academic contexts.

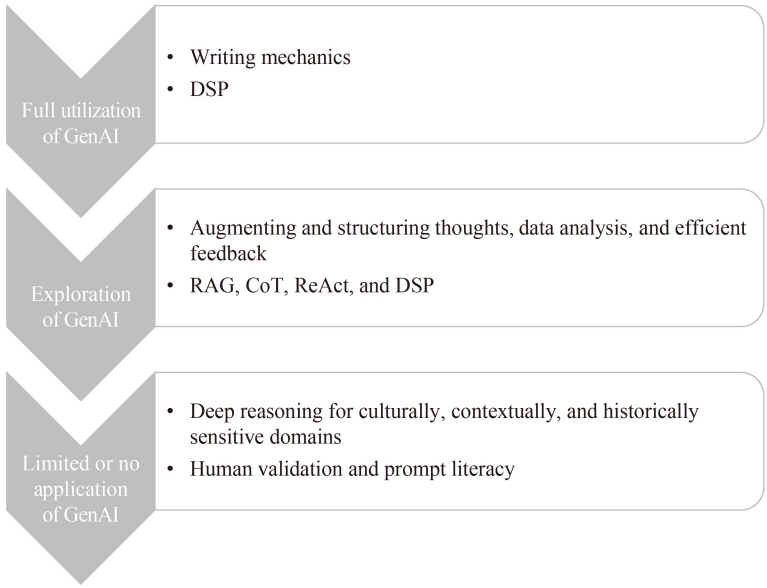

Figure 1 GenAI use in doctoral dissertation writing and prompt literacy. DSP: directional stimulus prompting, RAG: retrieval-augmented generation, CoT: chain of thought, ReAct: reasoning and acting.

Figure 1 also shows that at the limited or no application of GenAI stage, participants emphasized the importance of human validation, particularly for cultural misinterpretation and insensitivity, historical context loss, and deep analysis limitation. They reported that GenAI struggled with context-specific issues, hallucinated references, and produced culturally biased interpretations. Our findings align with those of Ji et al. (2023) and Magesh et al. (2025), who documented the persistent risk of fabricated citations and references. The cultural misinterpretation and insensitivity identified by the participants also mirror those found by Lin (2024) and Woo et al. (2025) who found that GenAI often misinterpreted idioms and failed to capture cultural connotations in non-native writing. Moreover, ethical concerns raised by the supervisors in our study echo those identified by Rowland (2023), Bahroun et al. (2023), and Adam and Chowdhury (2024), who in their work emphasized the unresolved debates about authorship, integrity, and attribution in GenAI-assisted academic writing. These convergences suggest that while GenAI has clear applications, its cultural and ethical shortcomings reinforce the irreplaceable role of human scholarship and supervisory mentorship in doctoral research.

While many of our findings converge with the previous studies, notable divergences also exist. For example, Jacobsen and Weber (2025) suggested that with strong prompts, feedback from GenAI tools can approach or even surpass expert evaluations. In contrast to their work, participants remained skeptical of such equivalence, stressing the need for supervisor validation even when in cases involving carefully constructed prompts. Similarly, White et al. (2023) highlighted the potential of GenAI to act as a collaborative co-writer, whereas our findings suggest that doctoral students were reluctant to rely on GenAI for anything beyond surface-level support, especially in culturally sensitive domains. Moreover, although Park and Choo's (2024) frameworks and Schulhoff et al.'s (2024) prompt catalogs assume that systematic prompting can mitigate contextual risks, participants emphasized that cultural misinterpretation and insensitivity and historical context loss still require human insights, echoing concerns raised by Lin (2024) and Woo et al. (2025). These divergences suggest that doctoral dissertation writing in the social sciences and humanities disciplines places higher stakes on originality, cultural nuance, and academic integrity than what general academic writing studies have accounted for prioritizing clarity and efficiency in the presented findings (Rafi & Amjad, 2025).

AIAS is applicable only within a relatively narrow range of EFL contexts in which technological resources, digital literacy, and pedagogical readiness are sufficiently developed. Its successful implementation depends heavily on institutional support, educator training, and digital infrastructure. Moreover, varying policies, the differences between free and premium models, and unequal access to AI tools can limit the application of AIAS. Furthermore, AIAS does not address deeper ethical, cultural, and psychological dimensions of GenAI use, such as cultural biases, private concerns, emotional responses, or overreliance, which requires careful human validation.

Universities must move beyond the disruptive narrative of GenAI toward integrating it into their curricula to enable teachers and students to leverage

language models effectively (Wang et al., 2025). Rowland (2023) argued that modern employers now expect doctoral students to be proficient in the use of GenAI more than ever before. The findings of this study provide a framework for universities to encourage a combination of human intelligence and GenAI. This framework includes decision-mapping sessions to help doctoral students determine where GenAI should be used, limited, or avoided in academic writing tasks, particularly in doctoral dissertation writing. Embedding prompt strategies, including ready-to-use prompts, is central (Alfugaha & AL-Smadi, 2025), as such training can enable doctoral students to confidently explore new epistemic possibilities and achieve research excellence without compromising their intellectual labor (Giray, 2023). Knoth et al. (2024) further argued that higher-quality prompt engineering skills enhance GenAI output quality. Hence, prompt literacy should be institutionalized as a core academic competency, while positioning GenAI as a reflective partner with doctoral students for their dissertation writing.

6 Conclusions

This study explores GenAI's applications and limitations, prompt engineering, and human agency in doctoral dissertation writing. Moreover, this study finds that GenAI is reshaping doctoral dissertation writing in important yet uneven ways. Doctoral students can violate the principles of academic integrity if Pakistani universities fail to regulate GenAI and provide students with necessary training on how to capitalize on its potential for high-stakes writing. This study provides a roadmap for achieving research excellence while highlighting where, when, and how GenAI should be utilized. Furthermore, this study reinforces the notion that technically proficient and ethically aware teachers and students are more likely to succeed in academia. However, cultural interpretation, deep reasoning, and ethical sensitivity remain firmly in the domain of human scholarship. The doctoral students consulted in this study relied on supervisory mentorship to safeguard these dimensions in a way that reinforces the enduring value of human creativity and critical thinking in doctoral education.

The findings of this study can be generalizable to higher-education contexts in which both teachers and students lack institutional access to advanced versions of GenAI. Moreover, the findings are framed through a reused theoretical method that extends the epistemic value of the original data to highlight ethical, pedagogical, and institutional implications of GenAI in higher education. Furthermore, the fact that different fields of study have diverse methodological frameworks and expectations must be recognized. Future research, therefore, should investigate the impact of the proposed scale and the effectiveness of ready-to-use prompt strategies in enhancing research excellence across STEM (science, technology, engineering, and mathematics) education, natural sciences, and applied sciences, through longitudinal designs.

Acknowledgment This research did not receive any specific funding from any public sector, commercial or not-for-profit funding.

Author Contributions Conceptualization, methodology, formal analysis, data collection, and writing of the original draft as well as review and editing, were completed by Muhammad Shaban Rafi. Coding frame, including ready-to-use prompts, review, and copy-editing, were completed by Lubna Khalil. The authors have read and approved the final version of the manuscript.

Conflict of Interest The authors declare that they have no conflict of interest.

Ethics Statements This study was granted ethical approval from Riphah International University in accordance with the AAPOR Code of Professional Ethics and Practices (2021). Each of the participants was informed and had the right to withdraw from the research and was guaranteed confidentiality.

Data Availability Statements The authors confirm that all data generated or analysed during this study are included in this published article.

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