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ORIGINAL

Perceptions of AI Collaboration in Writing among Teacher Aspirants: An Empirical Cross-Sectional Study among Teacher Aspirants

Percepciones sobre la colaboración con la inteligencia artificial en la escritura: Un estudio empírico transversal entre aspirantes a docentes

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ABSTRACT

The integration of artificial intelligence (AI) into education has generated increasing interest, particularly in its role in academic writing. While prior studies have examined students' use of AI, limited attention has been given to teacher aspirants' perceptions of AI collaboration with human writers across subject disciplines. Addressing this gap is crucial in preparing future educators for responsible AI integration in teaching and learning. This study aimed to determine the perceptions of English, science, and mathematics teacher aspirants toward AI collaboration with human writers in academic essay writing and to examine differences across subject disciplines. A descriptive–quantitative design was employed, involving 90 undergraduate teacher aspirants equally distributed across the three disciplines. Stratified random sampling was used to ensure adequate representation, and data were collected through a structured questionnaire consisting of 10 items on a 5-point Likert scale with high internal reliability (α = 0,94). The data were analyzed via descriptive statistics and one-way ANOVA. The findings revealed generally positive perceptions of AI's role in writing, particularly in generating outlines, assisting with citations, and supporting editing processes. Significant differences emerged among disciplines, with science majors expressing the most favorable perceptions (M = 4,13), followed by English (M = 3,94) and mathematics majors (M = 3,90). The study concludes that disciplinary orientation shapes openness to AI collaboration in academic writing. It is recommended that teacher education programs integrate structured training on the ethical and effective use of AI, ensuring a balance between technological assistance and the preservation of creativity and critical thinking.

Keywords: Artificial Intelligence; Academic Writing; Teacher Aspirants.

RESUMEN

La integración de la inteligencia artificial (IA) en la educación ha generado un creciente interés, particularmente en su papel dentro de la escritura académica. Si bien estudios previos han examinado el uso de la IA por parte de los estudiantes, se ha prestado poca atención a las percepciones de los futuros docentes sobre la colaboración entre la IA y los escritores humanos en diferentes disciplinas. Abordar esta brecha resulta crucial para preparar a los futuros educadores en la integración responsable de la IA en la enseñanza y el aprendizaje. Este estudio tuvo como objetivo determinar las percepciones de los aspirantes a docentes de Inglés, Ciencias y Matemáticas hacia la colaboración de la IA con escritores humanos en la redacción de ensayos académicos, así como examinar las diferencias entre disciplinas. Se empleó un diseño cuantitativo descriptivo, con la participación de 90 aspirantes a docentes de licenciatura distribuidos equitativamente entre las tres disciplinas. Se utilizó un muestreo aleatorio estratificado para garantizar una representación adecuada y los datos se recopilaron mediante un cuestionario estructurado de 10 ítems en una escala Likert

de 5 puntos, con una alta confiabilidad interna (α = 0,94). Los datos fueron analizados mediante estadística descriptiva y un ANOVA de un factor. Los hallazgos revelaron percepciones generalmente positivas sobre el papel de la IA en la escritura, en particular en la generación de esquemas, la asistencia en citas y el apoyo en procesos de edición. Surgieron diferencias significativas entre disciplinas, siendo los estudiantes de Ciencias quienes expresaron las percepciones más favorables (M = 4,13), seguidos por los de Inglés (M = 3,94) y los de Matemáticas (M = 3,90). El estudio concluye que la orientación disciplinaria influye en la apertura hacia la colaboración con la IA en la escritura académica. Se recomienda que los programas de formación docente integren una capacitación estructurada sobre el uso ético y eficaz de la IA, garantizando un equilibrio entre la asistencia tecnológica y la preservación de la creatividad y el pensamiento crítico.

Palabras clave: Inteligencia Artificial; Escritura Académica; Aspirantes Docentes.

INTRODUCTION

Artificial intelligence has been acknowledged as beneficial across diverse fields, yet its use in education remains contested owing to potential risks and problematic consequences if left unregulated.[1,2] In the area of language education, studies have indicated that AI-powered writing tools enhance grammar checking skills and foster positive learner attitudes.[3,4] Generative AI has also been employed in the production of research proposals.[5,6] However, ethical concerns have led some learners to restrict their reliance on such tools.[7] Various perceptions have also been reported, with many learners expressing distrust in AI responses, whereas others regard them as useful assistants.[8] Divergent views were further observed where educators supported AI use, whereas learners disapproved, citing reduced creativity and critical thinking.[9] These findings suggest that while AI-powered writing tools assist in grammar checking, proofreading, and idea generation, they also raise ethical issues, risks of misuse, and potential overdependence.

In addition, the rise of generative AI has redefined the understanding of academic integrity, shifting emphasis from conventional infractions toward evolving ethical judgments. A survey of 401 students at U.S. universities revealed that ethical beliefs, rather than institutional policies, were the strongest predictors of perceived misconduct and actual AI use in writing.[9] Policy awareness had no significant effect, whereas students who considered AI writing to be cheating were substantially less likely to view it as ethical or engage with it. This finding indicates that many students perceive AI not as plagiarism but as a distinct category of academic conduct, underscoring the importance of ethics education over punitive approaches in addressing its use.

Complementing this perspective, AI-based paraphrasing tools have also been studied in relation to both academic performance and ethical concerns. A qualitative descriptive study revealed five recurring themes concerning their impact: time-saving tools, quality of outputs, originality of works, academic integrity, and students' academic performance. It also identified five recurring factors influencing students' decisions to adopt or refrain from use, namely, determining factors, preferred discipline, the role of academic guidelines and policies, accuracy and trustworthiness, and peer influence.[10] These findings reinforce the need to examine not only the technical utility of AI-powered writing tools but also their ethical implications, aligning with Lund et al.'s[9] argument that beliefs and judgments play a critical role in shaping responsible use.

Cross-national studies further illustrate these dynamics, particularly in the field of technology-enhanced language learning. In China, English language learners recognize AI tools as useful for generating content, justifications, and structured drafts.[11,12] In South Korea, learners value their accuracy in grammar, vocabulary, and flow but acknowledge the need for better error correction and feedback.[13] Similar favorable perceptions were evident in India and Vietnam, alongside calls for tool improvement.[14,15] In the broader context of emerging economies, one large-scale study involving 1 040 prospective teachers examined knowledge, extent of use, perceived influence, and perceptions of AI in academic writing. The findings revealed proficient knowledge and frequent use of AI tools, with 57,6 % of the respondents using AI-generated summaries to simplify complex articles. Regardless of gender, both males and females reported sufficient knowledge, a notable extent of AI use, and positive impacts of AI on academic writing, with significant relationships identified among the variables studied.[16]

In the context of the Philippines, research reflects a multidimensional picture of readiness, attitudes, anxieties, competencies, and practices across different groups of learners and educators. University students reported positive dispositions toward AI in academic writing in terms of usefulness, ease of use, and attitudes, which is consistent with the Technology Acceptance Model.[17] A similar investigation confirmed these patterns, with college students perceiving ChatGPT as intuitive and highly useful for academic work, although satisfaction was dampened by subscription costs, and concerns arose that excessive ease of use might undermine rigor in learning. Perceived usefulness was found to positively correlate with satisfaction and the intention to continue using the tool, highlighting both the promise and limitations of ChatGPT integration.[18] Second-

year teacher education students reported moderately positive attitudes toward ChatGPT across affective, cognitive, and behavioral components, with significant interrelationships among these domains and no gender-based differences.[19] Senior high school students echo these trends, demonstrating positive attitudes toward ChatGPT, particularly in terms of behavioral willingness, with no gender differences and weak correlations across affective, cognitive, and behavioral dimensions.[20]

Within the domain of language education, technology-enhanced approaches have also been explored in the Philippines. Research on prospective English language teachers has examined perceptions of mobile-assisted language learning (MALL), revealing a strong belief in the effectiveness of mobile technologies over traditional methods and support for integrating mobile applications into language learning.[21] Earlier investigations emphasized digital reading habits. Prospective reading teachers were reported to have "satisfactory" digital reading habits, with male students demonstrating stronger habits and a positive relationship between socioeconomic status and reading practices.[22] Subsequent findings on preservice elementary language educators confirmed "satisfactory" digital reading habits but revealed no gender differences.[23] Complementing these findings, preservice teachers also demonstrated considerable digital literacy across multiple dimensions, particularly in ethical and responsible technology use, with strong interconnections among competencies in data processing, integrity, and online conduct.[24] A related strand of language-focused research on ESL education highlighted Filipino secondary teachers' engagement with ChatGPT. The findings revealed moderate knowledge, somewhat positive attitudes, and high positive usage of ChatGPT, with uneven awareness of its features and ethical implications underscoring the need for training and institutional support.[25] A further exploration of BCAED students revealed openness to innovative tools, as digital game-based learning was perceived positively, with no significant gender differences, underscoring the potential of games as complementary learning technologies.[26] Collectively, these studies underscore how technology, particularly AI, mobile platforms, digital literacy, and educational games, is reshaping language learning, literacy, and academic practices in Philippine higher education.

Preservice teachers further demonstrated high levels of technological competence, particularly in TK, TPK, TCK, and TPACK, alongside strong ethical awareness in choosing appropriate AI tools and providing fair assessments.[23] Complementary evidence has indicated high levels of knowledge about generative AI, with fourth-year students and male respondents reporting greater knowledge, whereas third-year students and female respondents expressed greater willingness to adopt AI.[27] Teacher aspirants have also become a focus of investigation. A cross-sectional study among BCAED and BSED social studies students revealed that prospective teachers generally rated AI as "Moderately Acceptable" to "Much Acceptable," with no significant differences across genders, program affiliations, or family incomes. These findings highlight a collective readiness to embrace AI regardless of demographic factors while noting the importance of access to technology and digital literacy in shaping integration.[28] A related investigation of 392 teacher education students reported moderate acceptance, favorable attitudes, and positive perceptions of AI effectiveness, with significant age-group differences showing that older respondents demonstrated higher acceptance levels. Correlations among acceptance, attitude, and perceived effectiveness confirmed the interconnectedness of belief, emotion, and evaluation in shaping readiness for AI integration.[29] Additional evidence has shown that teacher aspirants generally exhibit neutral attitudes toward AI, with differences slightly favoring males and adults,[30] whereas another study reported no statistically significant gender differences, underscoring a cautious stance toward AI adoption.[31] In-service teachers presented more complex findings. Female teachers and those with lower educational attainment reported greater AI-related anxiety linked to sociotechnical blindness,[32] whereas secondary teachers in Zamboanga reported that negative attitudes stemmed from social influence and concerns over AI dominance, although they reported the ability to engage with AI without fear.[33] Another line of inquiry highlights educators' broader engagement with technology beyond AI. Research on teachers' attitudes toward online instruction revealed that they generally expressed moderately favorable views, demonstrated commendable levels of technological competence, and reported minimal barriers to access, with no significant gender differences. Strong correlations revealed that greater technological competence and improved access were associated with more favorable attitudes toward online teaching, underscoring the need for continued professional development and equitable access to technology.[34]

Taken together, global and local studies highlight converging and diverging perspectives on AI in education. Learners and preservice teachers frequently report positive attitudes, readiness, and competence, whereas teacher aspirants and in-service teachers display more neutral or anxious dispositions influenced by demographic and sociogeographical factors. Across contexts, challenges remain concerning uneven knowledge, ethical uncertainties, satisfaction barriers, and the influence of social perceptions. Despite this growing body of research, studies remain fragmented across populations, and little attention has been given to how AI is experienced in combination with human writing, particularly in academic essay contexts. What remains unexplored is how teacher aspirants in different subject disciplines perceive such collaboration. Addressing this gap is essential for clarifying the role of technology-mediated writing in teacher education and for informing

the responsible integration of AI into academic practice.

LITERATURE REVIEW

Academic Essay Writing and Students' Perceptions of AI in Writing

Academic essay writing remains a cornerstone of higher education, serving both as a form of documentation and as a critical avenue for knowledge production. It requires learners to demonstrate the logical and meaningful organization of ideas, backed by evidence and facts that contribute to scholarly discourse.[35] Singh and Lukkarila[36] emphasized that effective academic essays necessitate a comprehensive survey of the literature, situating the essay within the broader pool of information while ensuring clarity and persuasiveness. In addition to being a skill, essay writing functions as a key indicator of academic success, demanding rigor in the construction of arguments and originality in perspective. As Subandowo and Sardi[37] observed, mastery of academic essay writing equips learners not only to meet institutional requirements but also to contribute to ongoing conversations in the scholarly community.

The advent of artificial intelligence has introduced new dynamics into this process, particularly through AI-powered writing tools that support learners in grammar checking, proofreading, and idea generation. While these tools have been shown to foster positive attitudes by enhancing accuracy and efficiency,[3,4] they have also raised concerns regarding ethics, dependence, and the erosion of creativity. Malik et al.[2] underscored that although helpful across fields, AI in education requires careful regulation to mitigate risks. Studies further reveal diverse patterns of use: learners employ AI to draft proposals,[5,6] brainstorm topics,[38,39] and refine language.[40,41] However, limitations remain. Bin-Nashwan et al.[7] noted that ethical reservations often restrict use, whereas Amoozadeh et al.[8] reported mixed perceptions of AI usefulness, with a majority distrusting its responses and a minority viewing it as a helpful assistant. Educators themselves frequently recognize AI's potential, whereas students express apprehension, linking it to reduced creativity and diminished critical thinking.[42]

Cross-national research mirrors these divided views. In China, English language learners consider AI tools effective for generating outlines, justifications, and structured drafts.[11,12] In South Korea, students value their accuracy in grammar and paragraph flow but note limitations in error correction.[13] In India and Vietnam, learners similarly expressed favorable perceptions while calling for improvements in tool reliability.[14] In these contexts, the overall tendency has been to view AI as a useful supplement in academic writing, although it is consistently tempered with concerns about overreliance, ethical implications, and the need for a balance between human judgment and machine output.

Taken together, the literature underscores that while academic essay writing remains a rigorous intellectual practice, AI-powered tools are reshaping how students approach this task. They provide efficiency and linguistic support but simultaneously face new challenges in ethics, authenticity, and intellectual autonomy. Ensuring that learners benefit from these tools without undermining the integrity of academic writing requires proper training, clear guidelines, and an equilibrium between human authorship and technological assistance.

METHOD

Research Design

This study employed a quantitative descriptive–quantitative design to examine teacher aspirants' perceptions of AI collaboration with human writers. The design was used to describe and compare group characteristics through systematic data gathering, coding, analysis, and statistical evaluation.[43,44,45] The variables were measured through standardized instruments, and the data were analyzed via appropriate statistical procedures to determine significant differences among groups.

Respondents of the Study

The study involved 90 undergraduate teacher aspirants from a teacher education program, equally distributed across English, science, and mathematics majors, with 30 participants drawn from each discipline to ensure adequate representation. The respondents were selected via stratified random sampling, with subject discipline serving as the stratum, and simple random sampling was applied within each stratum to provide an equal probability of inclusion and minimize bias.[46] The sample was predominantly women (67 %, n = 60), whereas men comprised 33 % (n = 30), which is consistent with previous studies showing that women continue to dominate the teacher education field.[47,48,49,50,51,52] All participants completed a structured questionnaire designed to capture their perceptions of AI collaboration with human writers in the future.

Research Tool

Data were collected via an online questionnaire distributed via Google Forms. The instrument consists of five parts: (a) study information, (b) informed consent, (c) personal information, (d) perceptions of AI collaboration with human writers in the future, and (e) closing note of gratitude. These sections ensured that the respondents were informed of their rights, clarified the scope of data collection, and guided them in completing the survey.

The instrument was adopted from Malik et al.[2] and was developed through comprehensive literature reviews and pilot testing. Its validity and reliability were established through statistical procedures, yielding an internal consistency coefficient of 0,94. The questionnaire contains 10 items, each measured on a 5-point Likert scale, designed to assess teacher aspirants' perceptions of AI collaboration with human writers in the future.

Data collection procedure

The Google Form survey link was distributed to English, science, and mathematics teacher aspirants through Messenger group chats and direct communication.

Data Analysis Procedure and Statistical Treatment

Data were collected through Google Forms and encoded in Microsoft Excel. The responses were coded by subject discipline, with English coded as 1, Science coded as 2, and mathematics coded as 3. Invalid responses were removed to ensure data accuracy. The dataset was analyzed via SPSS version 25. Normality was assessed through the Shapiro–Wilk test. Descriptive statistics, interpreted via a weighted mean interval scale (1–2 = low, 3 = moderate, 4–5 = high), were used to summarize perceptions. Differences among groups were tested via one-way ANOVA.

RESULTS AND DISCUSSION

Student Perceptions of Future AI-Human Writing Collaboration

Table 1. Descriptive statistics on student perceptions of future AI-human writing collaboration

Item	Mean	Standard Deviation	Interpretation
1. I contend that AI should be employed as a writing helper to assist human authors during the essay writing process.	3,41	1,02	Moderate Agreement
2. AI should be used to discover probable grammatical and spelling problems, with human authors making the ultimate choice on fixes.	3,89	0,85	Moderate Agreement
3. I like AI to supply content recommendations and ideas, while human authors keep creative control over the essay's direction and reasoning.	3,92	0,84	Moderate Agreement
4. AI should assist human authors by suggesting research topics and suitable sources, but human writers should still undertake critical analysis and synthesis.	4,04	0,87	High Agreement
5. I contend that AI-generated outlines can be useful, but human authors should be free to adapt and expand on them to fit their writing style.	4,19	0,87	High Agreement
6. Artificial Intelligence (AI) should be employed for content summarizing and synthesis, supporting human authors in reducing complicated material into brief and comprehensible paragraphs.	3,88	0,82	Moderate Agreement
7. Involving artificial intelligence to assist in correct citation and referencing, but human authors must guarantee the authenticity and appropriateness of the sources mentioned.	4,10	0,88	High Agreement
8. While AI may assist with language translation, human authors should verify the translated content to guarantee context and correctness.	4,28	0,80	High Agreement
9. AI should be used to discover possible areas for improvement during the editing process, while human authors give the final tweaks and improvements.	4,14	0,87	High Agreement
10. I believe that AI and human authors should work in tandem to maximize AI efficiency while keeping human originality and critical thinking in essay writing.	4,14	0,87	High Agreement
Overall	3,99	0,87	High Agreement

The respondents strongly agreed that AI can support various stages of writing, including suggesting research topics and sources (Item 4, M = 4,04), generating outlines (Item 5, M = 4,19), assisting with citations (Item 7, M = 4,10), and identifying areas for improvement during editing (Item 9, M = 4,14). They also agreed with the

idea of AI and human authors working together to maximize efficiency while preserving originality (Item 10, M = 4,14). Slightly lower but still positive ratings were recorded for grammar and spelling (Item 2, M = 3,89) and content recommendations (Item 3, M = 3,92), indicating moderate agreement.

These findings align with previous research highlighting the perceived benefits of AI in writing. Aljuaid[53] reported that both students and educators view AI as a valuable tool for navigating the research process, with educators guiding the effective use of AI in writing development. The present results reinforce that AI can assist human writers in efficiently gathering and organizing information.

Overall, the positive perceptions of AI collaboration among aspiring teachers point to its potential in shaping future writing instruction. Teacher education programs should integrate training on the effective and ethical use of AI tools, emphasizing a balanced approach that maintains creative agency while leveraging AI as a supportive partner in the writing process. The implications of these findings suggest that teacher education programs should integrate structured training on the effective and ethical use of AI tools, ensuring that future educators are equipped to model the responsible use of AI in writing. Moreover, curriculum developers and policymakers should consider incorporating AI literacy and data ethics into teacher training to balance the benefits of AI support with the preservation of originality, critical thinking, and creativity.

Student Perceptions of AI Collaboration across Disciplines

Table 2. Descriptive statistics on student perceptions of AI collaboration across disciplines

Subject Disciplines	N	Mean	Standard deviation	F	Sig.
English Majors	34	3,94	0,95	7,13	0,0008
Science Majors	39	4,13	0,85		
Mathematics Majors	32	3,90	0,95		

As shown in table 2, a significant difference was found in the perceptions of AI collaboration with human writers when they were grouped by subject discipline. The obtained p value of 0,0008 is below the 0,05 alpha level, confirming sufficient evidence to establish significant variation among the groups. Science majors reported the highest mean score (M = 4,13, SD = 0,85), followed by English majors (M = 3,94, SD = 0,95) and mathematics majors (M = 3,90, SD = 0,95), with an overall F value of 7,13. A higher mean for science majors reflects a more favorable perception of AI collaboration, which is consistent with studies that note stronger acceptance of technology in STEM disciplines.[54,55] In contrast, English majors' slightly lower scores may be related to greater emphasis on creativity and human expression in writing, whereas mathematics majors' modest agreement may reflect the limited role of extended writing within their field.

CONCLUSION

The study revealed that teacher aspirants generally hold positive perceptions of AI collaboration with human writers, particularly in supporting research, generating outlines, assisting with citations, and improving drafts through editing. While all the groups expressed agreement on the usefulness of AI in writing, significant differences were observed across the subject disciplines. Science majors demonstrated the most favorable perceptions of AI collaboration, followed by English and mathematics majors. These findings indicate that disciplinary orientation influences how teacher aspirants evaluate the role of AI in academic writing, with those in STEM-related fields showing greater openness to technological integration.

RECOMMENDATIONS

In response to these findings, it is recommended that teacher education programs incorporate structured training on the ethical and effective use of AI in academic writing. Such training should emphasize the balance between technological support and the preservation of creativity, originality, and critical thinking in writing. Discipline-specific approaches may also be developed to address the unique needs and perspectives of English, science, and mathematics majors. Furthermore, institutions should establish clear policies and guidelines for responsible AI use while ensuring equitable access to digital tools. By equipping teacher aspirants with both competence and discernment, education programs can prepare them to guide future learners in navigating the opportunities and challenges of AI-assisted writing.

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