STUDENTS' PERCEPTION ON THE USE OF GENERATIVE ARTIFICIAL INTELLIGENCE TOOLS IN ESSAY WRITING

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Abstract

The role of Artificial Intelligence (AI) in education has evolved from automated systems to Generative AI (GenAI), now seen as collaborative partners for students in academic writing. This study employs a quantitative cross-sectional survey design to investigate the use of GenAI tools by English as a Second Language (ESL) tertiary students in Kota Kinabalu, Sabah, and their perceptions of these tools. An online questionnaire was administered to 136 diploma students, and the responses were analyzed using descriptive statistics. Results indicate widespread awareness and integration of GenAI tools, with students reporting the strongest use of GenAI for content summaries (79.4% agreement) and context-specific word and phrase suggestions (70.6%), suggesting that the technology serves as a linguistic scaffold for second language (L2) learners. Students perceived improvements in error identification (73.5%), clarity and coherence (64.7%) and organization of ideas (64.0%), although agreement regarding gains in self-editing (48.6%) and confidence in their own knowledge of GenAI tools (47.1%) was more modest. Students also expressed a strong desire to maintain autonomy in decision-making during writing, with 77.9% agreeing that human authors should make the final decisions on grammar and spelling corrections. The findings suggest that assessment practices may need to attend to the writing process rather than only the product, and that frameworks promoting a balance of collaboration between humans and AI systems can help students maintain their originality and human voice when producing written work.

Keywords: *Generative Artificial Intelligence, Essay Writing, Tertiary ESL Learners*

INTRODUCTION

The landscape for Artificial Intelligence (AI) in education is rapidly developing from early versions of automated systems to advanced forms of Generative AI (GenAI) models that are working as collaborative and intelligent partners in the learning and teaching environments (Shen & Guo, 2024; Tan et al., 2025). This rapid development is especially apparent in higher education, where technological innovations continue to dramatically shape both teaching practices and assessment methods. One of the most impacted academic disciplines is academic essay writing, which continues to be one of the most common skills assessed in universities as a way to assess students' academic literacy, critical thinking and engagement with disciplinary content.

With recent developments in GenAI, instructional and administrative domains have seen significant advantages. GenAI systems are able to tailor instructional interventions based on learners' proficiency levels, learning speeds and cognitive needs. Furthermore, GenAI models are able to provide continuous dialogic support simulating human interaction, enabling students to overcome linguistic and cognitive barriers without time constraints (Huang & Wang, 2025; Kohnke et al., 2025).

In terms of academic writing, GenAI tools rapidly evolved into sophisticated systems acting as writing assistants, virtual tutors, and digital peers throughout the writing process. Present day technologies include large language models (LLMs) and automated writing evaluation (AWE) systems that facilitate idea generation, paraphrasing, linguistic accuracy and automated essay scoring. By automating routine processes such as grammar checking and citation formatting, GenAI tools reduce students' intrinsic cognitive load, allowing them to dedicate resources to higher-order thinking processes such as argument construction and critical evaluation. This reduction is especially important for English as a Second Language (ESL) learners, serving as a linguistic bridge that translates complex conceptual material into accessible academic English.

However, despite its positive impact, the use of GenAI in higher education has produced the emergence of "AI-giarism" where students utilize GenAI to produce texts they did not create cognitively themselves. (Kohnke et al., 2025). Another challenge is the phenomenon of AI-halucinations, where GenAI generates text that is semantically but factually incorrect. Students lacking sufficient subject matter expertise may accept false information without scrutiny (Alghannam, 2025; Foung et al., 2024 Kim et al., 2024). Furthermore, excessive reliance on GenAI may impede critically thinking (Shen & Guo, 2024) and foster technological dependency, shifting learners from active learners into passive recipients of algorithmic outputs (Bashir & Zhou, 2025; Phan, 2023; Phua et al., 2025). Given these concerns, this study aims to determine the extent to which learners use GenAI tools in academic writing and to examine their perceptions of the impact and future collaboration of GenAI in academic writing.

LITERATURE REVIEW

Artificial Intelligence (AI) has a long-standing presence in scholarly discourse. AI is defined as technology that either emulates or extends certain components of human intelligence via algorithms which model cognitive processes such as learning, adaptability, synthesis, and problem solving (Bashir & Zhou, 2025; Kılıç & Çelik, 2025; Crompton & Burke, 2023; Storozhyk, 2024). Most educational researchers categorise AI between Strong AI and Weak AI. While Strong AI describes human-like reasoning and hypothetical systems, Weak AI functionally focuses on task-specific systems. Although most educational applications are known as Weak AI, their impact is considerable.

Generative Artificial Intelligence (GenAI), on the other hand is another type of classification recently developed in the context of educational discourse. GenAI represents the latest development in the evolution of AI tools in education and is comprised of tools that include chatbots such as ChatGPT and Claude, image generation and editing tools such as DeepSeek, and Gemini which are all powered by Large Language Models (LLMs) that enable them to generate new material across multiple formats such as text, audio, images and video (Lo et al., 2025; Martin et al., 2025). Writing-focused GenAI tools such as Grammarly, Quillbot and Turnitin have emerged as major actors in facilitating contemporary academic writing by supporting grammar correction, automated evaluation and plagiarism-detection functionality (Dong & Shi, 2021; Shen & Guo, 2024).

GenAI has reshaped ESL classrooms, acting as a more personalized, adaptable, and a 'more knowledgeable other' (MKO) assistant that provides both timely and individualized scaffolding for students (Huang & Wang, 2025). GenAI enables educators to develop structured lesson plans, curricula topics, and individualized learning objectives that are based upon students' proficiency level and specific learning needs (Tan et al., 2025). Furthermore, educators can use GenAI to generate discussion prompts for debates, summarize complex academic articles for literature reviews, and create customized exercises that reflect students' current language proficiency (Tan et al., 2025).

The implementation of GenAI for providing formative feedback and assessing student performance are another two areas of instructional practice. Automated Writing Evaluation (AWE) systems allow educators to provide immediate and neutral evaluations of grammatical structures, syntactical arrangements, and stylistic characteristics of student writings (Huang & Wang, 2025; Shen & Guo, 2024; Crompton & Burke, 2023). Research has shown that GenAI-based assessments may provide a better evaluation of the strengths and weaknesses of a student's paper in terms of content, organization, and language use than human evaluations that tend to prioritize content or organization over language use.

In addition to improving assessment efficiency, educators are increasingly framing GenAI as a type of cognitive scaffolding that supports high-level cognitive activity in writing. Instead of simply acting as tools that correct errors in writing, GenAI systems are viewed as cognitive partners that aid learners in developing coherent ideas, constructing arguments, and reflecting on their writing processes (Gao et al., 2025). Consistent with the tenets of Load Reduction Instruction Theory (Martin et al., 2025), teachers are also using GenAI to handle routine aspects of writing such as formatting and drafting. As a result, students are able to allocate their cognitive energy towards analyzing and synthesizing content.

Increasingly, educators are instructing students how to create effective and purposeful input that will yield meaningful analytical responses from AI tools. While these developments represent innovative approaches to pedagogy, much of the previous research has focused on the reported practices of teachers and the perceived advantages of using GenAI tools in the classroom. Specifically, there is a lack of empirical research on how students in higher education ESL writing classrooms define authorship, accountability, and critical judgment when using GenAI-based feedback during academic writing tasks.

While research demonstrates that GenAI tools serve as flexible assistants at each stage of the academic writing process for many students (Foung et al., 2024; Kim et al., 2024; Wang, 2024), most existing evidence concerning these practices has been collected via self-reports. Thus far, it is unclear what effects these practices have had on students' long-term writing development, autonomy in writing, and academic integrity in actual universities.

The first theory that guides this study is Cognitive Load Theory (CLT). This theory provides a strong theoretical base for assessing how people learn under cognitive load. CLT illustrates the dynamic relationship between working memory and long-term memory and asserts that the way people learn is influenced by the cognitive load imposed through instructional design (Martin et al., 2025; Sweller, 2024). Working memory is the conscious cognitive environment where learners focus their attention, manipulate information, and actively think (Martin et al., 2025). Conversely, long-term memory stores knowledge in the form of schemas.

CLT identifies three separate levels of cognitive load that all impact learner performance: intrinsic cognitive load, extraneous cognitive load and germane cognitive load. Intrinsic cognitive load measures the degree of interactive elements needed to understand those materials (Martin et al., 2025; Mayer & Moreno, 2003). Extraneous cognitive load results from how information is presented and represents the excessive or unnecessary cognitive effort placed on learners that does not enhance learning (Martin et al., 2025; Mayer & Moreno, 2003). Germane cognitive load is the cognitive effort associated with developing and automating schemas in long-term memory and is considered essential to achieving deep and lasting learning (Martin et al., 2025).

Studies have shown that novice learners derive significantly more benefit from studying worked out examples rather than attempting to solve equivalent problems alone because worked examples reduce both element-interactivity and cognitive burden (Sweller, 2024). However, there are cases where instructional supports lose their value as learners gain expertise. These instances give rise to the expertise-reversal effect.

Another theory that guides this study is Technology Acceptance Model (TAM). This theory explains students' and educators' beliefs, attitudes and intentions regarding their acceptance and utilization of GenAI tools within education settings (Abdelhalim et al., 2025; Huang & Mizumoto, 2024). Variables such as self-efficacy, technology anxiety, perceived enjoyment and mental load significantly influence these perceptions and acceptance. Furthermore, technological features such as human-likeness, interactivity and perceived intelligence are particularly relevant to GenAI acceptance. Facilitating conditions like institutional support, infrastructure, and technical assistance, enable or constrain actual technology use, enable or constrain the actual usage of educational technology, and concerns about trustworthiness, data protection and ethics are increasingly informing acceptance of GenAI technologies (Abdelhalim et al., 2025).

Most recently, research in ESL contexts has extended TAM to include instructional beliefs as moderator variables. For example, ESL instructors who endorse constructivist beliefs and prefer student-centered instruction that emphasizes collaboration and creativity are more likely than other teachers to view GenAI tools as both effective and easy to use as well as see them as means to foster autonomy and knowledge creation (Abdelhalim et al., 2025). On the contrary, ESL instructors who endorse transmissionist

beliefs and emphasize control and authority over the classroom are typically less accepting or less enthusiastic in their engagement with educational technologies (Abdelhalim et al., 2025). Overall, these findings suggest that for educational technology to be implemented effectively and sustainably, educators must engage with technology in ways that reflect their instructional values.

METHODOLOGY

This study employed a quantitative, cross-sectional survey design to determine how students use GenAI tools in academic writing and whether they view these tools positively or negatively. The respondents of this study were 136 diploma-level students in one of the higher education institutions located in Kota Kinabalu, Sabah. Using a purposive sampling model, the study integrated aspects of maximum variation sampling in order to obtain a diverse number of perspectives. The respondents were sampled from a variety of disciplines, and varying degrees of English proficiency and familiarity with GenAI tools.

The online questionnaire for this study was adapted from Malik et al. (2023) to ensure conceptual consistency with prior empirical research on GenAI-assisted academic writing. Structurally, the online questionnaire had four major sections. The first section gathered demographic information including students' genders, ages and fields of study. The second section surveyed students' knowledge of GenAI tools for essay writing and the frequency and extent of their use of these tools in academic writing (14 items). The third section examined students' perceptions of the impact of GenAI on their essay writing (seven items), and the fourth section examined their perspectives on future collaboration between human authors and GenAI (seven items). All items in the second to fourth sections were rated on a five-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree), giving 28 Likert-scale items in total. The questionnaire was also tested for its reliability and validity before administering formally to the respondents.

Data was collected via an online Google Forms questionnaire, allowing for efficient access to participants. Responses were cleaned and analyzed using SPSS software. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to establish general patterns and address the research objectives. The study adhered to ethical principles, securing institutional approval, informed consent, participant anonymity, and secure data storage.

FINDINGS & DISCUSSION

Demographic Profile of Respondents

The research was based on an empirical investigation of 136 diploma students. Their views about using GenAI as part of essay writing activities were collected through an online questionnaire. The demographics of this group, as illustrated in Table 1 on the following page, were summarized by gender, age range and field of study. Of those surveyed, 61.8% identified themselves as male, whereas 38.2% were female. In addition, 62.5% of respondents were in the 18–20 age category and 30.9% in the 21–23 age category, while the remaining 6.6% were in the 24–26 age category.

The respondents were primarily concentrated in the Accounting programme which represented 40.4% of all respondents. Following this was Business Administration with 21.3%, Early Childhood Education with 14.0% and Software Engineering at 11.8%. The remaining respondents of 12.5% came from other various areas of study including Marketing, Banking & Finance, Systems Engineering and Hotel Management.

Table 1: Demographic information of the participants (*N* = 136)

Demographic	Value	Frequency	Percentage
Gender	Male	84	61.8
	Female	52	38.2
Age Range	18-20	85	62.5
	21-23	42	30.9
	24-26	9	6.6
Field of Study	Accounting	55	40.4
	Business Administration	29	21.3
	Early Childhood Education	19	14.0
	Software Engineering	16	11.8
	Other fields (Marketing, Banking & Finance, System Engineering, Hotel Management)	17	12.5

Knowledge of GenAI for Essay Writing

Table 2 presents students' knowledge of GenAI tools for essay writing. Item means ranged from 3.52 to 4.06, with awareness of GenAI tools receiving the highest ratings. Most respondents (69.1%) agreed that they were aware that GenAI-powered writing tools for essays exist (*M* = 4.06, *SD* = 0.91), and an even larger proportion (76.5%) were aware of GenAI writing helpers that provide context-specific word and phrase suggestions (*M* = 4.00, *SD* = 0.78). Awareness of GenAI-powered services that recommend essay topics and sources was also high (*M* = 3.75, *SD* = 0.92).

Table 2: Knowledge of GenAI for essay writing

Attributes	**M**	**SD**
I'm aware that GenAI-powered writing tools for essays exist.	4.06	0.91
In my essay writing, I employed GenAI- powered grammar and spelling checkers.	3.79	1.08
I'm familiar with GenAI-based plagiarism detection techniques that I may use to ensure the originality of my academic work.	3.66	1.03
I'm aware of GenAI writing helpers that provide context-specific word and phrase suggestions to improve essay writing.	4.00	0.78
I've used GenAI-generated essay outlines to efficiently arrange my ideas before writing.	3.76	1.06
I'm aware of GenAI-powered services that recommend essay topics and sources for essay preparation.	3.75	0.92
I'm confident in my knowledge of GenAI-powered writing tools for essay writing.	3.52	0.97

Students also reported having used GenAI tools in their own essay writing. Approximately two-thirds agreed or strongly agreed that they had employed GenAI-powered grammar and spelling checkers (*M* = 3.79, *SD* = 1.08) and GenAI-generated essay outlines to arrange their ideas (*M* = 3.76, *SD* = 1.06), while 58.8% were familiar with GenAI-based plagiarism detection techniques (*M* = 3.66, *SD* = 1.03). In contrast, students were comparatively less certain about their own mastery of these tools. Only 47.1% agreed that they were confident in their knowledge of GenAI-powered writing tools (*M* = 3.52, *SD* = 0.97), the lowest mean in Table 2, and 42.6% selected the neutral option. The results therefore indicate that GenAI tools were widely recognized and used by the students, but that their confidence in their own knowledge of these tools was only moderate.

Frequency and Extent of GenAI Usage for Essay Writing

Table 3 presents the frequency and extent of students' use of GenAI tools in essay writing. Item means ranged from 3.49 to 4.04, indicating that students drew on GenAI at several stages of the writing process. The strongest agreement was for GenAI-generated content summaries as an aid to understanding difficult topics, with 79.4% agreeing (*M* = 4.04, *SD* = 0.98). Context-specific word and phrase suggestions (*M* = 3.90, *SD* = 0.96) and GenAI-generated essay outlines for arranging ideas before writing (*M* = 3.74, *SD* = 1.00) were also widely used. In addition, 61.0% reported examining and enhancing their work using GenAI-powered grammar and spelling checkers (*M* = 3.74, *SD* = 1.00).

Table 3: Frequency and extent of GenAI usage for essay writing

Attribute	*M*	*SD*
I examine and enhance my works using GenAI- powered grammar and spelling checkers.	3.74	1.00
I use GenAI-based plagiarism detection technologies to assure the originality of my essay writing.	3.51	1.05
GenAI-generated content summaries assist me in understanding difficult topics in my writings.	4.04	0.98
GenAI-powered writing helpers provide context-specific word and phrase suggestions to help me improve my essay writing.	3.90	0.96
GenAI-powered systems suggest subjects and suitable sources to help me prepare my essay.	3.65	1.00
GenAI tools assist me in tailoring the style and tone of my essays to certain academic criteria.	3.49	1.00
I utilize GenAI-generated essay outlines to successfully arrange my ideas before writing.	3.74	1.00

Use of GenAI for source recommendation, plagiarism checking and stylistic support was less pronounced. A total of 58.1% agreed that GenAI-powered systems suggested subjects and suitable sources to help them prepare their essays (*M* = 3.65, *SD* = 1.00), and 51.5% used GenAI-based plagiarism detection technologies to assure the originality of their essays (*M* = 3.51, *SD* = 1.05). The lowest level of agreement (44.9%) concerned the use of GenAI to tailor the style and tone of essays to academic criteria (*M* = 3.49, *SD* = 1.00). Overall, students most strongly endorsed GenAI for comprehension support through summaries and for lexical support, followed by grammar checking and outline generation, which together point to substantial use of GenAI tools by diploma students to support their academic writing.

Impact of GenAI on Essay Writing

Table 4 presents students' perceptions of the impact of GenAI on their essay writing. 73.5% agreed that GenAI-powered grammar and spelling checks had contributed to their writing ability growth (*M* = 3.89, *SD* = 0.93). Perceived gains in the clarity and coherence of students' work (*M* = 3.74, *SD* = 0.87), in the organization of ideas through GenAI-generated outlines (*M* = 3.77, *SD* = 0.94) and in vocabulary and writing quality through context-specific word and phrase choices (*M* = 3.76, *SD* = 0.91) were similarly positive.

Table 4: Impact of GenAI on essay writing

Attribute	*M*	*SD*
Using GenAI technologies in my essay writing has enhanced my general writing ability.	3.65	0.92
GenAI-powered grammar and spelling checks have assisted me in identifying and correcting writing errors, which has contributed to my writing ability growth.	3.89	0.93
Using GenAI writing aids has increased the clarity and coherence of my works, favorably improving my writing style.	3.74	0.87
GenAI-generated essay outlines have helped me arrange my ideas more efficiently and enhance the organization of my work.	3.77	0.94
The use of GenAI tools in my essay writing has forced me to critically assess and critique my own work, which has resulted in increased self-editing abilities.	3.58	0.95
AI technologies that provide context- specific word and phrase choices have helped me broaden my vocabulary and enhance the quality of my writing.	3.76	0.91
I feel that employing AI technologies has improved my writing abilities and greatly impacted my essay writing.	3.80	0.96

Furthermore, 61.8% agreed that GenAI had enhanced their general writing ability (*M* = 3.65, *SD* = 0.92), and 65.4% felt that employing AI technologies had improved their writing abilities and greatly impacted their essay writing (*M* = 3.80, *SD* = 0.96). The weakest perceived impact concerned self-editing: only 48.6% agreed that using GenAI had forced them to critically assess and critique their own work, resulting in increased self-editing abilities (*M* = 3.58, *SD* = 0.95), while 43.4% selected the neutral option, the largest neutral share of any item in Table 4. These data indicate that students generally perceived GenAI tools to have a positive impact on their essay writing, particularly at the level of accuracy, clarity and organization, but were less certain that the tools strengthened their own self-editing practices.

Students' Perspectives on Future Human-GenAI Collaboration

Table 5 presents students' perspectives on future collaboration between human authors and GenAI in essay writing. Support for GenAI as a general writing helper was positive but more tempered than support for specific, human-controlled uses: half of the respondents agreed that GenAI should be employed as a writing helper to assist human authors (*M* = 3.49, *SD* = 1.09).

By contrast, there was a strong preference for preserving human autonomy. A clear majority agreed that GenAI should be used to discover possible grammatical and spelling problems, with human authors making the final decision on corrections (*M* = 4.04, *SD* = 0.80), and 69.1% favored GenAI supplying content recommendations and ideas while human authors keep creative control over the direction and

reasoning of the essay (*M* = 3.84, *SD* = 0.90). Similarly, 69.1% agreed that GenAI-generated outlines can be useful but that human authors should be free to adapt and expand on them to fit their writing style (*M* = 3.99, *SD* = 0.89).

Table 5: Students' perspectives on future human-GenAI collaboration

Attribute	*M*	*SD*
I contend that GenAI should be employed as a writing helper to assist human authors during the essay writing process.	3.49	1.09
GenAI should be used to discover probable grammatical and spelling problems, with human authors making the ultimate choice on fixes.	4.04	0.80
I like GenAI to supply content recommendations and ideas, while human authors keep creative control over the essay's direction and reasoning.	3.84	0.90
I contend that GenAI-generated outlines can be useful, but human authors should be free to adapt and expand on them to fit their writing style.	3.99	0.89
GenAI should be employed for content summarizing and synthesis, supporting human authors in reducing complicated material into brief and comprehensible paragraphs.	3.76	0.90
GenAI should be used to discover possible areas for improvement during the editing process, while human authors give the final tweaks and improvements.	3.82	0.91
I believe that GenAI and human authors should work in tandem to maximize AI efficiency while keeping human originality and critical thinking in essay writing.	3.92	1.00

With respect to editing and synthesis, 64.0% agreed or strongly agreed that GenAI should be used to discover possible areas for improvement during editing, with human authors giving the final tweaks and improvements (*M* = 3.82, *SD* = 0.91), and 63.2% supported the use of GenAI for content summarizing and synthesis (*M* = 3.76, *SD* = 0.90). Finally, 65.5% agreed that GenAI and human authors should work in tandem to maximize AI efficiency while keeping human originality and critical thinking in essay writing (*M* = 3.92, *SD* = 1.00); this item received the largest share of 'strongly agree' responses in Table 5. Overall, the results show consistent support for a collaborative model in which GenAI assists but human authors retain final authority.

CONCLUSION

Limitations of the Research

While this study yields significant insights into the integration of GenAI within tertiary ESL writing, its conclusions must be interpreted with an awareness of certain inherent limitations. The primary limitation of this study is the strict geographical and institutional focus. Since this study was limited to one specific site, a single local private university in Kota Kinabalu, Sabah, Malaysia, the findings are specific to the extremely localized academic culture of this particular site. All aspects of the site, including the site-specific digital infrastructure, site-specific academic support systems, and site-specific ratio of students to instructors, contribute to how GenAI is viewed, used, and integrated. Thus, the results might be deeply embedded in the local culture, economy, and regionality of Kota Kinabalu, which includes such factors as unique linguistic profiles and varying levels of prior language proficiency that would not exist similarly throughout all other types of tertiary settings.

Furthermore, the institutional bounds on this research were compounded by its sampling and design. The study employed a quantitative, cross-sectional survey of 136 diploma students studying eight different majors, guided by Cognitive Load Theory (CLT) and the Technology Acceptance Model (TAM), and used nonprobability purposive and maximum variation sampling procedures. While these sampling strategies allow for perception-oriented data across multiple academic disciplines, there was no randomization based on probability. Therefore, the sample did not have the ability to eliminate selection bias. That is, while the sampled students came from a range of departments, they were likely to have baseline characteristics that vary from those of the broader student population, for example, high levels of tech savvy and differing cognitive abilities, therefore limiting the external validity and generalizability of the quantitative data set. In addition, because the study was cross-sectional and the analysis was limited to descriptive statistics, it can describe patterns of knowledge, usage and perception at a single point in time, but it cannot establish causal relationships, examine change over time, or test differences between subgroups of students such as those defined by gender, age or field of study. Finally, the closed-ended questionnaire captured the direction and strength of students' views but not the reasons behind them.

In addition to these issues, the research relied heavily on self-reporting measures in the survey instrument. As GenAI becomes increasingly polarizing in higher education, many of its applications remain fluid and highly sensitive. Because participants were reporting on their own behavior with respect to a technology that has been widely equated with academic dishonesty, the data collected during this study was vulnerable to social desirability bias. Participants may have either intentionally under-reported the frequency and extent of their usage of GenAI tools or may have intentionally over-reported their independent writing skills because they believed that would be seen as acceptable behavior by their institutions. In addition to concerns about plagiarism policies and subsequent sanctions for violating these policies, even with strong assurance of anonymity and confidentiality, students' fears of being surveilled or policed academically may also influence their answers. These psychological barriers created a subtle but powerful factor that could potentially mask the degree to which GenAI is relied upon and the level of cognitive load experienced by members of the student cohort. Thus, all findings generated from this study should be considered within these protective boundaries that participants establish.

Recommendations for Further Research

To expand upon the foundational knowledge developed throughout this study, several areas of potential future academic research are suggested to further develop our understanding of GenAI utilization in higher education. As a result of this study being dependent on self-reporting and confined to a local focus based on a single private university in Kota Kinabalu, the first two areas of future research would need to emphasize methodological approaches that increase the internal validity and generalizability of GenAI utilization in higher education.

The first opportunity is to incorporate larger, randomized, probability-based samples from multiple types of institutions that include both public and private universities, as well as multiple disciplines into future research. This increased sample size and representation will allow researchers to determine whether the patterns of GenAI use and the preference for retaining autonomy observed in the current study are applicable to a greater number of students, and will permit inferential analyses such as comparisons by gender, age, field of study and English proficiency. The second area of opportunity is to use longitudinal frameworks with objective performance metrics in place of self-reported measures of GenAI utilization. The longitudinal framework provides researchers with an opportunity to evaluate changes in writing ability using artifact-based analysis, over time. By doing so, researchers will be able to provide an accurate assessment of whether GenAI utilization results in long-term cognitive changes (e.g., loss of language skills), or whether it enables students to independently produce high quality written work.

Additionally, there are opportunities to extend the application of CLT and the TAM presented in this study to other levels of higher education, specifically, the inclusion of undergraduate and graduate student cohorts. Incorporating these additional levels of education will provide researchers with insight into how evaluations of metacognitive processes evolve as students advance through their educational careers. Because a closed-ended survey cannot explain why students hold the views they do, future studies could

also complement the present findings with qualitative evidence, such as interviews or focus groups, to examine the reasons behind students' perceptions, particularly the neutral responses on self-editing. Lastly, building upon the findings of this study, future research should include empirical assessments of institutional AI prototypes and formal pedagogical interventions. These assessments may take the form of either experimental or action-research studies designed to compare the efficacy of formative AI tools versus commercially available direct-fix engines. If conducted effectively, this type of research will provide educators and policymakers with evidence-based information that they can use to develop collaborative institutional AI policy that supports both educators and students.

Conflict of Interest

The authors declare no conflict of interest.

Author Contribution

Author 1 handled the research methodology, performed statistical analysis and interpreted the results. Author 2 prepared the literature review, research methodology and oversaw the writing.

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Ethics Statement

This study was conducted following ethical guidelines. Informed consent was obtained from all participants.

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