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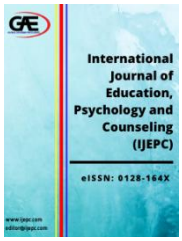

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DEEPSEEK FOR ACADEMIC WRITING: ODL TERTIARY STUDENTS' ACCEPTANCE THROUGH THE TECHNOLOGY ACCEPTANCE MODEL (TAM)

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Abstract:

Intelligence (AI) writing tools are increasingly being adopted in higher education to support students in producing structured and high-quality academic texts. Despite these technological advances, many students in Open and Distance Learning (ODL) programs struggle with organising ideas, maintaining clarity, and adhering to academic writing conventions without sufficient guidance. Therefore, this study aims to examine ODL tertiary students' perceptions of DeepSeek for academic writing through the lens of the Technology Acceptance Model (TAM) and to explore the challenges they encounter when using the platform. A qualitative design was employed, involving ten postgraduate TESL students from a Malaysian public university in Selangor. Data were collected through semi-structured interviews, open-ended questionnaires, and WhatsApp discussions, and were analysed thematically. Findings revealed that participants perceived DeepSeek as useful for improving writing clarity, refining language, and generating ideas, and found it accessible and intuitive, fostering positive attitudes and strong intentions to continue using it. Nonetheless, challenges such as citation inaccuracies, over-reliance, and occasional misinterpretation of outputs were reported. The study concludes that AI writing tools like DeepSeek can enhance distance education writing instruction, offering practical insights for educators, instructional designers, and developers seeking to optimise technology-supported academic learning.

Keywords:

Artificial Intelligence (AI), Academic Writing, Technology Acceptance Model (TAM), Open and Distance Learning (ODL), DeepSeek

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Introduction

Academic writing plays a central role in higher education, as it requires students to think analytically, construct structured arguments, and communicate ideas based on evidence (Zakaria et al., 2021; Azmar & Razali, 2025). In Malaysia, students must develop proficiency in academic writing to complete research assignments, essays, and theses successfully. However, learners in Open and Distance Learning (ODL) programmes, which provide flexible, self-directed study through digital platforms without regular physical attendance (Altbach et al., 2009; Saidi et al., 2021), often face additional challenges. They must manage their academic responsibilities with limited instructor feedback, minimal peer support, and heavy reliance on independent learning strategies (Kamble et al., 2021; Abdullah et al., 2022). Consequently, ODL students frequently struggle with organising ideas, maintaining clarity, adopting an academic tone, and using consistent referencing, which can negatively affect their performance (Paramasivam et al., 2021). Although workshops, online tutorials, and reference tools provide some assistance, they may not fully meet the personalised needs of these learners (Saidi et al., 2021).

To address these challenges, educators have increasingly turned to digital tools powered by Artificial Intelligence (AI) to support academic writing. These tools help students refine language, summarise content, format citations, correct grammar, and paraphrase, thereby promoting greater independence in completing writing tasks (Khalifa & Albadawy, 2024; Mohebbi, 2025). Nevertheless, general-purpose AI models such as ChatGPT, while producing fluent and coherent text, often generate unreliable content, fabricated citations, and superficial arguments (Walters & Wilder, 2023; Isiaku et al., 2024; Jan, 2025). As a result, AI platforms specifically designed for academic writing have attracted attention for their ability to provide reliable, accurate, and task-specific support. DeepSeek exemplifies such a platform, as it enhances research-based content, improves citation accuracy, and assists students in developing literature-focused arguments. Despite its potential, few studies have examined how Malaysian ODL students perceive and use DeepSeek.

This study applies the Technology Acceptance Model (TAM; Davis et al., 1989) to investigate students' acceptance of DeepSeek. TAM's four constructs; Perceived Ease of Use, Perceived Usefulness, Attitude Toward Use, and Behavioural Intention to Use, allow researchers to analyse the factors that influence learners' adoption and continued use of technology (Noh et al., 2021; Rosli et al., 2022). Accordingly, this study examines how ODL students perceive the usability and value of DeepSeek, as well as the benefits and challenges they experience in using it. Unlike prior quantitative studies, this research focuses on capturing students' perspectives through qualitative insights. The study is guided by the following research questions:

1. How do ODL tertiary students perceive the use of DeepSeek in their academic writing based on TAM constructs:

    a. Perceived Usefulness
    b. Perceived Ease of Use
    c. Attitude Toward Use
    d. Behavioural Intention to Use

2. What challenges do ODL tertiary students experience when using DeepSeek for academic writing?

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Literature Review

Academic Writing Challenges among ESL/ODL Students

Academic writing in the context of Malaysian tertiary students who are enrolled in Open and Distance Learning (ODL) refers to the ability to construct formal, well-organised, and evidence-based course-related assignments and essays that reflect critical thinking and academic competence (Ahmed et al., 2024). This includes producing course assignments, analytical or argumentative essays, research proposals, and full research papers or journal articles, all of which require logical structure, coherent argumentation, and accurate referencing (Walková & Bradford, 2022). It plays a crucial role in determining students' academic success, especially for those who are learning independently without regular face-to-face interaction. However, many ESL learners in ODL settings continue to face substantial challenges in their writing tasks. These include weaknesses in grammar, limited academic vocabulary, disorganised structure, and poor coherence that affect the clarity and quality of their writing (Abdullah Kamal, 2024; Paramasivam et al., 2021). Beyond language problems, students also encounter psychological and cognitive struggles such as anxiety, lack of motivation, and low self-confidence, which affect their ability to express ideas effectively and independently (Aidit et al., 2023; Yan, 2024). In addition, language interference from the first language often results in awkward phrasing and sentence construction that do not meet academic expectations (Abdullah Kamal, 2024). The absence of timely feedback and limited access to support in ODL environments have further increased these challenges and negatively impacted students' academic writing performance (Paramasivam et al., 2021). These ongoing issues highlight the need to introduce academic support tools that can assist students in improving their language accuracy, text organisation, and overall writing performance in flexible learning environments.

AI Tools in Academic Writing

The emergence of AI writing tools has sparked considerable academic inquiry, particularly in contexts involving ESL students and remote learners. ChatGPT, for example, has demonstrated potential to enhance writing fluency, idea generation, and structural coherence through immediate feedback, which leads to measurable improvements in grammar and organisation (Pariyanto & Tungka, 2025). Studies in Malaysian tertiary settings have reported that ChatGPT use reduced writing time and boosted student confidence (Mahda et al., 2024; Abd Hadi, 2024). Grammarly and QuillBot have similarly been shown to improve vocabulary usage, grammar accuracy, and paraphrasing ability, while fostering more positive attitudes toward writing (Raheem et al., 2023). Despite these advantages, limitations have surfaced: ChatGPT has frequently produced fabricated citations and misleading content, and lacks a consistent academic tone, raising concerns about reliability (Walters & Wilder, 2023; Jan, 2025). Users also reported feeling overwhelmed by conflicting suggestions, which hindered ownership over their writing (Isiaku et al., 2024). QuillBot's paraphrasing tools were praised for accessibility, yet some learners reported subscription barriers and limited ability in maintaining original tone (Thuratham, 2025). In response to these critiques, DeepSeek has gained attention as an academic-specific AI tool trained on research-based corpora that delivers citation-aware paraphrasing and improved factual consistency compared to general-purpose models (Shah et al., 2025). While some bias concerns remain (Shah et al., 2025), DeepSeek's superior reference accuracy and domain-specific focus position as a promising writing support tool for ODL tertiary students who require reliability and scholarly alignment.

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DeepSeek as an Emerging Academic Writing Tool

DeepSeek is an artificial intelligence tool that was introduced in late 2024 and is designed to support academic writing tasks such as citation-aware paraphrasing, reference generation, sentence restructuring, and grammar correction (Deng et al., 2025). The model was developed using a research-based corpus that prioritises scholarly tone and factual accuracy, which makes it distinct from general artificial intelligence platforms such as ChatGPT (Dandage, 2025). In comparative studies, DeepSeek was found to outperform other large language models in the accuracy of bibliographic references and in maintaining formal tone and structural clarity, which are essential for academic writing (Dandage, 2025; Maiti et al., 2025). While ChatGPT is often described as more flexible and creative in generating responses, it has been criticised for producing hallucinated citations and vague content that do not meet academic standards (Walters & Wilder, 2023; Isiaku et al., 2024; Jan, 2025). A classroom-based investigation conducted by Antara and Anggreni (2025) demonstrated that DeepSeek was able to identify common grammatical errors among English as a Second Language learners such as article misuse, subject-verb disagreement, and incorrect prepositions, which enabled learners to make targeted revisions. Despite these promising outcomes, DeepSeek remains underexplored in current literature, especially in educational research involving second language learners or open and distance learning students. The lack of qualitative inquiry into how students perceive DeepSeek's ease of use and usefulness indicates a clear research gap. Moreover, there are concerns related to safety risks, possible cultural or linguistic bias, and limited adaptability in informal writing tasks, which must be considered in evaluating its educational relevance (Zhai, 2025). Therefore, this study addresses these limitations by examining how Malaysian tertiary students that study in open and distance learning environments perceive the use of DeepSeek as an academic writing support tool through the lens of the Technology Acceptance Model.

Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM), which was developed by Davis (1989) and further extended by Bagozzi, Davis, and Warshaw (1989), is one of the most influential frameworks for explaining how individuals accept and use new technologies. This model identifies two core constructs that drive user acceptance: Perceived Usefulness (PU), which is defined as the degree to which an individual believes that using a particular technology would improve their task performance, and Perceived Ease of Use (PEOU), which is defined as the degree to which a person believes that using the technology would require minimal effort (Davis, 1989). These two constructs determine the user's Behavioural Intention (BI) to adopt the technology, with PEOU having both a direct influence on PU and an indirect influence on BI (Bagozzi, Davis, and Warshaw, 1989; Venkatesh and Davis, 2000). In the context of educational technology, TAM has been extensively applied to evaluate students' adoption of learning management systems, digital writing tools, and artificial intelligence-based platforms, including those used in academic writing (Tan, 2024; Shofiah & Putera, 2024). This model becomes especially relevant in open and distance learning (ODL) environments, where students engage in self-directed learning and often depend on digital tools to complete academic writing tasks (Urip et al., 2025). For this study, TAM provides the theoretical lens to examine how ODL tertiary students in Malaysia perceive the use of DeepSeek, which is an academic writing tool that integrates citation assistance, factual accuracy, and formal tone. Specifically, the study investigates whether students find DeepSeek useful in enhancing the quality and efficiency of their academic writing, and whether they find it easy to use in their independent learning context.

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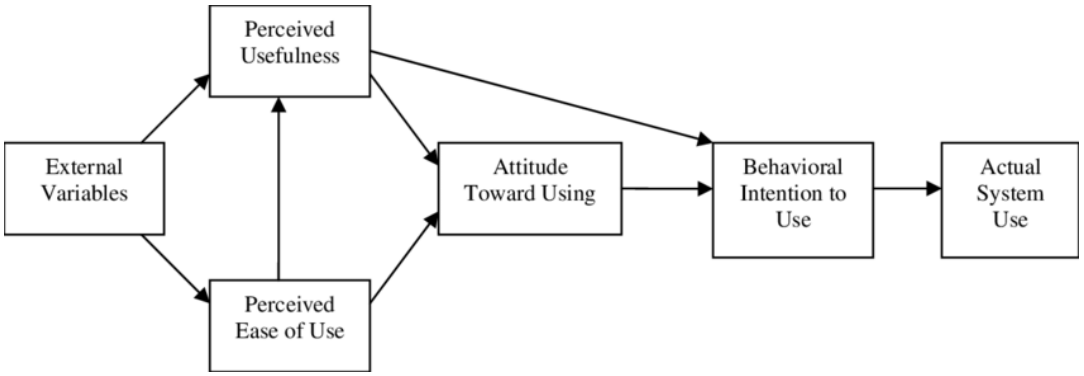
Figure 1: Adapted TAM Framework for DeepSeek Adoption Among ODL Students



Methodology

Research Design

The study adopted a qualitative research design, which is appropriate for exploring students' perceptions of AI-based tools in the under-researched context of Open and Distance Learning (ODL). This approach enabled an in-depth understanding of learners' meanings and interpretations of DeepSeek that quantitative methods could not capture effectively (Merriam & Tisdell, 2016; Creswell & Poth, 2018). Qualitative inquiry allowed a context-aware examination of behaviours, attitudes, and cognitive responses that shaped students' writing experiences (Creswell & Poth, 2018; Silverman, 2021). Scholars have noted that such methods are well-suited for studies of technology adoption because learner autonomy, digital access, and academic readiness often influence engagement (Harrison et al., 2017; Lincoln & Guba, 1985). These issues were particularly relevant for ODL learners who faced limited real-time feedback and reduced academic support (Abdullah et al., 2022; Kamble et al., 2021). Although AI-assisted writing tools gained traction in Malaysia, prior studies largely employed quantitative or mixed-methods designs that emphasised performance rather than user experience (Tan et al., 2020; Nordin et al., 2022; Mahda et al., 2024). Emotional, cognitive, and experiential aspects remained insufficiently addressed, especially in relation to academic-specific tools like DeepSeek, which existing literature rarely examined compared to more common platforms such as ChatGPT, Grammarly, and QuillBot (Raheem et al., 2023; Walters & Wilder, 2023; Mariappan et al., 2024). Through examining students' experiences through constructs related to perceived usefulness, perceived ease of use, attitude toward use, and behavioural intention, this study incorporated a structured lens aligned with the Technology Acceptance Model and presented a detailed account of how Malaysian ODL learners perceived DeepSeek as a support system for their academic writing.

Participant and Settings

This study employed purposive sampling to select ten participants from a cohort of 30 postgraduate students enrolled in the Master of Education (TESL) programme at a well-established public university in Selangor, Malaysia. The participants were actively engaged in academic writing tasks such as research papers, proposals, and coursework assignments that required structured, citation-based, and critically informed writing. Participants were selected based on three criteria: (1) active enrolment in the TESL ODL programme, (2) prior experience with AI-assisted writing tools such as ChatGPT, Grammarly, or QuillBot, and (3) ongoing

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engagement with English academic writing tasks within their programme. TESL students were chosen because their programme emphasises formal academic writing skills that align with the objectives of this study, which made them suitable to provide insights into the use of DeepSeek for academic writing.

The TESL programme at this university is delivered through an Open and Distance Learning (ODL) system, which emphasises learner autonomy and digital engagement without mandatory physical attendance (Altbach et al., 2009; Saidi et al., 2021). The ODL experience involves both asynchronous and synchronous learning activities. Asynchronous activities include reading lecture notes, accessing resources on the Learning Management System (LMS), completing quizzes, and submitting coursework assignments. Synchronous learning occurs through scheduled online meetings on Zoom or Google Meet, which are recorded to allow students to review sessions at their convenience. This flexible structure enables students to engage with course content, practice academic writing, and receive feedback digitally, which makes the programme particularly suitable for exploring perceptions of AI-assisted writing tools like DeepSeek in supporting academic writing.

Research Instruments

This study employed a triangulated qualitative data collection approach, which comprised semi-structured interviews, open-ended questionnaires, and WhatsApp-based discussions, to capture TESL postgraduate students' perceptions of DeepSeek for academic writing. The semi-structured interviews, as the primary instrument, consisted of eight items addressing TAM constructs (Perceived Usefulness, Perceived Ease of Use, Attitude Toward Use, Behavioural Intention) and challenges in using the tool. Interviews were conducted individually via Google Meet, lasted 30–45 minutes, and were audio-recorded with consent. The open-ended questionnaire included six items aligned with TAM and challenges, which allowed participants to provide written reflections via Google Forms. The WhatsApp discussions (*see Figure 1*), conducted over two weeks, captured participants' real-time or reflective engagement with DeepSeek through short texts, screenshots, or voice notes guided by prompts about usability, helpful features, and difficulties encountered.

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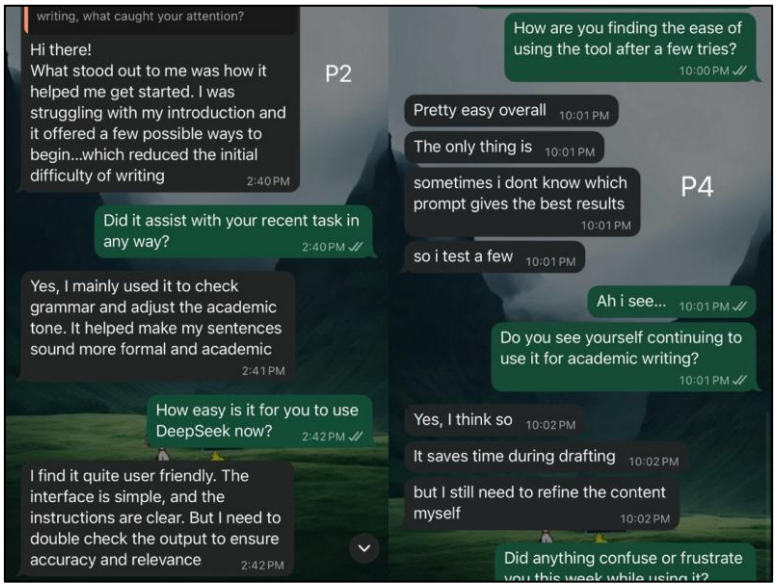
Figure 1: Sample Excerpt from WhatsApp-Based Discussion



The study was carried out over four weeks: participants were introduced to DeepSeek in Week 1 and used it for their assignments, while Week 2 involved WhatsApp discussion. In Week 3, they completed the open-ended questionnaire, and Week 4 comprised the semi-structured interviews for in-depth insights. As explained by Denzin and Lincoln (2012), triangulation allows for cross-verification, which involves comparing responses across different instruments to identify consistent themes and patterns. Therefore, triangulation of these data sources enabled cross-verification of responses, enhanced credibility, and minimised bias, which provided a comprehensive understanding of how ODL TESL postgraduate students engaged with DeepSeek in their academic writing (Denzin & Lincoln, 2012; Maxwell, 2012; Creswell & Poth, 2018).

Data Analysis

The data were analysed using thematic analysis following Braun and Clarke's (2006) six-phase framework. All semi-structured interviews, open-ended questionnaire responses, and WhatsApp-based discussions were transcribed verbatim. For example, P4 stated in an interview, "I feel more confident submitting my paper because I know my grammar and sentence flow have been checked," while P5 noted in the open-ended questionnaire, "I can check my writing by myself and my paragraphs become clearer after using the tool." In Phase 1, the researcher familiarised herself with the data through repeated readings to gain a comprehensive understanding of students' experiences with DeepSeek. Phase 2 involved generating initial codes inductively from meaningful phrases such as "improves clarity," "helps organise ideas," and "suggests alternative phrasing." In Phase 3, related codes were grouped into potential themes, for instance, codes on clarity, organisation, and idea generation were categorised under Perceived Usefulness, while codes on ease of navigation and interface intuitiveness formed Perceived Ease of Use.

In Phase 4, themes were reviewed to ensure alignment with the coded data and research questions. Phase 5 involved refining and descriptively naming themes, with subthemes such as Future Usage Intention and Planned Frequency of Use reflecting learners' integration of DeepSeek into their workflow. Phase 6 consisted of producing the report by integrating

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selected quotations with researcher interpretation, including WhatsApp discussions where P5 commented, "It loads quickly on my laptop but sometimes takes time on mobile," to validate the accessibility subtheme. Manual coding maintained close engagement with the data, while QDA Miner Lite version 4.0, a qualitative data analysis software, facilitated the coding process by supporting keyword searches, code frequency checks, and visual displays of generated codes and themes. A detailed summary table of themes, subthemes, and supporting quotations demonstrates how the findings reflect the lived experiences of ODL TESL postgraduate students using DeepSeek to enhance academic writing. Figures 3 and 4 illustrate the software-assisted coding process in QDA Miner Lite, showing how codes and categories were generated.

Trustworthiness

Trustworthiness was ensured following Lincoln and Guba's (1985) criteria of credibility, transferability, dependability, and confirmability. Credibility was enhanced through triangulation of semi-structured interviews, open-ended questionnaires, and WhatsApp discussions, with recurring patterns cross-verified across these sources. Member checking allowed participants to review and clarify their responses. Dependability was maintained through a detailed audit trail of coding, theme development, and methodological decisions. Confirmability was ensured by linking all interpretations directly to participants' responses from the three instruments. Transferability was supported through rich descriptions of the ODL TESL postgraduate context, the nature of their writing tasks, and their engagement with DeepSeek.

Ethical Considerations

Ethical procedures included obtaining written informed consent from all participants prior to data collection. To ensure comfort and convenience, all data collection was conducted individually via online platforms at times chosen by each participant. This allowed them to participate from their own space without pressure. Participants could pause or reschedule sessions if needed, which reduced stress and supported thoughtful responses. Pseudonyms (P1–P10) were assigned to protect confidentiality, and all data were stored securely and accessed only by the researcher. Participants were informed of their right to withdraw at any stage to ensure autonomy and safeguarding well-being throughout the study.

Results and Discussion

This section presents the findings of the study based on thematic analysis. The results are organised by themes to reflect participants' experiences with DeepSeek. Table 1 summarises the emergent codes, categories, and themes derived from the interview data, which highlight the main insights expressed by participants under each theme.

Table 1: Emerged Codes, Categories and Themes

Research Questions	Codes	Category	Theme
RQ1: How do ODL tertiary students perceive the use of DeepSeek in their academic writing based on TAM constructs: **(a) Perceived Usefulness**	• Improves clarity of writing • Makes essays more coherent • Organises ideas logically • Helps structure paragraphs • Enhances overall readability	Writing Enhancement	Perceived Usefulness

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Research Questions	Codes	Category	Theme
	• Reduces redundant sentences		
	• Suggests better word choices • Corrects grammar mistakes • Provides alternative phrasing • Improves sentence variety • Enhances academic vocabulary	Language Refinement	
	• Provides new ideas for assignments • Helps brainstorm perspectives • Encourages creative thinking • Generates topic suggestions • Offers examples to support arguments	Idea Generation	
(b) Perceived Ease of Use	• Easy to navigate • Can access anytime • Requires minimal effort to start • Simple interface design • Fast response time	Tool Accessibility	Perceived Ease of Use
	• Needs rephrasing prompts • Difficulty phrasing questions • Confusion with input format • Errors when input is vague • Requires multiple attempts to get correct output	Prompt Challenges	
	• Quick to learn interface • Intuitive layout • Minimal training required	Interface Intuitiveness	

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Research Questions	Codes	Category	Theme
(c) Attitude Toward Use	• Increases confidence • Improves self-efficacy • Encourages risk-taking in writing	Writing Confidence	Attitude Toward Use
	• Encourages consistent writing • Motivates improvement • Keeps learners engaged • Stimulates interest in writing tasks • Promotes persistence	Engagement and Motivation	
(d) Behavioural Intention to Use	• Plan to use for next tasks • Incorporate into regular workflow • Explore more features	Future Usage Intention	Behavioural Intention
	• Intend to use regularly • Aim to integrate with study habits • Will experiment with prompts frequently	Planned Frequency of Use	
RQ2: What challenges do ODL tertiary students experience when using DeepSeek for academic writing?	• Inaccurate citations • Need to double-check references • Missing sources • Incorrect formatting • Misleading references	Citation Accuracy Issues	Challenges in using DeepSeek
	• Risk of over-reliance • Reduced independent thinking • Dependency on AI for ideas • Less self-editing • Overconfidence in AI output	Dependency Concerns	
	• Misinterpreted outputs • Outputs not aligned with topic • Confusing suggestions • Irrelevant examples • Inconsistent responses	Misinterpretation Risks	

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Table 1 summarises the themes, categories, and codes from interviews, questionnaires, and WhatsApp discussions on ODL students' experiences using DeepSeek for academic writing. The first theme, Perceived Usefulness, captures learners' perceptions of how the tool improved writing clarity, coherence, language refinement, and idea generation. The second theme, Perceived Ease of Use, reflects learners' experiences with tool accessibility, interface intuitiveness, and challenges in phrasing prompts. The third theme, Attitude Toward Use, indicates that learners developed greater confidence, engagement, and motivation in writing through their interactions with the tool. The fourth theme, Behavioural Intention, highlights plans for continued and frequent use of DeepSeek based on prior positive experiences. The fifth theme, Challenges in Using DeepSeek, reveals difficulties including citation inaccuracies, dependency concerns, and misinterpretation of outputs.

The next section provides a detailed discussion of each theme and its subthemes. Selected excerpts from participants are presented to illustrate key insights, followed by interpretive discussion on how learners' experiences shaped their confidence, engagement, attitudes, and intentions to adopt DeepSeek in academic writing.

Perceived Usefulness

The first theme captures learners' perceptions of the practical benefits and value of using DeepSeek in their academic writing. It reflects how learners experienced improvements in writing performance, language precision, and idea development, which highlight the ways the tool supports independent and efficient learning. Three subthemes emerged under this theme: writing enhancement, language refinement, and idea generation.

Writing Enhancement

Learners reported that the tool improved grammar, sentence flow, and paragraph clarity, which directly facilitated the production of academically acceptable writing. In the semi-structured interviews, P4 stated, "DeepSeek helps me correct my grammar and makes my sentences sound more academic," while P7 observed, "It organises my ideas better when I do not know how to structure them." This perception was further supported by responses from the open-ended questionnaire, where P3 noted, "I can check my writing independently, and my paragraphs become clearer after using the tool." Similarly, in a WhatsApp-based discussion, P6 shared, "I usually use it to revise my draft before submitting, and it helps me make my writing clearer without waiting for feedback." Overall, these findings indicate that learners valued the tool's ability to support independent revision and efficient improvement in writing quality. For ODL learners with limited access to immediate instructor feedback, such scaffolding strengthened confidence and supported autonomous writing. These observations align with the Technology Acceptance Model construct of Perceived Usefulness, which suggests that learners are more likely to adopt tools that enhance their writing performance (Zhang et al., 2025).

Language Refinement

In addition to structural improvements, participants highlighted enhancements in word choice, sentence precision, and stylistic tone. In the semi-structured interviews, P2 explained, "It helps me select more precise words so that my arguments sound clearer," while P8 remarked, "Sometimes the suggested phrasing makes me rethink my sentence structure, which improves how I organise my ideas." This perception was further supported in the open-ended questionnaire, where P5 noted, "The tool gives me suggestions that make my sentences easier to understand without losing my own style." Similarly, in a WhatsApp-based discussion, P4

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shared, “I like comparing different suggestions and picking the one that feels most natural for my writing.” These insights illustrate that learners selectively integrated feedback to maintain clarity while preserving personal expression. These experiences align with previous research, showing that the tool promotes critical engagement with language and supports independent refinement of writing (Gao et al., 2025; Nabilla et al., 2025).

Idea Generation

Participants described the tool’s role in supporting idea development and argument structuring, which eased task completion and reduced writer’s block. In the semi-structured interviews, P3 stated, “When I struggle to start a paragraph, it gives me prompts that help me think about the main points,” while P9 added, “It helps me consider perspectives I hadn’t thought of before.” Insights from the open-ended questionnaire further supported this, with P6 noting, “The prompts guide me to organise my ideas more clearly for my assignments.” In a WhatsApp-based discussion, P9 shared, “I like bouncing ideas with the tool and adjusting them to fit my arguments.” These findings reaffirm that the tool enhances cognitive scaffolding and supports independent writing in ODL contexts, which helps learners generate coherent, well-structured arguments (Gao et al., 2025; Sirta, 2025).

Perceived Ease of Use

The second theme captures learners’ perceptions of the ease and effort required to use DeepSeek in their academic writing. It reflects how learners navigated accessibility, prompt generation, and interface intuitiveness, which highlight the factors that influenced their comfort, efficiency, and confidence when interacting with the tool. Three subthemes emerged under this theme: tool accessibility, prompt challenges, and interface intuitiveness.

Tool Accessibility

Learners highlighted varied experiences regarding the tool’s accessibility. In the semi-structured interviews, P1 stated, “I can check my writing anytime, anywhere,” while P4 added, “It is easy to access on my laptop, which helps me manage my assignments independently.” Insights from the open-ended questionnaire supported this, with P5 noting, “I can revise my drafts whenever I want without waiting for feedback,” and a WhatsApp-based discussion highlighted similar issues, where P7 mentioned, “Sometimes the tool loads slowly on my phone, so I have to try multiple times.” These observations suggest that accessibility is influenced by both the tool’s design and learners’ devices or connectivity. Research shows that reliable access is crucial for distance learners to maintain engagement and complete tasks independently (Fabian et al., 2022). The tool’s accessibility allowed participants to revise and refine their writing efficiently, which strengthened confidence and autonomy.

Prompt Challenges

Participants shared contrasting experiences with generating prompts. P4 stated in the semi-structured interview, “I just type what I want, and it understands,” while P6 added, "The prompts are straightforward and easy to use once I get the hang of it." Insights from the open-ended questionnaire further supported this perception, where P5 noted, “I can get useful suggestions quickly if I phrase my question clearly.” Meanwhile, a WhatsApp-based discussion with P5 highlighted some challenges: “Sometimes I need to rephrase the prompt several times to get a relevant answer.” These findings indicate that usability depends on learners’ skill in interacting with the tool, a factor highlighted in studies on user engagement

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with AI-assisted writing tools (Algahtani, 2024). Effective prompt use reduced cognitive load and facilitated smoother task completion.

Interface Intuitiveness

Learners consistently praised the tool's interface design. P2 stated in the semi-structured interview, "Everything is quite straightforward. I don't have to search around to find features," while P10 added, "The layout is simple, so I can quickly find what I need." Insights from the open-ended questionnaire indicated similar perceptions, with P8 noting, "The interface is clean and easy to navigate, which makes writing less stressful." WhatsApp-based discussion with P10 reinforced this, as they mentioned, "I can focus on writing rather than figuring out the system." Prior research emphasises that intuitive interfaces enhance usability, minimise effort, and increase sustained engagement in learning technologies (Dakulagi, 2025). The simple design promoted effortless interaction and supported learners' confidence in completing tasks independently.

Attitude Toward Use

The third theme captures learners' attitudes toward using DeepSeek, which reflects how their experiences with the tool shaped confidence, motivation, and willingness to adopt it in academic writing. It highlights the ways structured support and interactive feedback influence learners' positive disposition and engagement (Hidayat-ur-Rehman, 2024). Two subthemes emerged under this theme: writing confidence, as well as engagement and motivation.

Writing Confidence

Besides emotional support, several learners highlighted that structured support improved their self-assurance, which shaped positive attitudes toward using the tool. P3 stated in the semi-structured interview, "I feel more confident submitting my paper because I know my grammar and sentence flow have been checked," while P1 added, "It reassures me that my paragraphs are clear and coherent." Insights from the open-ended questionnaire indicated similar perceptions, with P6 noting, "Knowing the tool checks my writing boosts my confidence to submit on time." WhatsApp-based discussion with P3 reinforced this, as they mentioned, "Sharing drafts and seeing suggestions from the tool makes me trust my work more." These experiences indicate that successful task completion and effective support enhance learners' perception of ease and usefulness, which fosters a more positive disposition toward the tool. They are consistent with TAM's premise that perceived usefulness influences attitude and intention to use (Davis, 1989; Alhumsi & Alshaye, 2021).

Engagement and Motivation

Participants reported that interactive feedback increased their motivation to engage with writing, which influenced their attitude toward adoption. P7 stated in the semi-structured interview, "I am more willing to start writing because I know I can get quick suggestions," while P2 added, "Receiving prompts makes me feel more confident to continue revising my work." Insights from the open-ended questionnaire reflected similar experiences, with P1 noting, "It encourages me to keep improving my paragraphs and ideas." In the WhatsApp-based discussion, P7 mentioned, "Seeing how the tool suggests changes keeps me motivated to experiment with different ways of writing." This engagement aligns with previous observations on idea generation and language refinement, which showed that when learners perceive a tool as useful and easy to use, they develop positive attitudes that drive sustained interaction and autonomous learning behaviours (Hidayat-ur-Rehman, 2024; Dakulagi, 2025).

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Behavioural Intention

The fourth theme captures learners' behavioural intention to use DeepSeek, which depicts their plans for future use and the anticipated frequency of engagement with the tool. It highlights how prior experiences with writing improvement, tool accessibility, confidence, and motivation in above findings shaped learners' willingness to adopt the tool in academic writing. Two subthemes emerged under this theme: future usage intention and planned frequency of use.

Future Usage Intention

Learners' intention to continue using the tool was shaped by the combined effects of writing improvement, accessibility, and positive learning experiences established in earlier themes. P1 stated in the semi-structured interview, "It's reliable and eases my writing experience, so I will continue using it," while P9 added, "I'll rely on it to check grammar and flow before submitting assignments." Insights from the open-ended questionnaire reflected similar intentions, with P3 noting, "I plan to use it for drafting my essays because it helps me organise my ideas." In the WhatsApp-based discussion, P3 also mentioned, "I will keep experimenting with prompts to refine my writing further." These intentions reflect the way perceived usefulness informs future adoption decisions, consistent with prior findings where clearer paragraph construction, improved vocabulary choices, and enhanced idea generation encouraged sustained reliance on digital writing tools. This pattern aligns with TAM literature, which shows that positive task outcomes strongly predict continued use of digital writing support (Davis, 1989; Zou & Huang, 2023).

Planned Frequency of Use

Learners also discussed how often they intended to use DeepSeek, and their responses reflected the cumulative influence of emotional support, growing confidence, and increased motivation for writing. Participants who felt encouraged and reassured by the tool's feedback reported plans for regular or repeated use. P4 mentioned in the semi-structured interview, "I usually check my draft outlines with DeepSeek before writing seriously because it helps me feel more confident about my writing." Insights from the open-ended questionnaire further supported this, with P7 noting, "I try to use DeepSeek for brainstorming first, then revisit it to refine my paragraphs." Additionally, in a WhatsApp-based discussion, P5 shared, "I like using it in stages…first for ideas, then for editing. so I can improve my writing step by step." These responses indicate deliberate and strategic integration of DeepSeek into learners' workflow and align with prior research showing that positive attitudes shaped by emotional support, improved task performance, and motivational reinforcement translate into stronger and more consistent behavioural intentions (Alhumsi & Alshaye, 2021; Dakulagi, 2025).

Challenges in using DeepSeek

The fifth theme captures learners' difficulties with DeepSeek, including citation inaccuracies, over-reliance on the tool, and misinterpretation of its suggestions. These challenges highlight the need for critical evaluation and balanced engagement to maintain academic integrity and effective writing. Three subthemes emerged: citation accuracy issues, dependency concerns, and misinterpretation risks.

Citation Accuracy Issues

Learners reported concerns regarding citation accuracy when using DeepSeek. P5 explained in the semi-structured interview, "Sometimes the references it provides are not real or do not

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match the sources I cited," while P10 noted, "I often need to double-check every reference because the formatting or details may be incorrect." Insights from the open-ended questionnaire reinforced this concern, with P6 stating, "I have to verify each reference carefully, as some citations provided by DeepSeek are incorrect." In a WhatsApp-based discussion, P5 added, "Occasionally, the tool suggests sources that seem credible but are misleading, so I always double-check them before including in my writing." These observations suggest that while the tool aids in drafting content, it does not guarantee reliable citation practices, which require learners to exercise critical verification. Such challenges align with previous studies indicating that AI-assisted writing tools can generate inaccurate references, potentially affecting academic integrity if unchecked (Nwozor, 2025; Singh & Kaur, 2025). Learners highlighted the necessity of cross-referencing and manual verification, underscoring that effective writing support extends beyond content generation to include careful attention to scholarly standards. This finding reflects the importance of fostering digital literacy and critical evaluation skills in ODL contexts.

Dependency Concerns

Several participants acknowledged the potential for over-reliance on the tool during writing tasks. P1 reflected in the semi-structured interview, "I sometimes feel I depend on it too much for phrasing ideas, and I don't think through alternatives on my own," while P2 noted, "I realized I edit less because I trust the suggestions it gives." Insights from the open-ended questionnaire supported this concern, with P8 stating, "I often rely on DeepSeek for sentence phrasing and forget to think of my own alternatives." In a WhatsApp-based discussion, P2 added, "There is a risk that I might start overconfidently using whatever it generates without evaluating it carefully, so I try to cross-check every suggestion." These reflections suggest that although the tool facilitates writing, excessive dependence may undermine independent thinking and critical self-editing. Prior research similarly highlights that frequent use of AI-assisted writing tools can reduce learner autonomy and foster overconfidence in AI outputs (Singh & Kaur, 2025). Participants emphasised the need to balance AI support with active engagement to ensure that learners remain responsible for idea generation and revision to maintain academic rigour and skill development.

Misinterpretation Risks

Participants also highlighted concerns about the accuracy and relevance of the tool's outputs. P4 explained in the semi-structured interview, "Sometimes the suggestions do not match my topic, and I have to spend extra time correcting them," while P10 observed, "Some examples are confusing or irrelevant, which can mislead my writing." Insights from the open-ended questionnaire revealed similar issues, with P7 stating, "Sometimes the sentences or examples it provides do not fit my argument, so I need to adjust them carefully." In a WhatsApp-based discussion, P9 added, "Occasionally, the tool gives inconsistent responses that make it hard to decide which version to use, so I double-check everything." These insights indicate that misinterpretation risks may arise when learners assume that AI-generated outputs are fully accurate or contextually appropriate. Such challenges align with prior studies showing that AI-assisted writing tools can produce outputs that require careful evaluation to avoid errors or off-topic content (Elsayed, 2024; Nwozor, 2025). Learners emphasised the importance of critical appraisal and cross-checking suggestions, thereby reinforcing the need to use AI as a complementary support rather than a definitive source for academic writing.

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Conclusion

This study examined ODL students' perceptions of DeepSeek in academic writing through the lens of the Technology Acceptance Model, aiming to explore its perceived usefulness and ease of use, learners' attitudes toward the tool, and their behavioural intentions to adopt it, as well as the challenges encountered. Overall, learners found DeepSeek useful for improving writing clarity, language precision, and idea generation, while its accessibility and intuitive interface facilitated ease of use. Furthermore, positive attitudes emerged from increased confidence, engagement, and motivation, which in turn shaped strong behavioural intentions to continue using the tool. Nonetheless, learners faced challenges including citation inaccuracies, over-reliance, and occasional misinterpretation, highlighting the need for critical evaluation and balanced engagement.

In addition, the study demonstrates that DeepSeek can effectively support independent writing, enhance learner confidence, and foster engagement in ODL contexts, which reinforce the relationships proposed by TAM. Moreover, the findings offer practical insights for educators, instructional designers, and AI developers seeking to optimise AI-supported academic writing instruction. However, limitations such as small sample size, reliance on self-reported data, and single-researcher analysis may constrain generalizability. Therefore, future research could expand the sample, include multiple data sources, and examine the long-term effects of AI writing tools on learner autonomy and academic performance.

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