

Students' Perception of Technology Affordance on AI-Based Feedback for Academic Writing

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Abstract

This study explores undergraduate students' perceptions of the technological affordances of AI-based feedback in academic writing from the perspective of Gibson's affordance theory. The study employed a qualitative phenomenological approach involving semi-structured interviews with five purposively selected undergraduate students. The interview data were analyzed using thematic analysis. The findings identified six technological affordances representing key dimensions of students' experiences with AI-based feedback. Together, these affordances supported students throughout the writing process by improving accessibility, revision practices, communication, and the effective use of AI technologies. However, participants also reported several challenges, including excessive reliance on AI, limited access to premium features, and concerns about data privacy. This study contributes to the growing body of research on AI-based feedback in higher education by demonstrating how technological affordances shape students' academic writing experiences and support more effective writing practices.

Key words: *Academic writing, AI-based feedback, Artificial intelligence, Students' perception, Technology affordance.*

INTRODUCTION

Artificial Intelligence (AI)-based feedback has become an important component of higher education, particularly in supporting students throughout the academic writing process. AI-based feedback applications no longer function only as grammar-checking tools. They also assist students in generating ideas, improving sentence construction, refining academic language, and revising written texts more effectively. These features encourage students to actively participate in evaluating and improving their own writing, fostering greater independence throughout the writing process (Zhao, 2023; Jeanjaroonsri, 2023). Popular AI-based applications, including Grammarly, QuillBot, and Paraphrase.io, support students during both the drafting and revision processes. Despite their educational benefits, the increasing adoption of these applications has also raised concerns about plagiarism, copyright infringement, and ownership of academic work (Salvagno et al., 2023).

The increasing demand for twenty-first-century competencies requires students to acquire not only disciplinary knowledge but also transferable skills such as collaboration, problem-solving, adaptability, and critical thinking (Celik et al., 2024). Consequently, digital technologies have become valuable learning resources that help students overcome academic challenges while improving the quality of their written work. Arizena & Mayasari (2021) found that approximately two-thirds of the participants were already familiar with paraphrasing through various learning resources. Their findings indicate that students increasingly rely on digital technologies to support academic writing activities. Nevertheless, although AI-based feedback offers considerable educational advantages, its growing adoption also raises important questions about their long-term influence on students' learning behaviour and writing development.

An important concern is that students may become overly dependent on AI-based feedback, which may reduce their critical engagement and limit opportunities to strengthen independent writing skills (Zhai, 2022). The utilization of AI-based feedback requires students to upload their academic work to external systems, raising concerns about the confidentiality of written content, personal data

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protection, and information security (Chan, 2023). Despite these concerns, AI-based feedback helps address persistent challenges such as limited language proficiency, excessive class sizes, and a lack of individual attention, by providing a user-friendly interface along with dynamic and motivating feedback (Wang, 2022). Furthermore, digital integration extends writing instruction beyond traditional classroom constraints, allowing students to complete tasks more flexibly (Haleem et al., 2022). Despite these concerns, AI-based feedback continue to play an important role in supporting academic writing and language learning in higher education.

From a theoretical perspective, affordance theory explain how technology provides actionable possibilities that shape users' interaction with technological systems. In academic writing contexts, these affordances shape how students engage with AI-based feedback, revise their work, and develop writing skills. AI-based feedback offers features such as immediate automated responses, collaborative editing, and paraphrasing support that can enhance writing skills as well as fostering critical thinking and independent problem-solving abilities (Nykyporets, 2023). In addition, paraphrasing as an essential academic writing strategy, contributes to the credibility of scholarly work by enabling writers to express ideas in their own words instead of relying heavily on direct quotations (Mira & Fatimah, 2020). It enhances the originality of a paper by allowing writers to restate others' ideas in their own words, rather than relying on direct quotations that reproduce the original author's exact wording.

Previous studies have demonstrated the educational potential of AI-based feedback in supporting students' writing development. QuillBot has been shown to improve students' ability to paraphrase texts and enhance the quality of their writing (Syahnaz & Fithriani, 2023; Xuyen, 2023). Likewise, Grammarly supports students in refining grammar, sentences, organization, and writing clarity by providing immediate corrective feedback (Dewi, 2022). Other tools, including Paraphrase.io, assist learners in selecting appropriate vocabulary and restructuring sentences to produce more coherent academic text (Sulistyaningrum, 2021). Overall, previous studies suggest that AI-powered tools can effectively support paraphrasing practices while contributing to broader aspects of students' academic writing performance.

Although AI-based feedback has been widely examined, limited research has explored students' experiences of AI-generated feedback from the perspective of technological affordance. Earlier investigations have mainly focused on evaluating the effectiveness and educational benefits of specific AI writing applications. In contrast, relatively few have examined how learners interpret both the opportunities and the limitations arising from their engagement with these technologies. To address this gap, the present study explored the live experiences of undergraduate students who regularly use Grammarly, QuillBot, and Paraphrase.io to support their writing assignments. Instead of comparing the effectiveness of individual applications, this research focuses on students' perceptions of the affordances and challenges of AI-generated feedback. By applying affordance theory, this study contributes empirical evidence on how students experience AI-based feedback and how these technological affordances shape academic writing practices in higher education.

RQ1 : How do undergraduate students interpret the affordances of AI-generated feedback in supporting their academic writing from the perspective of Gibson's affordance theory?.

METHODOLOGY

To address the research objective, this study employed a qualitative phenomenological design to explore how undergraduate students experienced AI-based feedback during the writing process. This approach was considered appropriate because it emphasizes participants' personal experiences and the meanings they assign to those experiences. The participants were five female undergraduate students from the English Language Education Study Program at Universitas Mercu Buana Yogyakarta, in their eighth semester, aged 21-22 years. Purposive sampling was employed to recruit participants who met the following criteria: (1) they were enrolled in the English Language Education Study Program, (2) they were in their eighth semester, (3) they had completed academic writing courses, (4) they had experience using AI-based feedback tools, including Grammarly, QuillBot, and Paraphrase.io, while

completing academic writing assignments, and (5) they were willing to participate in an in-depth interviews. Five participants were selected because phenomenological research prioritizes rich, detailed accounts of lived experiences over large sample sizes. Data collection continued until sufficient depth and recurring patterns had been identified to address the research objectives adequately. The primary data were gathered through individual semi-structured interviews. Open-ended questions encouraged participants to explain how they used AI-based feedback, the benefits they perceived, and the challenges they encountered during the writing process. After obtaining participants' consent, all interviews were recorded and transcribed to produce accurate textual data for further examination. The data were analyzed using thematic analysis. The researcher repeatedly reviewed the transcripts, identified meaningful codes, grouped related ideas into categories, and interpreted across participants' responses. This analytical process generated six overarching themes that represent the technological affordances of AI-based feedback in academic writing. Additional insights regarding usage patterns, implementation challenges, critical thinking, and perceived usefulness also emerged from the data, providing a more comprehensive understanding of participants' experiences.

RESULT AND DISCUSSION

RESULT

1. Students' Perceptions of Flexible Access in AI-Based Feedback

Participants consistently identified flexible access as one of the most valuable affordances of AI-based feedback. They reported that AI-based feedback could be accessed whenever they needed writing assistance, regardless of time or location. Most participants explained that AI-based feedback was available across multiple devices, such as smartphones and laptops, allowing them to use it throughout different stages of the writing process. They also stated that AI-based feedback supported various writing activities, including generating ideas, improving text organization, and revising academic texts. However, several participants mentioned that unstable internet connections, limited premium features, and occasional technical issues sometimes restricted the effective use of AI-based feedback.

"I think these tools are easy to access. I just open the website and paste my text, then the result appears immediately." (R1)

"I can use these tools anytime as long as I have internet access, and they are quite flexible." (R2)

"It is very easy to access, especially because I can use it on my phone or laptop." (R3)

"The tools are accessible, but sometimes the features are limited unless I pay for premium." (R4)

"It is easy to use because it's web-based, but not fully optimized due to feature limitations." (R5)

These findings indicate that participants perceived flexible access as a key affordance of AI-based feedback. They reported that AI-based feedback could be accessed conveniently across different devices and writing contexts. However, unstable internet connections, limited premium features, and occasional technical issues occasionally limited its effectiveness.

2. Students' Perception of User-Controlled Scheduling in AI-Based Feedback

Participants described user-controlled scheduling as an affordance that allowed them to decide when and how to use AI-based feedback during the writing process. They explained that they selected different AI-based feedback tools based on their writing preferences and the type of support needed at each stage of the writing process. Some participants preferred to use Grammarly after completing a draft to review grammar and sentence structure, whereas others used QuillBot and Paraphrase.io to improve wording and paraphrase sentences. Participants also reported that AI-based feedback helped them organize their revision process and complete writing tasks more efficiently. However, they noted several practical limitations, including login requirements, limited free features, word limits, and the possibility of becoming overly reliant on AI-based feedback.

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"I usually use these tools when I start writing a paragraph. After writing a draft, I check grammar using Grammarly, and if a sentence feels stiff, I use QuillBot or Paraphraser." (R1)

"They help me save time because they reduce the amount of manual revision I need to do. I usually use these tools after finishing my draft to improve sentence structure." (R2)

"Yes, I feel free to use them anytime depending on my needs." (R3)

"I write my first draft without using these tools, then use Grammarly and QuillBot for revision. Sometimes I over-rely on them, so I try to be careful when using them." (R4)

"I usually use it at the end, but sometimes also in the middle when I'm unsure. They help save time, but sometimes login or limits interrupt the process." (R5)

The findings indicate that participants perceived user-controlled scheduling as an affordance that enabled them to incorporate AI-based feedback in line with their individual writing preferences and revision strategies. At the same time, they recognized several practical constraints that occasionally affected their use of AI-based feedback.

3. Students' Perception of Timely Engagement in AI-Based Feedback

"Grammarly is probably the most standout one, since it immediately highlights the wrong words. That's really helpful because I can immediately see where the mistake is without wasting a lot of time." (R1)

"The quick feedback feature is very helpful because I can immediately identify and correct mistakes. This matches my need for a more efficient writing process." (R2)

"It is quite good because the process is fast." (R3)

Real-time feedback is genuinely useful; catching errors as I type saves a lot of revision time. But speed doesn't always mean accuracy. Grammarly sometimes flags correct sentences or misidentifies academic vocabulary as errors, so I've learned to treat its feedback as a guide, not a rule. (R4)

"The feedback is provided very quickly, which helps me make revisions right away." (R5)

Participants consistently valued the speed with which AI-based feedback applications generated suggestions during the writing process. They explained that immediate feedback enabled them to identify language errors and revise their work without waiting until the draft was completed. Most participants considered rapid responses beneficial because they improved writing efficiency and reduced the amount of time needed for revision. Nevertheless, one participant reported that automated suggestions were not always accurate in academic writing and therefore required careful consideration before acceptance.

Participants viewed timely engagement as an important affordance of AI-based feedback because it enabled them to receive immediate responses and revise their writing more efficiently. Despite these advantages, they emphasized the importance of carefully evaluating AI-generated suggestions, particularly when writing academic texts.

4. Students' Perception of Secure Data Exchange in AI-Based Feedback

"Honestly, I'm a little concerned. Since we upload text to their servers, I usually avoid entering personal data." (R1)

"I somewhat trust these tools, but I still have concerns since my writing must be uploaded to their systems." (R2)

"In my opinion, it is quite safe, but sometimes I still feel worried." (R3)

"I'm not fully sure how my data is stored or used, so I feel cautious." (R4)

"I'm a bit concerned about security, especially when writing something important." (R5)

The interview responses revealed that participants held diverse opinions regarding the security of AI-assisted writing applications. While several participants considered these applications

sufficiently reliable for everyday academic tasks, others remained uncertain about how uploaded texts were stored, processed, or protected after submission. As a result, many participants preferred to avoid sharing personal information or sensitive academic documents through these platforms. Their responses suggest that trust in AI-assisted writing applications depends not only on the technology's usefulness but also on users' confidence that their data is handled responsibly. These concerns demonstrate that perceptions of secure data exchange influence students' willingness to integrate AI into their academic writing practices.

Overall, participants recognized secure data exchange as an important aspect of AI-based feedback. Although they generally considered AI-based feedback useful for academic writing, several participants expressed concerns about data privacy and the handling of uploaded texts

5. Students' Perception of Seamless Transaction in AI-Based Feedback

"Overall, it's great and really helpful, especially for improving grammar and polishing writing." (R1)

"My experience has been quite positive because they are user-friendly and support me in improving my writing." (R2)

"My overall experience is quite good and helpful in the writing process." (R3)

"Grammarly feels the most polished, but sometimes there are bugs or crashes." (R4)

"It's quite helpful, but there are still occasional errors and slow loading." (R5)

Most participants describe their overall experience with AI-based feedback as smooth and beneficial throughout the writing process. They explained that AI-assisted writing applications, such as Grammarly, QuillBot, and Paraphrase.io, were easy to operate and could be incorporated into writing activities without creating unnecessary technical difficulties. This seamless transaction enabled participants to apply AI-based feedback efficiently, improving grammar, refining sentence structure, and enhancing the quality of their academic texts. Several participants also mentioned that the applications reduced the effort required during revision because the available features were straightforward to understand. Despite these positive experiences, some participants reported occasional technical issues, including software bugs and slow loading times, which temporarily disrupted their writing activities.

Participants perceived seamless transaction as an affordance that enabled them to interact with AI-based feedback smoothly during the writing process. Although minor technical problems were reported, participants generally considered AI-based feedback easy to use and supportive of their writing activities

6. Students' Perception of Clear Communication in AI-Based Feedback

Participants viewed clear communication as one of the most valuable features of AI-based feedback during academic writing. They explained that understandable explanations, correction suggestions, and revision recommendations helped them recognize writing errors more easily and improve their academic texts. Most participants appreciated feedback presented in a straightforward manner because it simplified the revision process and supported more confident writing decisions. At the same time, several participants reported that certain explanations were difficult to understand or did not accurately reflect their intended meaning. These responses indicate that the availability of corrections is important, as is the clarity with which those recommendations are communicated to users.

"Grammarly is the most helpful because it not only shows mistakes but also provides explanations." (R1)

"The suggestions are quite clear, especially for grammar, but sometimes confusing for style." (R2)

"The suggestions are clear, but sometimes they do not match what I mean." (R3)

"Some terms like 'dangling modifier' are difficult to understand." (R4)

"Sometimes the feedback is not fully explained, so I don't always understand it." (R5)

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Participants viewed clear communication as an affordance that supported their understanding of AI-based feedback during the revision process. Although participants generally found the feedback understandable, they acknowledged that certain explanations and technical terms occasionally required additional interpretation before they could be applied to their academic writing.

DISCUSSION

1. Flexible Access

Flexible access emerged as an important affordance, enabling students to integrate AI-based feedback into their academic writing without time or location constraints. Instead of functioning exclusively as a digital writing assistant, AI-based feedback became a learning resource that supported students at different stages of writing and was tailored to their individual needs. This flexibility encouraged greater learner autonomy by allowing participants to decide independently when to seek technological assistance. From an affordance perspective, the educational value of technology lies in the opportunities it offers users to perform meaningful actions within a particular context. Therefore, accessibility was not merely a technical feature but also a condition that supported more independent writing practices. Similar findings were reported Amanda et al. (2023) and Hall (2024), who found that easily accessible AI technologies encourage continuous engagement with academic writing. However, the present study further demonstrates that contextual factors, including internet connectivity, restrictions on premium features, and system reliability influence the benefits of accessibility. This suggests that technological affordances are realized through the interaction between technological capabilities and the surrounding learning environment (O'Neill & Russell, 2019; Nazari et al., 2021; Yan, 2023).

2. User-Controlled Scheduling

The findings indicate that students exercised considerable control over how AI-based feedback was incorporated into their writing process. Instead of relying on a single application or following a fixed writing procedure, participants selected different AI-based feedback applications based on the specific writing tasks they needed to accomplish. The pattern demonstrates that students actively regulated their own learning by deciding when to use technological assistance and when to write independently. Such behavior reflects the development of self-directed learning, in which technology functions as a flexible learning resource rather than replacing students' own writing decisions. These findings support Ismailia & Novawan (2025), who argued that AI applications facilitate students' revision practices by enabling them to manage grammar correction and paraphrasing in line with their learning preferences. At the same time, participants' awareness of excessive reliance on AI suggests that effective use of AI-based feedback requires a balance between technological support and independent critical thinking. This observation reinforces Kasneci et al. (2023), who emphasized that AI should strengthen students' decision-making rather than reduce their active involvement in the writing process.

3. Timely Engagement

Immediate feedback encourages a more iterative approach to academic writing by enabling students to review and refine their work as they compose continuously. Rather than postponing revision until a complete draft had been produced, participants incorporated revision into the writing process itself, allowing writing development and revision to occur simultaneously. This continuous interaction with AI-based feedback may contribute to a more efficient writing process because language-related issues can be addressed before they accumulate into larger problems. According to Dong (2023) and Alonzo et al. (2024), who found that immediate AI-generated responses support continuous revision and sustained engagement during writing activities. Nevertheless, participants also recognized that rapid responses should not automatically be considered accurate or appropriate for every academic context. These findings suggest that students continue to play an essential role in evaluating AI-generated recommendations before integrating them into their final work. Supporting argument by Chen (2025) that AI-based feedback should complement, rather than replace, human judgment.

4. Secure Data Exchange

Participants' concerns regarding data privacy suggest that trust remains an essential factor influencing the acceptance of AI-based feedback in higher education. Although AI applications offer substantial benefits for academic writing, uncertainty about how personal information and uploaded documents are managed may discourage students from using these technologies for more sensitive academic tasks. These findings indicate that students evaluate AI applications not only by their functional usefulness but also by the transparency and security of their data management practices. Similar concerns have been highlighted by Devineni (2024), who emphasized that transparent data governance is fundamental to establishing users' trust in AI technologies. Likewise, Ayodeji Oseni et al. (2020) argued that effective security measures, including encryption and controlled access, are essential for protecting users' information. The present findings therefore suggest that increasing transparency regarding data collection, storage, and processing may strengthen students' confidence in AI-based feedback and encourage its responsible adoption in academic writing.

5. Seamless Transaction

The positive experiences reported by participants indicate that usability plays a central role in supporting the effective adoption of AI-based feedback. When a technological system operates smoothly and requires minimal effort to use, students can devote more attention to developing ideas and improving the quality of their writing rather than managing technical problems. In this context, seamless transactions enhance the practicality of AI-based feedback by reducing unnecessary interruptions throughout the writing process. These findings are consistent with Cavaleri & Dianati (2016), who found that user-friendly writing applications contribute to students' writing development by simplifying the revision process. However, participants' experiences also demonstrate that occasional software errors and system instability can interrupt writing activities and reduce the effectiveness of AI-based feedback. This findings support Liao et al. (2024), who argues that the educational value of AI technologies depends not only on the quality of automated recommendations but also on system usability and operational reliability.

6. Clear Communication

The findings suggest that the effectiveness of AI-based feedback depends not only on the accuracy of automated recommendations but also on how clearly those recommendations are communicated to users. Feedback that provides understandable explanations enables students to recognize writing problems, understand the reasons behind suggested revisions, and make more informed writing decisions. Consequently, AI-based feedback has the potential to contribute not only to immediate text improvement but also to the development of students' long-term writing competence. According to Maulidina & Wibowo (2022) who found that understandable AI-generated explanation increase students' confidence and encourage more meaningful revision practices. Nevertheless, participants also reported that technical terminology and stylistic recommendations were occasionally difficult to interpret, particularly when the explanations did not correspond to their intended meaning. These findings are consistent with Paracha et al. (2024) who noted that AI-based feedback may not always represent the contextual meaning of complex academic writing. Therefore, the effectiveness of AI-based feedback depends on its ability to communicate recommendations accurately, comprehensibly, and in contextually appropriate ways.

In summary, the discussion demonstrates that the six technological affordances collectively explain how AI-based feedback supports students' academic writing experiences. Rather than functioning solely as automated correction tools, AI applications provided opportunities for students to access writing support flexibly, regulate their revision strategies, receive timely feedback, interact with user-friendly systems, understand revision suggestions more clearly, and develop confidence in using digital writing technologies. At the same time, the findings indicate that the educational value of AI-based feedback depends on students' ability to evaluate AI-generated suggestions critically and use them responsibly. Institutional support and reliable technological infrastructure also play an important role in ensuring these affordances are fully utilized. Overall, The study suggests that AI-based feedback serves as a

complementary educational resource that enhances academic writing by supporting students' autonomy, critical thinking, and continuous writing development rather than replacing their own writing abilities

CONCLUSION

This study concludes that undergraduate students perceive AI-generated feedback as a valuable tool for improving academic writing, offering technological affordances that support multiple stages of the writing process. The findings identified six technological affordances that shape students' experiences with AI-generated feedback in academic writing: flexible access, user-controlled scheduling, timely engagement, secure data exchange, seamless transactions, and clear communication. These affordances enabled students to access writing support conveniently, manage revision activities independently, receive timely feedback, interact securely with AI applications, experience efficient writing processes, and communicate ideas more effectively. The findings further contribute to affordance theory by demonstrating that the educational value of AI-generated feedback stems from the interaction between technological features and students' ability to interpret and apply automated suggestions critically. Practical constraints include limited access to premium features, dependence on stable internet connectivity, and concerns regarding personal data. These challenges indicate that AI functions most effectively as a complementary learning tool rather than a replacement for students' knowledge, critical judgment, and writing abilities.

Based on these findings, students are encouraged to use AI writing applications as learning support tools while maintaining independent judgment and critically evaluating AI-generated suggestions throughout the writing process. Lecturers should integrate AI-supported technologies into writing instruction by guiding students to interpret, evaluate, and selectively apply AI-generated feedback in their academic writing. Furthermore, universities should establish institutional guidelines, strengthen digital literacy programs, and provide training that promotes the ethical and responsible use of AI while protecting personal information. These initiatives can help students use AI effectively while continuing to develop independent writing skills and reflective learning practices.

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