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Student perceptions of hybrid feedback: Using gen-AI to enhance engagement with EAP writing feedback

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Feedback is crucial in the learning process, yet many students struggle to engage with teacher feedback effectively. This study explores the potential of Generative Artificial Intelligence (gen-AI) to enhance student engagement with feedback in English for Academic Purposes (EAP) writing. Using a mixed-methods approach involving surveys and interviews with undergraduate students at a Sino-British transnational university where English is the medium of instruction (EMI), the research examines students' cognitive, behavioral, and affective engagement with feedback, with a particular focus on how gen-AI tools can help clarify and implement feedback. The findings suggest that students perceive the integration of gen-AI with teacher feedback as effective, with improvements observed in cognitive, behavioral, and affective engagement, though behavioral engagement was slightly less pronounced. While the study highlights the potential benefits, it also identifies a range of concerns, indicating that a comprehensive approach is needed to address challenges related to integrating gen-AI in feedback processes. This research provides timely insights into how gen-AI can be used to foster students' feedback engagement and enhance writing outcomes.

Keywords: Feedback, generative artificial intelligence (gen-AI), student engagement, EAP writing, students' perceptions

Introduction

English academic writing, a fundamental aspect of English for Academic Purposes (EAP), is a complex and cognitively challenging skill that requires

mastery of specific processes, structures, and conventions. It serves as a crucial tool for students to develop and show their critical thinking abilities, articulate their understanding, and construct persuasive arguments to support their findings or conclusions (Swales & Feak, 2012). This process can be particularly challenging for English as a Second Language (ESL) learners, who often struggle with language barriers. Despite receiving personalized instruction and formative feedback from educators, many students fail to incorporate feedback to improve their writing performance or continue to make the same errors in future tasks (Lee, 2008; Zimbardi et al., 2017).

Student engagement with feedback has been conceptualized as a multi-dimensional construct encompassing cognitive, behavioral, and emotional aspects (Ellis, 2010; Fredricks et al., 2004; Zhang & Hyland, 2018). According to these studies, cognitive engagement reflects how students process and apply feedback, behavioral engagement focuses on the observable revisions made, and emotional engagement captures students' attitudes and feelings toward feedback. Low engagement can stem from external factors, such as the quality of feedback provided by teachers and the nature of the tasks (Jonsson, 2013), as well as internal, learner-related factors. Concerning learner-related factors, Winstone et al. (2017) highlight several key barriers, including difficulties in interpreting feedback, a lack of knowledge about effectively using feedback, feelings of disempowerment, and challenges in translating feedback into actionable improvements. These barriers impede students' ability to engage meaningfully with feedback, ultimately limiting their academic growth.

Given these persistent barriers to effective feedback engagement, Generative Artificial Intelligence (gen-AI) emerges as a promising solution, offering well-documented advantages, including real-time interaction and feedback, personalized language instruction, an extensive knowledge base, natural language processing capabilities, and the ability to generate human-like responses (Bishop, 2023; İpek et al., 2023). With these advantages, gen-AI holds the potential to enhance feedback engagement across all three dimensions by creating tailored examples to clarify feedback, simplifying complex language through translation and paraphrasing, providing deeper explanations for difficult concepts and teacher comments, and assisting with grading and assessment to track progress (Barrot, 2023; Dai et al., 2023; Imran & Almusharraf, 2023; Shen & Zhu, 2023).

While existing research underscores the benefits of gen-AI in feedback, most studies primarily focus on gen-AI's standalone capabilities, particularly in automated feedback generation, leaving a gap in understanding how the integration of gen-AI with traditional teacher feedback can complement each other, especially in English for Academic Purposes (EAP) contexts. This study aims to address this gap by exploring a hybrid approach that leverages both gen-AI and human feedback to enhance student engagement with feedback in EAP writing.

Student engagement with feedback

Student engagement with feedback has been conceptualized in various ways. Ellis (2010) generalizes it as the manner in which students respond to feedback, while Zhang and Hyland (2018, p.91) provide a more detailed explanation, describing engagement as “the extent students are invested or committed to their learning, embracing a complex of factors which can be seen in students’ responses to texts and their attitudes to writing and responding”. Although scholars with different theoretical and epistemological perspectives may approach the concept from diverse viewpoints, one prominent framework views feedback engagement as a cognitive meta-construct explored through three interconnected dimensions: behavioral, emotional, and cognitive engagement (Ellis, 2010; Fredricks et al., 2004; Han & Hyland, 2015).

Fredricks et al. (2004) describe student engagement as a multifaceted construct comprising emotional, behavioral, and cognitive aspects. Cognitive engagement refers to the level of effort students invest in completing a task, while emotional engagement involves positive or negative emotional reactions during the task. Behavioral engagement, on the other hand, is characterized by observable participation in the task and is regarded as the best predictor of academic learning performance (Lai, 2021). Ellis (2010) introduced a tripartite framework for interpreting second-language learners’ responses to written corrective feedback, considering the cognitive, behavioral, and affective dimensions as interconnected. Building on Ellis’ (2010) framework, Han and Hyland (2015) further refined the sub-components of each dimension. Specifically, cognitive engagement involves recognizing and understanding writing errors, which requires the use of both cognitive and metacognitive strategies to process feedback. Behavioral engagement is reflected in visible revision strategies and learning approaches, such as acting on teacher feedback by processing and applying the information provided, as well as feedback seeking, where students proactively seek information related to their learning performance. Affective engagement is demonstrated by students’ emotional reactions and attitudes towards written feedback, which influences how they evaluate the feedback’s usefulness and value. These emotional responses, whether positive or negative, are pivotal in either fostering or hindering academic engagement (Pekrun, 2006).

Multiple studies have explored student engagement with feedback through Han and Hyland’s (2015) framework. For example, Koltovskaia (2020) examined how two ESL students engaged with Grammarly’s automated feedback, focusing on their behavioral, cognitive, and affective responses to the tool’s suggestions. Similarly, Koltovskaia and Mahapatra (2022) investigated how two ESL students engaged with teacher-written corrective feedback (WCF) provided via Microsoft Word’s comments feature. The study examined the scope and strategies of feedback to capture student engagement behaviorally, cognitively, and affectively. Both studies highlight the applicability of the tripartite framework to varied feedback contexts.

Factors influencing students' feedback engagement

Effective student engagement with feedback is shaped by a complex interplay of pedagogical, cognitive, and linguistic factors. At the pedagogical level, research highlights how feedback design critically influences engagement. Jonsson (2013) identifies key barriers, including perceived irrelevance due to poor timing or quality, lack of personalization, authoritative tone, unclear terminology, and absence of actionable strategies. These findings place a significant onus on educators to deliver constructive, clear, and implementable feedback.

Even well-designed feedback can fail to produce desired outcomes when students lack the readiness to engage with it. Handley, Price, and Millar (2011) define this readiness as comprising both the willingness and emotional capacity to receive feedback. Han and Hyland (2015) similarly emphasize that learners' goals and beliefs play a critical role in shaping their engagement with written corrective feedback (WCF). When students perceive feedback as futile, these challenges can escalate into learned helplessness, leading to complete disengagement (Winstone et al., 2017). Psychological barriers such as these are often compounded by gaps in assessment literacy – for example, difficulties in distinguishing between formative and summative feedback purposes (Price et al., 2010), or in applying feedback to specific tasks and transferring it across contexts (Winstone et al., 2017). Han and Xu (2021) further demonstrate that students with limited feedback literacy tend to exert less cognitive and behavioral effort when processing feedback.

Language proficiency emerges as another critical barrier. Students with lower language proficiency often struggle to engage meaningfully with feedback due to a lack of linguistic knowledge necessary to understand and address errors (Zhang & Hyland, 2018; Zheng & Yu, 2018). This challenge is echoed by Carless (2006), Nicol & Macfarlane-Dick (2006), and Winstone et al. (2017), who highlight students' inability to decode feedback, especially when teachers use metalanguage or complicated language in their comments. When feedback is not comprehensible, students may miss critical insights necessary for improvement.

This multilayered analysis reveals that meaningful feedback engagement requires: (1) pedagogically sound feedback design, (2) development of student assessment literacy and proactive habits, and (3) linguistically accessible communication tailored to learners' proficiency levels.

Role of gen-AI in feedback

The existing body of research predominantly explores the efficacy of gen-AI in providing feedback to students in different contexts, highlighting the effectiveness of tools like ChatGPT in providing specific corrections and explanations. In STEM education, Wan and Chen (2024) explored GPT-3.5's ability to assist feedback writing for students' written responses to physics conceptual questions by having four student researchers compare AI and human feedback. They found that students rated AI feedback as equally correct, more useful, and

mostly usable with minimal/no edits. Similar positive outcomes have emerged in language learning contexts. Wiboolyasarín et al. (2024) found that ChatGPT-enhanced feedback significantly improved L2 writing outcomes in a collaborative revision task with Thai undergraduates, while Mahapatra (2024) demonstrated ChatGPT's significant enhancement of tertiary ESL students' academic writing skills through a mixed-methods study involving three writing tests and focus group discussions, with participants reporting strongly favorable perceptions of the tool's effectiveness.

Particularly in EFL contexts, research has shown AI's versatility in addressing diverse writing components. Bok and Cho (2023) and Solovey (2024) have both shed light on the potential of AI tools like ChatGPT to offer constructive feedback on various aspects of English as a Foreign Language (EFL) student writing, from grammar and coherence to content development. Gozali et al. (2024) further advanced this understanding through a comparative analysis of AI writing tools (including ChatGPT, Grammarly, and QuillBot) and their impact on EFL writing feedback literacy, proposing an Automated Writing Evaluation (AWE) Tools Integration Framework. Their findings underscore ChatGPT's advantages for paraphrasing and ideation, alongside risks such as over-reliance on gen-AI tools.

While the aforementioned studies have established the usefulness of AI in the feedback process, such as offering corrections and improving writing proficiency, researchers also acknowledge AI's limitations in replacing human tutors. For instance, Bok and Cho (2023) stressed that despite the positive reception of ChatGPT as a writing revision tool, students still expressed a strong preference for human tutor feedback. This preference is further supported by Solovey's (2024) comparison of EFL students' preferences regarding peer feedback, feedback from the AI tool ChatGPT, and teacher feedback. The results showed that teacher feedback remains the most preferred option among EFL students, followed by hybrid approaches combining ChatGPT and teacher feedback. Similarly, Escalante et al. (2023), through their comparison of human and GPT feedback, ultimately recommended a blended approach that capitalizes on the strengths of both feedback methods.

Research gap and research questions

While existing research has explored the benefits and challenges of gen-AI in giving feedback (Bok & Cho, 2023; Escalante et al., 2023; Gozali et al., 2024; Mahapatra, 2024; Solovey, 2024; Wan & Chen, 2024; Wiboolyasarín et al., 2024), significant gaps remain regarding the integration of gen-AI with human feedback, particularly in the EAP context. Most studies focus on gen-AI's standalone capabilities, but little attention has been given to how gen-AI and teacher feedback can complement each other. This hybrid approach could combine gen-AI's ability to simplify complex feedback with the nuanced, personalized insights of human tutors, offering a more comprehensive strategy for enhancing feedback engagement.

Additionally, while gen-AI provided feedback preferences and perceptions

have been studied (Bok & Cho, 2023; Escalante et al., 2023; Solovey, 2024), these are rarely examined through the lens of the cognitive, behavioral, and affective dimensions of student engagement. Employing a well-established model to assess these dimensions provides practical insights into how hybrid feedback approaches can enhance engagement in meaningful ways.

These gaps highlight the need to investigate the effectiveness of the integration of gen-AI and teacher feedback and its impact on student engagement across three dimensions. To address these gaps, this study explores two key questions:

1. How do students perceive the effectiveness of integrating gen-AI into the feedback process?
2. How does the use of gen-AI impact students' cognitive, behavioral, and affective engagement with teacher feedback in EAP writing?

Methodology

Participants

The study involved 62 undergraduate students from a Sino-British transnational university in China, where English is the medium of instruction (EMI). Participants included 32 students from EAP 035 (an undergraduate EAP module for Year 1 advanced students) and 30 students from EAP 105 (an undergraduate EAP module for Year 2 business students). Although enrolled in different academic years, all participants demonstrated comparable English proficiency levels (CEFR B2 to B2+). First-year students were placed at these levels through placement tests, while second-year students were required to reach these levels for program progression. Of the 62 participants, 60 were Chinese students with English as a foreign language, and 2 were international students with English as their second language. The vast majority of participants had prior experience using gen-AI tools. 9 of these students volunteered for in-depth interviews to provide qualitative insights into their experiences.

Research methods and procedure

The researchers utilized the formative writing coursework from each module to implement the integration of gen-AI and teacher feedback. Year 1 students were tasked to write a 1000-word discursive essay on the topic of influencer marketing based on eight sources provided, while Year 2 students wrote a 300-word argumentative essay on the topic of leadership styles based on two sources provided. Both essays followed similar structures, except that the discursive essay presents pros and cons equally, but the argumentative essay requires an additional rebuttal paragraph. The study spanned ten weeks, with two 100-minute in-person sessions each week. In the first few weeks, students were taught in detail how to write the essays and then worked on their writing tasks. In week 8, students submitted their essays, and the two researchers started to provide formative feedback using similar checklists aligned with

marking criteria, ensuring consistency across both cohorts. These checklists highlighted areas for improvement, such as structure, language, and argument development, without explicitly providing solutions. The checklists include items such as “Does each body paragraph have a clear topic sentence?” or “Is there a wide range of academic and business-specific vocabulary?”.

In Week 10, students received checklists with feedback from the researchers, and in one of the class sessions, all students were required to read the feedback and use XIPU AI (a university-funded gen-AI tool built on Microsoft’s Azure OpenAI model, featuring an interface and functionalities similar to ChatGPT) to engage with teacher feedback and revise their writing accordingly. To ensure the effective use of gen-AI tools, basic guidance on using XIPU AI and engineering effective prompts was provided through slides and demonstrations, along with sample prompts pre-tested by researchers for validity. If students encountered difficulties with a specific item, they could begin by using the provided example prompts, which were paired with corresponding checklist items (see Appendix A), before crafting their own personalized prompts for more specific issues. Students then completed a revision form documenting the gen-AI suggestions they accepted and incorporated into their essays. Students may use the gen-AI tool to better comprehend teacher feedback and implement changes from different perspectives, such as understanding certain terms, refining language, or asking for detailed examples. The following screenshot shows the use of the gen-AI tool in dealing with teacher feedback, stating that “some of the expressions in the essay are not academic” based on a Year 1 student essay (see Figure 1). By the end of the session, all students who participated in the study were asked to complete an online survey. One-on-one interviews were conducted afterwards with students on a voluntary basis.

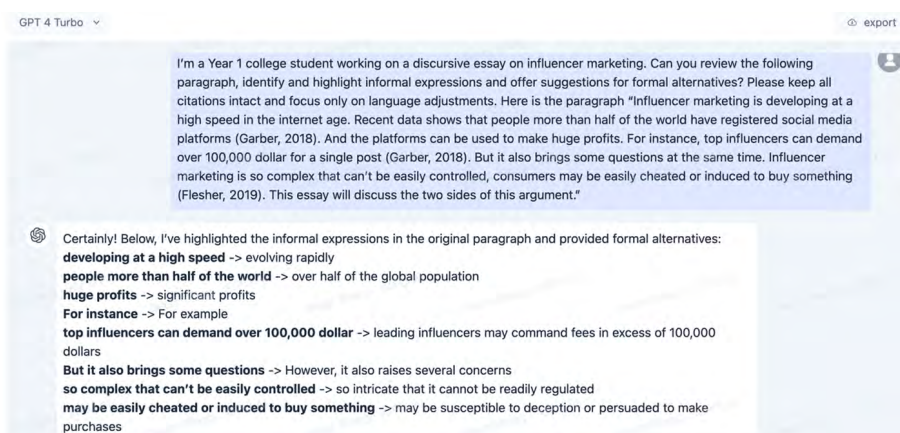


Figure 1. Screenshot illustrating the use of a gen-AI tool to address teacher feedback regarding non-academic expressions in an essay

Data collection and analysis

Data were collected from questionnaires and interviews. A 20-item bilingual (English and Mandarin) online questionnaire, administered via Wenjuanxing, China's leading online questionnaire platform, was designed to collect data on students' perceptions of the overall effectiveness of the integrated feedback approach, the perceived effectiveness of each feature, and their perception of the cognitive, behavioral, and affective dimensions of their engagement, and challenges or concerns they encountered. The items related to assessing student feedback engagement were adapted from an established multidimensional student engagement framework (Ellis, 2010) and its derivatives (Han & Hyland, 2015; Man, Chau & Kong, 2020). Survey data were analyzed using SPSSAU, Excel, and Wenjuanxing. The reliability and validity of the questionnaire were evaluated using Cronbach's α , the Kaiser-Meyer-Olkin (KMO) measure, and Bartlett's test of sphericity (see Table 1).

The overall Cronbach's α for the scale was 0.875, which exceeds the recommended threshold of 0.8, indicating high reliability. Construct validity was assessed through exploratory factor analysis (EFA). The KMO measure of sampling adequacy was 0.826, surpassing the acceptable threshold of 0.6, and Bartlett's test of sphericity was significant ($\chi^2 = 553.595$, $p < 0.001$), suggesting that the data were very suitable for factor analysis.

In addition, the means and standard deviations for the survey items were generated using SPSSAU. To interpret the means of the survey items, particularly for the three dimensions of feedback engagement, the study utilized a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree). Mean scores were classified into three categories: low (1.00–2.99), moderate (3.00–3.99), and high (4.00–5.00).

To complement the survey, in-depth interviews were conducted with 9 voluntary students (5 Year 1 and 4 Year 2), exploring their experiences with gen-AI in the feedback process. The interviews, conducted in the students' first language (Mandarin) for Chinese students and English for an international student, were recorded, transcribed, and translated into English where necessary. The qualitative data were thematically coded and analyzed, with agreement between the two researchers ensuring reliability. The study also incorporated an example of student work (one paragraph), showing the number of revisions made, to strengthen the validity of the findings (see Appendix B).

Table 1. Reliability and validity of the three dimensions of feedback engagement

Dimension	Statement	Cronbach's α	KMO	Bartlett's test
Cognitive Engagement	1. The use of gen-AI enhanced my understanding of the feedback provided by my teacher.	0.887	0.801	$\chi^2 = 168.303$, $p < 0.001$
	2. I can better understand the mistakes in my essay with the help of gen-AI.			
	3. I find that gen-AI provides useful insights that supplement my teacher's feedback.			
	4. The use of gen-AI helped me improve my writing skills in general.			
Behavioral engagement	5. I used gen-AI when I didn't understand the feedback provided by my teacher.	0.757	0.642	$\chi^2 = 96.146$, $p < 0.001$
	6. I did nothing about the teacher's feedback that I could not understand.			
	7. I used gen-AI to revise my writing and ignored teacher's feedback.			
Affective Engagement	8. I ended up making more changes to my writing when using gen-AI compared to only using the checklist provided by my teacher.	0.944	0.770	$\chi^2 = 168.454$, $p < 0.001$
	9. I would prefer continued use of gen-AI in the feedback process in future assignments.			
	10. My overall perception of the use of gen-AI in the feedback process is positive.			
	11. I feel confident in interpreting feedback with the help of gen-AI.			
Overall		0.875	0.826	$\chi^2 = 553.595$, $p < 0.001$

Ethical considerations

Ethical considerations included obtaining informed consent from all participants, ensuring their voluntary participation, and understanding of the study's objectives. Confidentiality was maintained throughout the research process, with all data anonymized to protect participants' identities.

Results and discussions

RQ1: How do students perceive the effectiveness of integrating gen-AI into the feedback process?

Overall effectiveness. The first research question was to investigate the effectiveness of using gen-AI to assist students in understanding and implementing their teacher's feedback. According to survey results (see Table 2), 88.71% of participants (55 out of 62) rated the hybrid approach as effective to varying degrees, with 16.13% considering it "Very Effective," 48.39% rating it "Effective," and 24.19% marking it as "Somewhat Effective." Only 11.29% (7 participants)

gave ratings of “Average” or “Not very effective,” and no participants found the approach completely ineffective. The mean score of 4.65 (with “Very effective” rated as 6 and “Completely ineffective” rated as 1) and a standard deviation of 0.99 reflect a generally positive perception of the hybrid method’s ability to support feedback comprehension and application. These survey findings were reinforced by interview results, with all 9 interviewees affirming that gen-AI was effective in helping them comprehend and apply teacher feedback. Comments such as “very helpful” and ‘gen-AI can effectively help you understand teacher’s feedback’ were common.

Table 2. Students’ perception of the effectiveness of using gen-AI to understand and implement teacher feedback

Perceived effectiveness	Number of respondents	Percentage (%)	Rating value	Weighted contribution	Means	Standard deviations
Very effective	10	16.13	6	60		
Effective	30	48.39	5	150		
Somewhat effective	15	24.19	4	60		
Average	4	6.45	3	12		
Not very effective	3	4.84	2	6		
Completely ineffective	0	0	1	0		
Total	62	100			4.65	0.99

Effectiveness of gen-AI in different aspects. The study further delved into the specific areas where students perceived gen-AI as instrumental in enhancing their understanding of teacher feedback. As illustrated in Figure 2, students predominantly valued gen-AI’s contributions to grammar (77.42%), vocabulary (64.52%), and paraphrasing (54.84%). These preferences were echoed in interviews, where 7 out of 9 interviewees cited improvements in language-related aspects. For example, one student noted, “It will give me a more diversified or different type of expression, which will help me have a deeper understanding of that academic language.” while another observed, “gen-AI can help me check my grammar without changing my original meaning, which is very helpful.”

For areas beyond language skills, such as idea development, logic and idea connection, coherence and cohesion, organization and structure, and source use and integration, students’ perceived helpfulness of gen-AI ranges from 35.48% to 46.77%, indicating moderate reliance on gen-AI. Interview responses revealed generally positive attitudes toward gen-AI’s effectiveness in these areas, with three students specifically highlighting its value for improving coherence and cohesion. For instance, one student remarked, “AI helps restructure sentences to make them more coherent,” while another noted, “AI can help improve essay coherence.” Interviewed students also acknowledged the benefits of AI in organization, structure, and paraphrasing. However, the perceived

helpfulness in these areas is not as pronounced as in language enhancement, which aligns with the survey findings.

The survey also showed lower perceived effectiveness of gen-AI in “core task requirements” (32.26%), “unfamiliar terms” (25.81%), and “referencing and citation” (25.81%). Several factors may explain these results. For instance, core task requirements, such as word count and the number of sources, may not require gen-AI assistance. Students were likely already familiar with the “unfamiliar terms” since these were extensively covered in class. As for referencing, a possible reason could be Year 2 students were not required to provide a reference list for this assignment, making gen-AI less relevant for this aspect. For citation formatting specifically, students reported technical limitations that explained their low effectiveness ratings. For example, Interviewees 3 and 7 mentioned that “gen-AI often removes all the citations” and “ChatGPT is not that smart; it sometimes removes my citations.” These observations align with Jacob et al. (2024), who found that gen-AI, like ChatGPT, might produce inaccurate citations due to the probabilistic basis of their predictive responses.

The above-mentioned findings are consistent with researchers’ expectations and mirror Bok and Cho’s (2023) observations, where students found ChatGPT highly beneficial for editing grammar, vocabulary, clarity, coherence, and flow. Similarly, Solovey (2024) noted that ChatGPT can accurately identify errors in mechanics, grammar, and content, though it does not always improve expression quality. The results suggest that while gen-AI is perceived as beneficial for enhancing specific aspects of writing, it is more effective for mechanical aspects and may not fully replace the nuanced understanding required for complex academic writing tasks. This indicates a continued need for human guidance in developing advanced writing skills and, at the same time, underscores the importance of a hybrid approach that combines the strengths of AI with human instruction to foster a more holistic skill development.

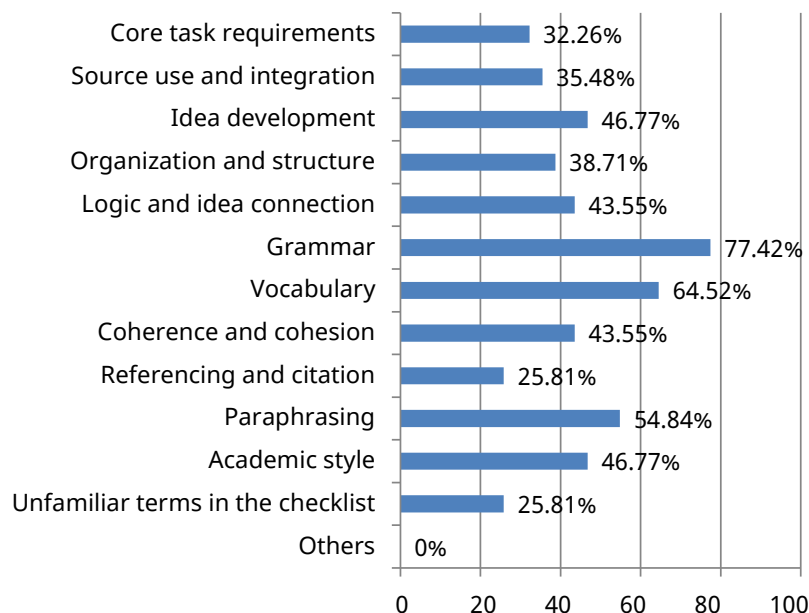


Figure 2. Students' perception of the effectiveness of gen-AI in different aspects

RQ2: How does the use of gen-AI impact students' cognitive, behavioral, and affective engagement with teacher feedback in EAP writing?

This study employed a multi-dimensional approach to assess student engagement with gen-AI, examining cognitive, behavioral, and affective aspects. As shown in Table 3, engagement levels were measured on a 5-point Likert scale, where 5 represented "strongly agree" and 1 indicated "strongly disagree." For Items 6 and 7, this scoring was reversed due to their negative phrasing. The results showed that students demonstrated high engagement in the cognitive and affective domains (with means of 4.10 and 4.02), while engagement in the behavioral domain was moderate (with a mean of 3.63).

Table 3. Student engagement across three dimensions

Dimension	Item	Statement	Strongly agree/ agree (%)	Natural (%)	Strongly disagree/ disagree (%)	Mean	SD
Cognitive	1	The use of gen-AI enhanced my understanding of the feedback provided by my teacher.	75.8	17.7	6.5	4.00	0.87
	2	I can better understand the mistakes in my essay with the help of gen-AI.	77.4	17.7	4.8	4.11	0.87
	3	I find that gen-AI provides useful insights that supplement my teacher's feedback.	74.2	21	4.8	4.10	0.90
	4	The use of gen-AI helped me improve my writing skills in general.	75.8	22.6	1.6	4.15	0.83
	Overall					4.10	
Behavioral	5	I used gen-AI when I didn't understand the feedback provided by my teacher.	66.1	21	12.9	3.81	1.04
	6	I did nothing about teacher's feedback that I could not understand.	19.4	24.2	56.5	3.55	1.34
	7	I used gen-AI to revise my writing and ignored teacher's feedback.	19.4	8.1	72.6	3.92	1.40
	8	I ended up making more changes to my writing when using gen-AI compared to only using the checklist provided by my teacher.	46.8	30.6	22.6	3.34	1.17
	Overall					3.63	
Affective	9	I would prefer continued use of gen-AI in the feedback process in future assignments.	80.6	12.9	6.5	4.07	0.85
	10	My overall perception of the use of Gen AI in the feedback process is positive.	77.4	17.7	4.8	4.05	0.84
	11	I feel confident in interpreting feedback with the help of Gen AI.	75.8	17.7	6.5	3.97	0.91
	Overall					4.02	

Cognitive dimension. As shown in Table 3, the average score for the cognitive dimension was 4.10, indicating a high perceived effectiveness of gen-AI in enhancing engagement with feedback. A majority of students responded positively, with 75.8% agreeing that gen-AI enhanced their understanding of

teacher feedback, 77.4% finding gen-AI helped them better understand their mistakes, 74.2% agreeing that it provided useful insights to supplement teacher feedback, and 75.8% believed that this approach contributed to improving their overall writing skills.

Qualitative data from interviews confirmed these findings, with all interviewees stating that gen-AI effectively enhanced their cognitive engagement. Frequently mentioned themes included its role in reducing cognitive load by simplifying complex feedback and breaking down feedback into smaller tasks, improving attention to detail, and encouraging critical thinking. According to students' responses, gen-AI tools effectively addressed the challenge of decoding complex feedback by simplifying intricate teacher comments, thereby reducing cognitive strain. Students 5, 6, 7, and 9 noted that the AI made comments more comprehensible, helping them decode teacher feedback. Students 1, 3, and 4 also appreciated that "AI generates samples based on feedback," which helped them understand and apply teacher feedback more effectively. Student 2 highlighted another benefit of AI: summarizing feedback. She noted, "By inputting the teacher's feedback checklist, AI can create a more readable summary, which makes it easier for me to comprehend complex feedback." By simplifying complex feedback through examples and summaries, gen-AI reduces cognitive load and makes it easier for students to decode and implement teacher feedback. This finding aligns with Dai et al. (2023), reinforcing the idea that gen-AI's ability to provide summaries can be a key factor in enhancing students' cognitive engagement with feedback.

Students reported that gen-AI reduced cognitive load by breaking feedback into actionable steps, making revisions more manageable. Students 5, 6, and 8, for example, valued how AI guided them through each step of the revision process, making the process less overwhelming. According to Student 5, "Teacher feedback sometimes feels overwhelming, but AI breaks it into actionable suggestions, which I can then refine step by step." Similarly, Student 8 consulted AI for explanations and actionable steps when he received teachers' comments such as "restructuring a paragraph". Additionally, Students 4, 8, and 9 mentioned that by automating simpler tasks such as correcting grammar and spelling, gen-AI allowed them to redirect their cognitive resources toward more complex aspects of writing such as refining arguments or improving essay structure. This finding aligns with Zhang and Hyland (2018), who emphasize that engagement with feedback requires a supportive framework to process and apply teacher input. Similarly, Solovey (2024) observed that students found gen-AI tools like ChatGPT valuable for addressing mechanical errors and clarifying teacher feedback, though its utility in improving expression quality was sometimes limited.

Another key finding from the interviews was that this integrated approach helped students focus more on specific details. Many reported that using gen-AI tools enabled them to pay greater attention to detailed feedback, with several students noting that AI-generated examples clarified specific points. For example, Student 9 shared that AI feedback made him more aware of his language mistakes, allowing him to focus more on this area in subsequent revisions.

Furthermore, the integration of gen-AI also encouraged critical thinking and problem-solving. Students 1, 2, 3, and 7 indicated that crafting prompts for the AI required them to think critically about their writing and the feedback they received. Additionally, Students 1, 4, and 9 mentioned that evaluating AI-generated suggestions required them to make informed decisions about which revisions to implement. This evaluative process, as Student 1 explained, sharpened his critical thinking skills by pushing him to determine which feedback was truly valuable.

Behavioral dimension. The behavioral dimension examined how students interacted with feedback and the extent of changes made to their writing. Although the cognitive and affective dimensions received comparatively higher engagement mean scores (4.10 and 4.02), the behavioral dimension (3.63) still indicated significant student interaction with feedback. Survey results showed that 66.1% of students used gen-AI to clarify unclear teacher feedback, while only 19.4% reported doing nothing about feedback they did not understand, demonstrating a proactive approach to seeking AI assistance. Additionally, 46.8% of students reported making more revisions to their writing when using gen-AI compared to the teacher-provided checklist only, indicating an active engagement with feedback facilitated by gen-AI.

Interview data and revised student essays further supported these findings, revealing that gen-AI positively influenced behavioral engagement. All interviewees agreed that gen-AI effectively encouraged them to take more action in response to feedback. For example, Students 7 and 9 described gen-AI suggestions as “definitely actionable and helpful,” underscoring its role in guiding their revisions. Most students reported making more changes after using gen-AI, for example, Student 1 stated, “Now I am making more detailed revisions because revision is much easier,” and Student 2 added, “Using gen-AI can save a lot of time and therefore help me to make more changes.” These insights suggest that gen-AI not only helped students understand feedback but also motivated them to engage more actively in the revision process. In Appendix B, the revised version is a significant improvement over the original. It enhances clarity, academic tone, logical flow, and depth by incorporating background context, statistical support, and a well-defined thesis statement, with approximately 60–70% more words in the revised version.

Additionally, the interviews revealed that students experienced a shift in their revision approaches after integrating gen-AI. For example, Student 5 moved from complete rewrites to more iterative edits guided by both AI and teacher feedback, while Student 3 expanded revisions beyond grammar and citations to more comprehensive changes. This integrated approach also enhanced student proactivity and independence. Students 6, 7, and 9 noted that AI made them more proactive in addressing feedback and reduced procrastination; to be more specific, Student 9 noted that “Sometimes when you feel like you’re stuck at one problem, you don’t feel like doing it, and that caused me to procrastinate... I feel like using gen-AI is making me more comfortable in trying to revise it directly and more.” Additionally, Students 1 and 6 reported

using multiple gen-AI models for several rounds of changes, allowing deeper engagement with feedback. This shift of revision strategies seen in the interview results demonstrates that gen-AI not only enhanced students' ability to understand feedback but also provided them with the knowledge of effective strategies and guided them in translating teacher feedback into actionable steps for their revisions.

Interestingly, despite the high adoption rate of gen-AI, 72.6% of students disagreed with ignoring teacher feedback entirely, indicating that they still regard teacher feedback as the primary authority. This sentiment was echoed in the interviews, where several students reported using gen-AI as a supplementary tool rather than a replacement. For example, Student 7 mentioned, "The suggestion offered by gen-AI is only a suggestion, not an answer." Similarly, Student 6 stated that "AI feedback cannot replace teacher feedback; the two can complement each other." Student 4 also reinforced this idea, noting that "AI helped me understand my teacher's feedback better, but I still made final decisions based on what the teacher said." These comments underscore the value students place on human expertise alongside AI assistance, aligning with Solovey (2024), who found that students typically preferred teacher feedback for its depth and reliability, while viewing gen-AI as a tool for quick, supplementary corrections.

The behavioral engagement observed in this study, characterized by students' relatively lower scores in behavioral measures despite their active cognitive engagement, contrasts with Luo et al. (2024), who found that lower-proficiency students (A2–B1) demonstrated high behavioral engagement with Grammarly but low cognitive processing of its feedback. This divergence may stem from differences in language proficiency, as the participants in this study were at a higher proficiency level (B2), likely enabling them to critically process feedback rather than adopting suggestions uncritically. Additionally, while the students in Luo et al.'s (2024) research accepted automated written corrective feedback offered by Grammarly without critical thinking, the students in our study appeared more cognitively engaged, reflecting a deeper interaction with feedback. These findings highlight the importance of considering proficiency level and feedback approach when integrating AI tools into language learning.

Affective dimension. The affective dimension of the study explores students' attitudes toward the integration of gen-AI in the feedback process. Overall, the survey results indicate a strong positive sentiment regarding gen-AI's role in their learning, with a mean score of 4.02 across the affective dimension, highlighting a favorable view of the approach examined.

A notable theme that emerged is the strong preference for the continued use of gen-AI in future assignments, with 80.6% of students expressing support (strongly agree/agree) for this statement. Student 1 articulated this sentiment clearly, stating, "I would encourage my friends to use AI because it's becoming an essential skill." Several interviewees also expressed intentions to apply gen-AI beyond EAP classes, extending to other academic disciplines. For instance, Students 5, 6, and 7 all mentioned that they plan to use gen-AI to help understand teacher feedback across various disciplines. This indicates that students

recognize the versatility of gen-AI as a valuable resource for enhancing their overall academic performance, reinforcing its perceived long-term benefits beyond just writing assignments.

Students also conveyed an overall positive perception of gen-AI, as indicated by 77.4% of respondents approving of its role in the feedback process. Confidence in interpreting feedback with the help of gen-AI was also high, with 75.8% of students expressing confidence in using the tool. Interview data further supported these findings, with many students reporting increased confidence (Students 1, 2, 5, 9) and higher satisfaction (Students 3, 6, 9). For example, Student 9 described his feeling about the integration of gen-AI as “definitely helped me feel more confident and satisfied”, and Student 4 commented, “With AI, my work feels smoother and easier to read, and I feel more assured about the quality.” Several students also reported a decrease in anxiety and stress (Students 4, 7, 8) after adopting gen-AI. For instance, Student 4 mentioned that the support of gen-AI reduces his stress during both the feedback implementation process and the essay drafting stage. Similarly, Student 6 remarked that using gen-AI felt empowering, as it allowed students to revise more effectively and catch errors they might otherwise overlook. By offering clear guidance and actionable suggestions, gen-AI helped students feel more in control of their writing process, which in turn allowed them to approach feedback with a more positive and proactive mindset.

Moreover, 7 out of 9 students valued the time efficiency and convenience of using gen-AI. Student 5 perceived AI as “very simple” and “human-like,” but “faster than human and therefore can save time”, appreciating its quick responses and ability to handle multiple revisions efficiently. Student 2 echoed these sentiments, finding AI saves time “by summarizing the teacher’s feedback, making it easier to understand and act upon.” Students 5 and 6 also emphasized the efficiency and convenience of using AI compared to traditional methods like consulting dictionaries or peers. These comments illustrate that students appreciate the time-saving and convenience benefits of gen-AI, indicating its perceived utility. Convenience is also highlighted by Bok and Cho (2023), noting that students not only appreciated accurate error detection and corrections but also the convenience afforded by gen-AI tools.

Overall, the interviews revealed very positive feelings about the hybrid approach and its impact on their writing, with phrases like “positive,” “very optimistic about it,” and “it feels great” frequently mentioned. In Koltovskaia and Mahapatra’s (2022) study, participants felt overwhelmed by the sheer volume of teacher comments provided via Microsoft Word. Integrating teacher feedback with gen-AI tools seems to offer a potential solution to this challenge, as gen-AI can help students summarize teacher feedback. In findings by Luo et al. (2024), students initially experienced anxiety but later developed trust in Grammarly’s feedback. The presence of teacher feedback in the hybrid mode appears to alleviate this concern by combining the personalization and depth of teacher input with the clarity and efficiency of AI tools, thus fostering a more positive and emotionally supportive feedback experience for students.

Despite the positive feedback, some students also expressed mixed feelings

towards the use of gen-AI. To further understand the concerns and challenges of students, students were asked to describe their concerns and challenges in using gen-AI to engage with teacher feedback. According to survey results, the primary concerns included academic dishonesty (79.03%), the quality of AI responses (64.52%), and the difficulty in formulating precise questions (61.29%). These concerns were echoed in interviews, with five out of nine interviewees expressing worries about academic dishonesty and unclear institutional policies, a finding that aligns with Chan and Hu (2023), who reported that students felt uncertain about using gen-AI due to a lack of clear guidance.

Students also doubted the quality of AI feedback, with 64.52% struggling to determine its accuracy and 43.55% believing that gen-AI struggled with complex feedback. Interviewees, including Students 1, 5, 6, and 7, felt that AI-generated responses were often “too general and broad,” and Student 1 added they were “inflexible and too formal.” This concern is consistent with Kasneci et al. (2023), who noted that AI can sometimes produce low-quality or incorrect content.

The third concern was difficulty in formulating precise prompts (61.29%). Three interviewees found it challenging to provide accurate questions, stating that “It’s difficult to give precise prompts to gen-AI” and that they had to ask several questions to get useful responses. Researchers like Atlas (2023) and Warschauer et al. (2023) also emphasize that precise prompts are crucial for obtaining accurate AI feedback. Notably, follow-up questions revealed these students had not utilized the sample prompts provided by researchers, suggesting a disconnect between recognizing the approach’s cognitive/affective value and its behavioral implementation. This pattern partially corresponds with the finding that while students cognitively and affectively consider this approach as useful, their behavioral engagement scores were comparatively lower.

Another concern raised by students includes fairness and over-dependence on AI, fearing it might give an unfair advantage and potentially diminish their skill development. For example, Student 5 used the word “scared,” fearing that over-reliance on AI might lead to laziness and bypassing the learning process. These concerns align with Chan and Hu (2023) and Li (2023), who noted that over-reliance on AI could hinder critical thinking and problem-solving skills.

Privacy risks further compounded these anxieties. While Chan and Hu’s (2023) survey highlighted the risk of privacy leakage as a general student concern, our study revealed more contextualized privacy anxieties. One interviewee specifically worried about institutional data monitoring through university-provided AI platforms. Students’ technology-specific concerns extended beyond privacy to include practical challenges like slow generation times, unstable network connections, and the need for more comprehensive AI training.

Despite these concerns, the integration of gen-AI predominantly enhanced students’ affective engagement with the feedback process, with the majority expressing increased confidence, satisfaction, reduced stress, and appreciation for its convenience and efficiency.

Conclusion

This study examined the integration of gen-AI in the EAP writing feedback process and found that this approach has shown promising results in enhancing feedback engagement. In response to the first research question, students expressed a positive perception of gen-AI's effectiveness in the feedback process, appreciating its ability to clarify feedback and provide actionable suggestions. The majority of participants found that gen-AI made the feedback process more accessible and easier to implement, which improved their overall writing experience. Students found gen-AI particularly helpful for improving language skills such as grammar, vocabulary, and academic writing competencies like paragraphing, idea development, essay structure, and coherence. Despite its effectiveness, students emphasized that gen-AI should not replace teacher feedback but rather complement it, suggesting that the hybrid approach offers a more balanced and comprehensive learning experience.

Regarding the second research question on how gen-AI impacts cognitive, behavioral, and affective engagement, the study revealed that gen-AI positively influenced all three dimensions. Cognitively, students reported that gen-AI helped them better understand teacher feedback, enabling them to implement teacher suggestions more effectively and improve overall writing skills. Behaviorally, students were more proactive and engaged in the revision process, making more changes to their writing with the assistance of gen-AI. Affective engagement was also enhanced, as students expressed increased confidence, reduced stress, and greater satisfaction with their writing when using gen-AI. Importantly, the integration of gen-AI addressed key barriers to student engagement, as Winstone et al. (2017) identified earlier, such as difficulties in decoding feedback, lacking knowledge about effective strategies, and translating feedback into actionable steps, which contributed to a more empowered learning experience.

Despite the positive feedback, several concerns were raised by students, including issues related to academic dishonesty, the quality of AI-generated responses, their ability to use AI effectively, the risk of growing dependence on AI, and technology-specific concerns. To address these concerns, both students and teachers suggested implementing a detailed AI policy to provide clarity and proper usage guidelines. Incorporating gen-AI into regular EAP teaching and offering instruction on how to write effective prompts could further enhance the educational experience. Moreover, emphasizing the responsible use of gen-AI is crucial, and both students and teachers need to recognize the importance of treating AI critically, despite its helpfulness.

In conclusion, this study demonstrates that integrating gen-AI with teacher feedback offers a promising approach to enhancing student engagement in EAP writing. By combining the strengths of AI with human expertise, this hybrid method not only supports students in overcoming engagement barriers but also fosters a more balanced, effective, and nuanced learning experience.

Several limitations of this pilot study must be noted. Firstly, the research results are based on a comparatively small sample size and were conducted in a single institutional context. This may limit the generalizability of the findings



to other educational settings with different technological infrastructures or gen-AI policies. Secondly, while the study included students from both Year 1 and Year 2, it did not explore differences between these two cohorts. As a result, variations in their engagement with gen-AI, potentially influenced by language proficiency, feedback literacy, academic experiences, or task requirements between the two cohorts, remain unexplored. Additionally, the study did not account for the influence of students' familiarity with gen-AI tools on their perceptions and usage. Variability in prior exposure and comfort with these tools may have influenced how students interacted with and perceived the feedback process. Moreover, while this study captured students' perceptions, it did not assess whether these perceptions align with actual improvements in their writing. Further research should examine whether students' self-reported enhancements in their writing skills correlate with objective measures of their progress. Finally, the study did not assess the longer-term impact of using gen-AI on sustained improvements in writing. Future research could examine whether consistent use of gen-AI tools leads to ongoing development in writing proficiency over time.

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Year 2 feedback checklists and pre-tested prompts

Argumentative Essay Checklist	Yes/No	Possible prompts
Task requirements		
1. Is the essay more than 300 words?		
2. Is there a clear stance ?		e.g. My teacher says I don't have a clear stance in this thesis statement '...'. What does it mean? How can I revise this thesis statement '...' to make my stance clearer?
3. Are there at least 3 in-text citations?		
4. Does the author only use both of the provided sources?		
5. Is the essay on topic ?		
6. Is there at least one argument , one counter argument and rebuttal in the body paragraphs?		
7. Is the essay organized in an appropriate structure (block structure/integrated structure) ?		
Introduction		
8. Is appropriate background (argumentative contrast) information on the topic given?		e.g. What is an argumentative contrast? How can I revise the following sentences '...' into an argumentative contrast? How can I add an argumentative contrast on the topic of '...', before my thesis statement: '...'
9. Thesis statement: Does the author clearly state his/her stance in the last sentence of the introduction?		e.g., Does my thesis statement '...' clearly state my stance: 'Leaders should (not) always ask for team members' opinions before making decisions.'? Can you revise my thesis statement '...' and have it clearly state my stance of agreeing/disagreeing with the statement '...'?
10. Thesis statement: Is there a brief outline given in the thesis statement?		e.g. What does it mean by 'Thesis statement'? Can you revise my thesis statement '...' and have it include an outline of my two arguments '...' and '...' Can you revise my thesis statement '...' based on the template here: this essay will + stance + two arguments?
Body paragraphs		
11. Does each body paragraph have a clear topic sentence?		e.g. Can you revise this sentence '...' into a clearer topic sentence for this paragraph '...'?
12. Are arguments sufficiently supported with details and evidence?		e.g. Can this sentence '...' (evidence/details) support my argument of '...' ?
13. Does at least one of the body paragraphs contain a counter-argument and a rebuttal?		e.g. My teacher says my rebuttal '...' does not appropriately refute my counter-argument '...', how can I revise?

14. Is appropriate language used to introduce arguments, counter-arguments, and rebuttals?	e.g. This is my argument for an argumentative essay '...'. Can you revise the language to make it more appropriate and clearly identify itself as an argument? Can you provide examples of appropriate language to introduce arguments, counterarguments, and rebuttals?
15. Are rebuttals closely linked to counter-arguments?	e.g. Could you modify my rebuttal '...' and make it more closely linked to/better refute my counterargument '...'?
16. Are ideas fully developed?	
17. Is information arranged logically? Is it easy to follow and understand?	e.g. My teacher says the information in this paragraph '...' is not arranged logically and is not easy to follow, how can I revise?

Conclusion

18. Does the author restate his/her stance?	e.g. How can I effectively restate my stance in the conclusion while avoiding repetition of the introduction? Can you paraphrase/restate my statement '...'?
19. Does the author summarize his/her main arguments?	e.g. What is the best way to summarize my main arguments in the conclusion to reinforce my essay's overall message? How can I briefly summarize my counterarguments and rebuttal '...' into one sentence?
20. Is there a closing statement?	e.g. How can I craft a compelling closing statement that leaves a lasting impression on the reader? How can I make a recommendation based on my essay as my closing sentence?
21. Did you avoid including new ideas in this part?	

Citations

22. Are ideas from the text well paraphrased?	e.g. Can you paraphrase this sentence '...'?
23. Are citations correctly formatted?	e.g. Can you correct the formatting of this in-text citation '...' according to the Harvard referencing style? What are the citation issues with this sentence '...'? We use the Harvard Referencing System.
24. Are varied ways of integrating sources used?	e.g. How can I use a different way to integrate the source in this sentence '...'?
25. Are most of the sources relevant and well integrated?	e.g. How can I make this source '...' better integrated with my idea '...'?

Language

26. Are there a range of complex grammar structures (passive, clauses, etc.)?	e.g. Can you combine these sentences '...' into a complex sentence? Can you correct the grammar errors in this paragraph '...'/sentence '...'?
27. Is there a wide range of academic and business-specific vocabulary ?	e.g. What is an academic/informal way to say "..." Can you polish this sentence "..."?

28. Are there sufficient cohesive devices?	e.g. How can I incorporate more cohesive devices to improve the flow and coherence of this paragraph? What additional cohesive devices can I incorporate to improve the flow and coherence of this paragraph? How can I improve the cohesion between these sentences "....."? Are there any other cohesive devices for me to use to connect these sentences "....."?
29. Does the author mostly follow the academic style of writing?	e.g. Can you check my essay and make sure it consistently follows an academic style, particularly in terms of tone and formality?

Appendix B

Excerpt from student writing before and after hybrid feedback implementation

Original version

Leadership, the technique used by leaders to direct and motivate followers, is evolving rapidly in the fast changing world. Participative leadership is becoming more favored, as its authoritative counterpart has been dominant until 70's (Hart, 2021). In the process of comparing and combining these two leadership styles, a large debate on whether followers should be involved in decision-making process sustained. This essay is going to argue that leaders should always ask for team members' opinions before making decisions.

Revised version

With the advancement of technology, industries transition to be more knowledge-intensive, leading to a heightened dependency on human capital within companies. Leadership plays a pivotal role in shaping employee behavior through their management practices. Despite its significance, 82% of organizations report a failure to recruit competent and suitable managers (Andrews, 2019). Skilled leaders often assess the advantages and drawbacks before implementing practices such as decision-making involvement. Some scientists state that the opinions of employees should be considered during the decision-making process, while there are also leaders who claim decision-making should not involve the opinions of employees. This essay is going to argue that leaders should always ask for team members' opinions before making decisions in terms of the benefits of avoiding making efforts in the incorrect directions and empowering employees.

Relevant teacher feedback on the checklist

Argumentative Essay Checklist	Yes/No (original version)	Yes/No (revised version)
Introduction		
1. Is appropriate background (argumentative contrast) information on the topic given?	No	Yes
2. Thesis statement: Does the author clearly state his/her stance in the last sentence of the introduction?	Yes	Yes
3. Thesis statement: Is there a brief outline given in the thesis statement?	No	Yes
Language		
4. Are most of the sentences error-free?	No	Yes
5. Is there a wide range of academic and business-specific vocabulary ?	No	Yes



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