Investigating Academic Writing Workload Among English Department Students: A NASA-TLX Analysis of Gamified Instruction

Monika Łodej
Jan Kochanowski University, Poland

Abstract

This study investigates the workload experienced by English Department students in a gamified academic writing task. The NASA Task Load Index (NASA-TLX) serves as the primary instrument for analyzing workload distribution across six dimensions: mental demand, physical demand, temporal demand, performance, effort, and frustration. Additionally, the study examines its correlation with self-reported perceived learning and learning outcomes. Data collected from 23 Master's students in Poland indicate a moderate overall workload, with effort and frustration emerging as the primary contributors. While students reported improvements in citation mastery, perceived workload did not exhibit a significant correlation with final grades. The findings suggest that gamification can enhance student engagement without imposing excessive cognitive strain.

Keywords: academic writing; workload; higher education; English Medium Instruction (EMI); gamification

1. Introduction

Academic writing is a core skill in higher education, particularly in tasks that emphasize precise language, structured argumentation, and critical engagement with sources, such as writing essays, term papers, and MA theses. The workload associated with academic writing can be significant, particularly for English Department students, who are expected to develop complex analytical skills and adhere to rigorous citation standards. This challenge becomes even greater for students for whom English is the medium of instruction, particularly those from non-Anglophone educational systems where academic writing conventions differ, for example, students who write in English but were educated in a different linguistic and cultural tradition. These students often navigate academic conventions that may differ significantly from those in their home education systems, where rhetorical structures, citation practices, and expectations for argumentation can vary. Consequently, they face additional cognitive

load in simultaneously mastering course content and expressing their ideas in an acquired language, which can make the writing process even more demanding.

Research indicates that English Medium of Instruction (EMI) students struggle with organizing information effectively and complying with style guides, thus reflecting differences in academic conventions between their native and target educational contexts. These students often encounter difficulties in adjusting their writing styles to align with academic expectations, which can differ significantly from those in their home countries (Liu 2005). Consequently, the academic writing workload for these students may extend beyond content mastery to include the ongoing negotiation of language, discourse conventions, and cultural expectations within their field. For instance, Lin (2015) found that many English Language Learner (ELL) students struggled to adjust their writing styles to align with American academic thought patterns, as they tended to think in their first language and apply its rhetorical structures when composing English essays. This difficulty was found to arise due to the fact that writing patterns are deeply embedded, both cognitively and culturally, making adaptation a time-consuming process. Additionally, Amano et al. (2023) revealed that non-native English-speaking researchers require significantly more time to read and write English-language papers compared to their native-speaking counterparts, indicating a higher cognitive load and extended workload. In sum, non-native English-speaking students face a multifaceted academic writing burden that goes beyond language proficiency. They are required to navigate different writing conventions, adapt to unfamiliar citation standards, and bridge diverse academic expectations, all while managing an increased cognitive load.

The reported challenges faced by English Department students in academic writing, especially those dealing with English as a Medium of Instruction, highlight the need for an examination of how instructional strategies can help reduce the cognitive load. Although gamification has been adopted in language learning (e.g., gamified vocabulary acquisition), its impact on the workload in academic writing remains underexplored. Similarly, while writing load has been discussed in terms of cognitive effort, few studies have applied an empirical workload measurement framework such as NASA-TLX, which measures not only cognitive but also physical and emotional factors. Therefore, this research, by applying the NASA Task Load Index (NASA-TLX) to this specific learning context, aims to evaluate whether gamified academic writing instruction can mitigate the perceived cognitive demands experienced by EMI students. Understanding the workload distribution across different types—mental demand, physical demand, temporal demand, performance, effort, and frustration—helps provide a comprehensive evaluation of the cognitive, physical, and emotional challenges faced during the academic writing task.

2. Academic writing and cognitive load in higher education

Writing workload is considered to be triggered by multiple factors, including cognitive demands, cultural demands, and linguistic proficiency. As observed by Flower and Hayes (1981), the process of writing involves a series of distinct cognitive activities that writers coordinate while composing a text. These activities are not linear but operate within a hierarchical structure where one process can be embedded within another. Writing is

fundamentally a goal-directed cognitive task, shaped by the writer's evolving network of objectives. Writers set their own goals in two primary ways: by establishing overarching goals and sub-goals that reflect their developing sense of purpose and, at times, by modifying or even redefining these goals based on insights gained during the writing process. Specifically, university-level academic writing classes can call for students to engage in tasks that demand high levels of cognitive effort, such as research, synthesis of sources, and adherence to formal writing rules (Hyland 2018).

Building on this, Sweller (1988) emphasized in the Cognitive Load Theory (CLT) that the efficiency of learning and cognitive performance is affected by the way information is processed in working memory. The CLT (Sweller 2010) provides a useful framework for understanding the challenges students face in academic writing. According to this theory, learners experience three types of cognitive load: intrinsic, extraneous, and germane. Intrinsic cognitive load relates to the natural complexity of information, such as organizing ideas and constructing arguments. Extraneous cognitive load depends on how the instruction is designed and comes from unnecessary difficulties, such as unclear instructions or unfamiliar formatting requirements, which make writing harder than necessary. Germane cognitive load focuses on knowledge and is related to the mental effort that helps students develop writing skills and improve their understanding, such as practicing academic writing conventions and refining their arguments. Writing, being a cognitively demanding task, imposes intrinsic cognitive load due to its complexity, extraneous cognitive load when poorly designed instructional methods interfere with the writing process, and germane cognitive load when cognitive resources are effectively allocated toward developing structured and meaningful written content. When cognitive overload occurs, writers may struggle to balance idea generation, organization, and revision. Therefore, effective instructional strategies should aim to optimize cognitive load by reducing unnecessary cognitive strain and allowing writers to focus on higher-order skills such as argumentation, coherence, and refinement.

Akin and Murrell-Jones (2018) aimed to close the gap in academic writing by exploring how the cognitive load theory can enhance academic writing instruction in higher education. The study identified key challenges students face, including difficulties in synthesizing theory and application, selecting appropriate scholarly resources, and managing the cognitive demands of academic writing. Using qualitative research methods, the study examined existing instructional practices and suggested new strategies to improve academic writing and concluded that explicit writing instruction is often lacking, leaving students without structured support to develop critical thinking and effective writing skills. In addition, it highlighted that students struggle with specific aspects of sentence structure, argument organization, citation styles (such as APA), and overall writing coherence. Writing instructors reported that many students do not fully utilize feedback, leading to persistent issues in writing quality. To explain these challenges, it is essential to emphasize the importance of reducing extraneous cognitive load, such as unclear instructions and redundant tasks, optimizing intrinsic load by tailoring assignments to students' expertise, and increasing germane cognitive load to enhance students' ability to process and apply academic writing principles. The key findings reveal that explicit academic writing instruction is essential but often missing, leaving students without the necessary guidance to develop their writing skills

effectively. Many students struggle to understand and apply course content in writing, as they face challenges in bridging the gap between their cognitive processes and the demands of academic writing.

Following from that, Wang (2024) emphasizes causal-chain windowing as a cognitive process that shapes how writers highlight causes and effects to guide readers' attention. This theory suggests that writers selectively 'window' causes and effects, directing focus and influencing how events are interpreted. Given an appropriate context, readers can infer missing elements of a narrative, while different ways of framing the same scene can evoke varied responses. Causal-chain windowing theory has practical applications in writing instruction, as it enhances both static descriptions in expository writing and dynamic elements in narrative writing. Wang (2024) explores this perspective through two key aspects: windowing of attention and causal chaining. The former helps students modify sentence structures and organize paragraphs, while the latter aids in choosing precise language to express clear causal relationships. By integrating these principles into writing instruction, Wang (2024) suggests that causal-chain windowing can help students produce more structured, coherent, and engaging texts.

Jinhui and Samu (2024) examined the writing of Chinese students through the theory of distributed cognition, which posits that cognitive processes are not confined to individuals but are distributed across people, media, and the environment. Using a three-draft process, learners initially relied on individual cognition but faced challenges such as uncertainty in topic selection, structural issues, and limited idea development. In the second draft, access to external cognitive resources—such as online dictionaries and reference materials—helped clarify misunderstandings, refine sentence structures, and improve coherence. By the third draft, the integration of automated feedback, peer reviews, and teacher comments fostered collaborative learning, leading to noticeable improvements in vocabulary richness, sentence complexity, and content organization. These findings highlight that a distributed cognition approach enhances writing proficiency by allowing learners to refine their work through interactive, technology-driven, and socially supported processes. This suggests that integrating external cognitive resources and structured feedback mechanisms into writing instruction can help students overcome writing challenges more effectively, ultimately fostering stronger composition skills.

In practical terms, Arliyanti and Hapsari (2022) highlighted that while process-based writing has been widely studied and applied in higher education, there is still a limited understanding of how cognitive strategies are employed in this approach. Therefore, they designed a study conducted with two English language education students from a private university in Yogyakarta to explore how EFL undergraduate students used cognitive strategies in process-based essay writing. The findings revealed that both participants used different writing strategies in the planning stage of the essay writing process. One student organized her writing using an outline, whereas the second student used keywords to organize his writing. This study suggests that when teaching process-based essay writing, language teachers or lecturers should be aware of the different stages of students' cognitive strategies, especially during the planning stage.

The cultural demand, on the other hand, is seen by Flower (1994) as being integrally inscribed in cognitive theory through the idea that writing is embedded in socially literate practices that require writers to respond to external expectations and discourse norms. Flower argues that social expectations, discourse conventions, and the writer's personal goals and knowledge become inner voices. The tension among these forces often creates the hidden logic behind student writing. Writers therefore navigate the tensions between personal meaning-making and the broader cultural frameworks that dictate how texts should be structured, interpreted, and valued. This aligns with the idea that literacy is not just about individual expression but about adapting to the communicative norms of specific communities. Flower's theory of negotiation highlights how writers internalize cultural and discourse conventions as 'inner voices' shaping their writing decisions. This means that cultural demand manifests as both an external constraint and an internalized expectation—writers must reconcile their personal rhetorical choices with cultural norms and social expectations. The process of negotiation allows writers to engage with, resist, or reshape these cultural forces, leading to meaning-making that is both personal and socially situated. In essence, Flower's framework suggests that cultural demand is not just a backdrop but an active force in writing. It influences how students construct meaning, adopt discourse conventions, and position themselves within academic and social contexts, making writing a site of tension, conflict, and adaptation to cultural literacy expectations.

In the same vein, the study by Rahmat and Whanchit (2024) aimed at exploring the writing process from the social-cultural theory, revealed that, contrary to popular beliefs, writing is not a solitary process. Writers use language to communicate with the people around them, both for content and as an audience to their work. The study found that the writing process can be considered a social-cultural task in several ways. Specifically, it revealed a strong positive relationship between language use, zone of proximal development, and social interaction. The valuable insights for teaching writing strategies based on the study's findings emphasize the importance of organization, review, and communication in writing. Clear structure and organization in writing tasks are observed to be essential for clarity, and reviewing one's own work can significantly enhance this clarity. Writing serves not only to present content clearly but also to engage the reader, with language use acting as a tool for effective communication. Cognitive skills such as planning ideas before writing play a crucial role, and employing brainstorming and outlining techniques can facilitate this process. The study also highlights the value of social interaction, with engagement during challenging writing tasks helping students feel more confident and reducing anxiety. Collaborative writing activities and peer feedback foster this social engagement, contributing to a more supportive learning environment. Furthermore, the positive relationships between language use, zone of proximal development, and social interaction suggest that writing tasks should be designed to provide appropriate scaffolding, guiding students through tasks that are just beyond their current abilities. These insights underline the significance of combining cognitive, social, and language-use strategies in writing instruction to enhance student engagement, reduce writing-related stress, and improve overall writing skills.

Linguistic proficiency is also found to contribute to writing workload (Aizawa et al. 2020). The data collected from Japanese undergraduate students reveal that linguistic

proficiency is shown to significantly influence writing workload in EMI settings. Students with higher English proficiency, as measured by TOEIC scores, experienced fewer challenges in academic tasks, including writing. This is because they could more easily understand course material and express their ideas clearly in writing. Although the study didn't identify a specific proficiency threshold, it revealed that students with lower proficiency faced greater challenges in writing tasks, resulting in a heavier workload. The paper also highlights that other factors, such as prior content knowledge, motivation, and the classroom learning environment, also impact students' ability to manage writing tasks. Therefore, students with lower language proficiency may require more time and support to complete writing tasks effectively, leading to an increased workload. Similar conclusions were yielded from the data obtained from graduate students with EMI in Kazakhstan (Tajik et al. 2024), which found that many students struggle with various aspects of academic writing due to low English proficiency, as well as specific challenges in academic writing such as style, documentation practices, and paraphrasing. Additionally, the findings that highlight insufficient exposure to English in earlier stages of their academic journey, along with gaps in available language and writing support, are also considered contributing factors. The paper concludes that these challenges, in turn, reflect broader tensions between policy goals for English Medium Instruction and the practical realities faced by students.

The lack of academic English skills of EMI, as a contributing factor, has also been observed in Icelandic students enrolled in the English Department. The so-termed "hidden challenge" (Ingvarsdóttir & Arnbjörnsdóttir 2014, in Arnbjörnsdóttir 2017: 77) was reported to be caused by an overconfident perception of students' English proficiency by university officials and by the students themselves. This situation arose from the Department of English's objective to quickly elevate students to a level of academic English that enabled them to engage with a curriculum and instruction based on English as a native language norms. The challenges students faced highlighted the need to adapt teaching and learning practices, as they differed from those encountered in their previous EFL-focused environments with limited writing experience. Research revealed that students' struggles in this new context, where English functioned as an additional language, underscored the importance of targeted instructional approaches. Based on the data, an intensive approach aimed at addressing the English academic literacy needs of students entering the University of Iceland was introduced. The approach reached its goals by fostering awareness of writing conventions, teaching when and how to apply strategies, improving revision skills, and encouraging persistence in rewriting until the text authentically reflected the author's ideas. Ultimately, the research demonstrated that through writing, students gained an understanding of English academic texts, which enhanced their reading skills.

It is to be observed that non-native English-speaking students often struggle with paraphrasing due to limited lexical and syntactic flexibility (Keck 2006). Academic English requires a level of linguistic proficiency that allows for meaning retention while modifying sentence structure, which can be particularly challenging for L2 learners. Research suggests that students with lower proficiency are more likely to rely on direct quotations or slightly modified sentences from sources, sometimes leading to textual plagiarism (Chandrasoma et al. 2004). Additionally, the complexity of citation styles, such as APA, MLA, and Chicago, can

create further difficulties for students unfamiliar with the nuances of attribution in English academic discourse (Hyland 2018). Recognizing this, universities worldwide have started implementing strict plagiarism detection systems. However, non-native students often report feeling anxious about these systems, fearing unintentional plagiarism due to differences in cultural expectations (Liu 2005). In addition, studies indicate that students who receive explicit instruction on plagiarism, citation techniques, and academic integrity policies demonstrate improved writing performance and greater confidence in source use (Bretag 2013). Institutions that integrate culturally sensitive plagiarism education, rather than punitive approaches, help students transition more effectively into Western academic writing norms (Introna et al. 2003).

In sum, academic writing workload in EMI contexts is shaped by cognitive, linguistic, and cultural demands, creating significant challenges for non-native English-speaking students. Beyond cognitive strain, students are expected to navigate unfamiliar rhetorical structures, adapt to new citation standards, and reconcile differences between their previous academic training and EMI expectations. Research highlights that distributed cognition, process-based writing, and scaffolding can help manage workload by easing the transition to new academic norms. Additionally, gamification has been explored as a strategy to reduce perceived workload by increasing engagement (Pitura 2022) and providing structured, interactive learning experiences (Turula 2021). However, without targeted support, EMI students often experience increased mental effort, frustration, and time pressure, making academic writing a persistent challenge.

3. Research aims and rationale

Higher education students often experience high workload levels due to multiple academic and extracurricular activities (see e.g., Chambers 1992; Jääskeläinen et al. 2022; Kember 2004; Kyndt et al. 2013 for reference). Specifically, academic writing is a cognitively demanding process that requires students to engage in complex tasks such as critical thinking, argument development, and synthesis of multiple sources. The study performed on university students in Saudi Arabia showed that the complexity of academic writing assignments, combined with the pressure to meet institutional expectations, can contribute to students excessive burnout (Al Murshidi 2014). For students studying in English-Medium Instruction (EMI) settings, academic writing presents additional challenges due to the requirement to operate in a non-native language (ref. Knoch et al. 2015). A Polish study on the cognitive load involved in learning academic words through writing composition confirms this proposition, as it revealed that "if learners are under heavy cognitive load, as in this study, sentence writing may be more conducive to lexical learning than essay writing" (Silva et al. 2021: 1168). In addition, studies have found that EMI students often struggle with producing clear and concise text, recognizing the relevance of writing to their academic needs, practicing effective strategies at different stages of the writing process, following the writing conventions of the English academic community, and composing and revising an expository essay (Arnbjörnsdóttir 2017). Furthermore, the move to the Anglophone writing conventions can create challenges for students, as they may struggle to adapt to unfamiliar structures as well as stylistic and

citation norms, including plagiarism, which can impact their academic performance and confidence (Tajik et al. 2023).

While there is existing research on the general difficulties faced by EMI students or students in broader academic contexts (e.g., struggles with clarity, structure, and adherence to academic conventions), few studies have specifically examined how writing workload influences English Department students' engagement with academic writing tasks. The present study fills this gap in the literature by focusing specifically on Polish higher education EMI students and their unique struggles with writing workload in academic writing. Additionally, this is the first study on English Department students that looks specifically at the effects of the application of gamified instruction in an academic writing class. Thus, the study aims to investigate the workload experienced in a gamified academic writing task.

To achieve this aim, the following research questions were formulated:

1. What is the general workload experienced in a gamified academic writing task?
2. How do different workload subscales contribute to overall workload perception in a gamified academic writing task?
3. Is there a correlation between NASA-TLX workload perception, self-reported citation mastery improvement, and final course grades?

While previous research has explored general challenges faced by EMI students, this study provides a deeper understanding of how workload impacts English Department students' ability to effectively engage with academic writing tasks. By examining this group in detail, the study offers insights into the specific demands they face and suggests strategies for managing these challenges to improve their writing outcomes.

4. Method

A cross-sectional study was conducted in the Department of English at a mid-sized Polish university. Data were collected using a Google Form survey, which was distributed to participants through a convenience sampling technique. This study employs a quantitative research design to examine the relationship between workload perception, perceived learning, and academic performance. Data were collected from three sources: student-reported workload (NASA-TLX), perceived citation mastery (Likert scale), and instructor-provided final grades. The following variables were analyzed: (a) Independent Variable: NASA-TLX Workload Scores (student-reported effort), (b) Mediating Variable: Citation Mastery Improvement (self-reported perceived learning), and (c) Dependent Variable: Final Course Grade (instructor-provided score). By integrating multiple data sources, the study provides a structured analysis of workload, perceived learning, and academic performance when mastering APA citations.

4.1. Participants

The research sample comprised 23 students enrolled in the first year of Masters's program in English with a concentration in either TESOL or translation studies. The ratio of female to male students was 17 (74%) to 7 (26%). The limited sample size corresponds directly to the total number of first-year Master's students in English enrolled at the time of the study. The actual available student population determined the sample size, ensuring the inclusion of all eligible participants.

4.2. Instrument

This study uses the NASA Task Load Index (NASA-TLX) to assess task workload. The index (NASA Ames Research Center 1986; Hart & Staveland 1988) consists of two parts. Part one evaluates participants' cognitive load and task complexity by assessing six aspects of workload and ranking their contribution to the overall experience using a 20-point scale (e.g., 1 = very low, 20 = very high workload). The six dimensions include six questions evaluating different workload aspects: mental demand (cognitive effort), physical demand (bodily exertion), temporal demand (time pressure), effort (exertion to meet task demands), performance (self-assessed success), and frustration (stress, irritation, or dissatisfaction). Part two involves ranking the six workload dimensions by requiring participants to compare them in 15 paired comparisons. For each pair, participants identify which dimension had a greater impact on their overall workload. Additionally, a five-point Likert scale question is included to measure students' perceived knowledge gains in citation mastery: "To what extent did this task help you master citation types?" This allows participants to self-assess their learning experience and the perceived impact of the gamified task. Finally, final course grades are provided by the instructor, who also served as the researcher.

4.3. Study design and procedure

The research was conducted during the winter semester of the 2024/2025 academic year as part of a 30-hour academic writing course, providing students with an opportunity to develop their in-text citation skills in APA format. To enhance collaborative learning, the instructor designed a gamified task that allowed students to practice the citation techniques before submitting a final graded assignment. Students worked in groups of four during a single gamified class session lasting 80 minutes, focusing on different types of direct and integrated quotations, paraphrasing, and summary citations. The task followed a step-by-step instructional format, guiding students through challenges designed to reinforce proper APA citation practices in an engaging and competitive manner.

5. Results and interpretation

In this study, descriptive statistics, Pearson's correlation coefficient, and correlation matrix with p-values were used to analyze workload perception in a gamified academic writing task and to measure students' perceived knowledge gains in citation mastery. Mean and standard deviation were computed for both weighted and unweighted NASA-TLX scores to assess overall workload and compare subjective versus objective perceptions. Pearson's correlation analysis examined the relationships between workload subscales and overall workload perception. The correlation matrix further explored associations between NASA-TLX workload scores, citation mastery improvement, and final course grade, providing insight into the statistical significance (p-values) of these relationships.

First, descriptive statistics were calculated (Table 1) to determine the general workload level, with a further distinction between objective (unweighted score) and subjective (weighted score) assessments. The data indicates a moderate overall workload with differences between objective and subjective assessments. The unweighted NASA-TLX score (M = 24.79, SD = 3.78) suggests that when all workload subscales were treated equally, students experienced a moderate level of workload. However, the lower weighted NASA-TLX score (M = 21.27, SD = 7.24) indicates that when students assigned importance to different workload factors, they generally perceived the task as less demanding. The greater standard deviation in weighted scores points to more variability among students in their workload perception.

Table 1: General workload perceptions

Score Type	Mean Score	Standard Deviation
Unweighted NASA-TLX	24.79	3.78
Weighted NASA-TLX	21.27	7.24

These findings indicate that students experienced the workload differently depending on whether it was measured objectively or subjectively. When all workload components were weighted equally, the task appeared moderately demanding. In contrast, when students rated which aspects felt most important, their perceived workload decreased. This suggests that students differentiated among workload dimensions rather than perceiving the task as uniformly demanding. Some participants may have focused more on time pressure, while others emphasized the effort required. Consequently, individualized weighting of workload components produced lower overall scores, reflecting diverse perceptions of what made the task demanding.

Next, descriptive statistics (Table 2) and Pearson's correlation coefficients (Table 3) were calculated to examine the contribution of individual NASA-TLX subscales to overall workload perception. The Performance score (M = 2.89, SD = 0.51, reverse-coded) indicates that students felt they performed well on the task. This suggests that the perceived success contributed the least to students' overall sense of workload. In contrast, Temporal Demand (M = 14.82, SD = 4.90) and Effort (M = 11.52, SD = 3.46) emerged as the strongest contributors to perceived workload, suggesting that students experienced notable time pressure and needed to exert sustained effort to achieve the task objectives. The workload

associated with Frustration (M = 8.65) and Physical Demand (M = 8.26) was medium, indicating that students generally experienced a moderate level of emotional strain and physical effort during the task. Finally, the relatively low Mental Demand score (M = 6.75, SD = 3.10) indicates that the task required moderate cognitive effort but was not overwhelmingly difficult.

Table 2: *Subscale statistics*

NASA-TLX Subscale	Mean Score	Standard Deviation
Mental Demand	6.75	3.10
Physical Demand	8.26	4.22
Temporal Demand	14.82	4.90
Performance	2.89	0.51
Effort	11.52	3.46
Frustration	8.65	5.14

Note. The *Performance* subscale was reverse-coded so that lower scores indicate better perceived performance (greater success) and higher scores indicate poorer perceived performance. The original (non-reversed) scores had a mean of 17.11 (*SD* = 0.51).

Additionally, analysis of standard deviations offered insight into workload variability. The low SD for performance (0.51) suggests consistent confidence in task completion. Mental demand (SD = 3.10) and effort (SD = 3.46) showed low variability, indicating a shared perception of cognitive workload. However, the higher SDs for physical (4.22) and temporal demand (4.90) suggest that some students felt significantly more time pressure and physical strain than others. The highest variability in frustration (SD = 5.14) indicates a wide range of emotional responses, with some students experiencing high stress while others found the task smooth and manageable.

These findings provided a foundation for correlation analysis, further exploring relationships between workload components and overall workload perception in the gamified learning environment. Pearson's correlation coefficient was used to determine the strength of relationships between each workload subscale and students' overall workload perception. The results (see Table 3) reveal that different subscales contributed to workload perception to varying degrees, with Effort and Frustration emerging as the strongest contributors.

Table 3: *Correlation between NASA-TLX subscales and Overall Workload*

NASA-TLX Subscale	Pearson's *r*
Mental Demand	0.55
Physical Demand	0.51
Temporal Demand	0.63
Performance	0.62
Effort	0.80
Frustration	0.76

Note. Correlations were calculated using the original (non-reversed) *Performance* scores, where higher values indicate poorer perceived performance.

Among all workload components, Effort (r = 0.80) and Frustration (r = 0.76) showed the highest correlations with overall workload. This suggests that students who perceived the task as requiring significant effort or who experienced frustration were more likely to report a higher overall workload. The strong relationship with *Effort* indicates that the amount of work students felt they had to invest to maintain their performance played a crucial role in shaping their workload perception. Similarly, the high correlation with Frustration highlights the emotional impact of the task, suggesting that students who found it stressful or difficult to manage were more likely to perceive it as demanding. Meanwhile, Temporal Demand (r = 0.63) and Performance (r = 0.62) demonstrated moderate correlations with overall workload. The correlation with Temporal Demand suggests that time pressure influenced workload perception, though it was not the most significant factor. Notably, the correlation with Performance was based on the original (non-reversed) scores, meaning that higher values reflect poorer perceived performance. Therefore, students who felt they performed less effectively also tended to report a greater workload.

Finally, Mental Demand (r = 0.55) and Physical Demand (r = 0.51) were the least correlated with overall workload. The relatively lower correlation with Mental Demand suggests that while students engaged in cognitive processing, they did not perceive the task as highly demanding from a cognitive standpoint. Similarly, the weaker correlation with Physical Demand indicates that students did not experience substantial physical strain while completing the task. Overall, the correlation analysis highlights that Effort and Frustration were the primary drivers of workload perception, while Temporal Demand and Performance had moderate associations. Mental and Physical Demand had the weakest correlations, indicating that the task was neither excessively difficult nor physically strenuous. These results that students' perceptions of workload were shaped more by their emotional response and the effort they had to exert rather than purely by time constraints, cognitive load, or physical strain.

In the final step, a correlation matrix with statistical significance (Table 4) was performed to investigate the correlation between three variables: a NASA (TLX) performance, self-reported citation mastery improvement, and a final course grade.

Table 4: Correlation matrix with p-values

	NASA (TLX) Workload Score	Citation Mastery Improvement	Final Course Grade
NASA (TLX) Workload Score	1.000 (p=1.00)	0.525 (p=.03)	0.037 (p=.86)
Citation Mastery Improvement	0.525 (p=.03)	1.000 (p=1.00)	0.261 (p=.32)
Final Course Grade	0.037 (p=.86)	0.261 (p=.32)	1.000 (p=1.00)

The correlation analysis revealed a statistically significant, moderate positive relationship between the overall NASA-TLX Workload Score and students' self-perceived improvement in citation mastery (r = .53, p = .03), suggesting that those who invested more cognitive and emotional effort in the gamified task reported greater perceived gains in mastering citation types. In contrast, both the correlations between the workload score and the final course grade

(r = .04, p = .86), and between citation mastery improvement and the final grade (r = .26, p = .32), were weak and not statistically significant. These results indicate that perceived workload and perceived citation improvement were not reliable predictors of actual academic performance. The findings suggest that students who felt the gamified writing task required more effort (both cognitively and emotionally) also tended to perceive greater improvement in their citation skills. However, these self-perceptions did not translate into higher final course grades. In other words, while the task may have been effective in raising students' awareness of their own learning progress, particularly in citation mastery, it did not have a measurable impact on their overall academic performance. This, in turn, suggests a disconnect between students' subjective learning experiences and the objective grading criteria used in the course, possibly due to other assessment components not directly related to the task.

6. Discussion and conclusion

The present investigation is inscribed in the current research line of academic workload perception and instructional design in EMI contexts, particularly in relation to gamified approaches in higher education. In reference to the first research question that aimed at investigating the general workload experienced by English Department students during a gamified academic writing task, the analysis indicates that students experienced a moderate level of workload while engaging in the gamified academic writing task. The findings reveal that the general workload related to academic writing was moderate, meaning the task was challenging but not overwhelming. Subjective perceptions of workload that students experienced in academic writing played a role, as they identified certain aspects as more demanding than others. These findings suggest that the gamified academic writing task effectively engaged students without imposing excessive cognitive strain. The consistency in workload invested in academic writing perception across students also indicates that the task was well-structured and balanced.

The second research question examined how workload subscales (Mental Demand, Physical Demand, Temporal Demand, Performance, Effort, and Frustration) contributed to the overall workload invested in academic writing. The analysis revealed that Effort and Frustration were the strongest correlates of perceived workload. This suggests that students experienced the task as requiring considerable effort and emotional involvement. Their sustained engagement in improving citation accuracy may have triggered frustration when they encountered skills that were still underdeveloped and required additional practice. Temporal Demand and Performance also showed moderate associations with overall workload. This indicates that time pressure and perceived performance played notable, though less dominant, roles in shaping workload perceptions. The competitive and structured nature of the gamified session, where students gained points for accuracy and timely submission, may have moderated their sense of time pressure. Finally, Mental Demand and Physical Demand had the weakest correlations with overall workload. When situated within the context of an academic writing classroom, the findings indicate that students reported minimal engagement in cognitive and perceptual processes such as reasoning, decision making, memory recall, visual attention, and information seeking during the task. Similarly,

they did not report experiencing any substantial physical demands related to the task workload, including sustained gaze, typing, scrolling, verbal interaction, or gesturing. Overall, the findings suggest that the experience of workload in this academic writing context was primarily influenced by students' perceived effort and emotional responses, while cognitive and physical demands appeared to play a more limited or secondary role. This pattern highlights the importance of affective and motivational factors in shaping students' experiences of academic tasks and points to the need for instructional approaches that attend not only to cognitive complexity but also to the emotional and self-regulatory dimensions of student engagement.

Addressing the third research question, which examined the relationship between students' perceptions of workload, self-reported improvement in citation mastery, and final course grades, the study explored how students' subjective experiences of task demands might relate to their perceived academic development and performance outcomes. The results suggest that students who reported higher workload levels also tended to report greater improvements in citation mastery, as indicated by a moderate and statistically significant positive correlation. It is possible that students who perceived the academic tasks as more demanding may have engaged more purposefully in the learning process, which could have contributed to their perceived improvement in applying APA citation conventions. However, this perceived improvement in citation skills did not show a statistically significant association with final course grades. Furthermore, there was no meaningful correlation between perceived workload and final course performance, which suggests that other variables such as prior academic knowledge, the structure of course assessments, or the specific roles students adopted during the gamified activity may have influenced final outcomes.

Given these insights, future research on writing workload experienced by English Department EMI students might extend to investigating various instructional strategies, such as peer tutoring, flipped classrooms, and differentiated instruction. This would allow researchers to observe which of these strategies most efficiently balance the workload invested in academic writing and enhance engagement without increasing frustration that could hinder gains in knowledge and skills. Additionally, longitudinal studies could explore how repeated exposure to gamified academic tasks influences long-term writing development and academic performance. While gamification can be an effective means of engaging students and improving specific writing skills, such as citation, instructors might consider how different workload components (effort, frustration, and time pressure) interact to shape students' overall experiences. By adapting gamified activities, for example, by reducing time constraints or increasing opportunities for peer collaboration, instructors can better align instructional design with students' cognitive and emotional needs. This, in turn, can contribute to creating a more supportive learning environment and facilitate a smoother, more confident transition to Anglophone academic writing conventions. Finally, it is important to note that the limited sample size, which includes only students enrolled in a specific course and the total number of first-year students in the Master's programme, constrains the generalizability of the findings. Thus, future research involving larger and more diverse cohorts is needed to validate these conclusions and further refine pedagogical approaches.

References

Aizawa, I., H. Rose, C. Thompson, and S. Curle. 2020. Beyond the threshold: Exploring English language proficiency, linguistic challenges, and academic language skills of Japanese students in an English medium instruction programme. *Language Teaching Research* 27(4): 837–861. https://doi.org/10.1177/1362168820965510.

Al Murshidi, G. 2014. Emirati and Saudi students' writing challenges at U.S. universities. *English Language Teaching* 7(6): 87–95. http://dx.doi.org/10.5539/elt.v7n6p87

Akin, I., and M. Murrell-Jones. 2018. Closing the gap in academic writing using the cognitive load theory. *Literacy Information and Computer Education Journal* 9(1): 2833–2841. https://doi.org/10.20533/licej.2040.2589.2018.0373.

Amano, T., V. Ramírez-Castañeda, V. Berdejo-Espinola, I. Borokini, S. Chowdhury, M. Golivets, et al. 2023. The manifold costs of being a non-native English speaker in science. *PLoS Biology* 21(7): e3002184. https://doi.org/10.1371/journal.pbio.3002184.

Arliyanti, D., and A. Hapsari. 2022. EFL undergraduate students' cognitive strategies in process-based writing. *Pioneer: Journal of Language and Literature* 14(2): 376–391. https://tiny.pl/ts6ftncj (accessed 9 February 2025).

Arnbjörnsdóttir, B. 2017. Preparing EFL students for university EMI programs: The hidden challenge. In H. Fjeld, S. Hagen, B. Henriksen, B. Johansson, B. Olsen, and H. Prentice (eds.), *Academic Language in a Nordic Setting – Linguistic and Educational Perspectives*, Oslo Studies in Language 9(3): 77–91. https://doi.org/10.5617/osla.5848.

Bretag, T. 2013. Challenges in addressing plagiarism in education. *PLoS Medicine* 10(12): e1001574. https://doi.org/10.1371/journal.pmed.1001574.

Chambers, E. 1992. Work-load and the quality of student learning. *Studies in Higher Education* 17(2): 141–153. https://doi.org/10.1080/03075079212331382627.

Chandrasoma, R., C. Thompson, and A. Pennycook. 2004. Beyond plagiarism: Transgressive and nontransgressive intertextuality. *Journal of Language, Identity, and Education* 3(3): 171–193. https://doi.org/10.1207/s15327701jlie0303_1.

Flower, L. 1994. *The construction of negotiated meaning: A social cognitive theory of writing*. Carbondale, IL: University of Southern Illinois Press.

Flower, L., and J. R. Hayes. 1981. A cognitive process theory of writing. *College Composition and Communication* 32: 365–387. http://dx.doi.org/10.2307/356600.

Hart, S. G., and L. E. Staveland. 1988. Development of NASA-TLX (Task Load Index): Results of empirical and theoretical research. *Advances in Psychology* 52: 139–183. https://doi.org/10.1016/S0166-4115(08)62386-9

Hyland, K. 2018. *The Essential Hyland*. London: Bloomsbury.

Introna, L., N. Hayes, L. Blair, and E. Wood. 2003. Cultural attitudes towards plagiarism: Developing a better understanding of the needs of students from diverse cultural backgrounds relating to issues of plagiarism. *Lancaster University Report on Plagiarism Research*. https://tiny.pl/j75gkd-y.

Jääskeläinen, T., G. López-Íñiguez, and M. Phillips. 2022. Music students' experienced workload in higher education: A systematic review and recommendations for good practice. *Musicae Scientiae* 27(3): 541–567. https://doi.org/10.1177/10298649221093976.

Jinhui, Z., and Q. Samu. 2024. A study on English writing ability of Chinese students based on the theory of distributed cognition. *Asian Journal of Research in Education and Social Sciences* 6(1): 321–326. https://myjms.mohe.gov.my/index.php/ajress/article/view/26213 (accessed 11 February 2025).

Keck, C. 2006. The use of paraphrase in summary writing: A comparison of L1 and L2 writers. *Journal of Second Language Writing* 15(4): 261–278. https://doi.org/10.1016/j.jslw.2006.09.006.

Kember, D. 2004. Interpreting student workload and the factors which shape students' perceptions of their workload. *Studies in Higher Education* 29(2): 165–184. https://doi.org/10.1080/0307507042000190778.

Knoch, U., A. Rouhshad, S. P. Oon, and N. Storch. 2015. What happens to ESL students' writing after three years of study at an English medium university. *Journal of Second Language Writing* 28: 39–52. https://doi.org/10.1016/j.jslw.2015.02.005.

Kyndt, E., I. Berghmans, F. Dochy, and L. Bulckens. 2013. 'Time is not enough.' Workload in higher education: A student perspective. *Higher Education Research & Development* 33(4): 684–698. https://doi.org/10.1080/07294360.2013.863839.

Lin, S. M. 2015. A study of ELL students' writing difficulties: A call for culturally, linguistically, and psychologically responsive teaching. *College Student Journal* 49(2): 237–250.

Liu, D. 2005. Plagiarism in ESOL students: Is cultural conditioning truly the major culprit? *ELT Journal* 59(3): 234–241. https://doi.org/10.1093/elt/cci051.

NASA Ames Research Center. 1986. *NASA Task Load Index (TLX) v. 1.0: Computerized version*. Human Performance Research Group. Retrieved from https://ntrs.nasa.gov/api/citations/20000021487/downloads/20000021487.pdf.

Pitura, J. 2022. *Gamification for engagement with language learning tasks*. Kraków: Wydawnictwo Naukowe Uniwersytetu Pedagogicznego im. Komisji Edukacji Narodowej.

Rahmat, N. H., and W. Whanchit. 2024. Exploring writing process from the social cultural theory. *International Journal of Academic Research in Business and Social Sciences* 14(3): 267–278. https://doi.org/10.6007/ijarbss/v14-i3/20931.

Silva, B. B., K. Kutyłowska, and A. Otwinowska. 2021. Learning academic words through writing sentences and compositions: Any signs of an increase in cognitive load? *Language Teaching Research* 28(3): 1143–1175. https://doi.org/10.1177/13621688211020421.

Sweller, J. 1988. Cognitive load during problem solving: Effects on learning. *Cognitive Science* 12(2): 257–285. https://doi.org/10.1207/s15516709cog1202_4.

Sweller, J. 2010. Element interactivity and intrinsic, extraneous, and germane cognitive load. *Educational Psychology Review* 22(2): 123–138. https://doi.org/10.1007/s10648-010-9128-5.

Tajik, M. A., S. Abdul Manan, A. C. Arvatu, and M. Shegebayev. 2024. Growing pains: Graduate students grappling with English medium instruction in Kazakhstan. *Asian Englishes* 26(1): 249–267. https://tiny.pl/zyx07k-r (accessed 9 February 2025).

Tajik, M. A., S. A. Manan, U. Schamiloglu, and G. Namyssova. 2023. Gaps between policy aspirations and enactment: Graduate students' struggles with academic English amidst a turbulent transition to the EMI environment in Kazakhstani universities. *Current Issues in Language Planning* 25(2): 212–235. https://doi.org/10.1080/14664208.2023.2283651.

Turula, A. 2021. The effects of computer-assisted gamified learning on students' attitudes and progress in advanced grammar class. *Teaching English with Technology* 21(3): 3–17. http://tewtjournal.org/?wpdmact=process&did=Njc1LmhvdGxpbms.

Wang, T. 2024. An application of causal-chain windowing theory to the teaching of writing. *Theory and Practice in Language Studies* 14(1): 224–232. https://doi.org/10.17507/tpls.1401.26.

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