# Unravelling the Dilemma: Examining the Adverse Effects of AI Writing Tools on STEM Student Motivation–Insights from an Academic Writing Center

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**ABSTRACT**

The increasing utilization of AI-powered writing tools, such as ChatGPT and Grammarly, has transformed how students engage with academic writing and research, particularly in STEM disciplines. While these tools provide valuable assistance in refining language, improving structure, and enhancing clarity, excessive reliance on them has raised concerns about diminishing students' intrinsic motivation, critical thinking, and overall engagement with the writing process. Drawing on firsthand observations from an Academic Writing Center (AWC) in the GCC region, this think piece examines the broader implications of AI-assisted writing on student motivation. The paper explores how overdependence on GenAI has contributed to declining student engagement, a reduction in deep analytical thinking, and the emergence of a shortcut mentality that undermines the intellectual rigor essential to higher education. Given these challenges, academic writing centers play a crucial role in ensuring that GenAI serves as a tool for enhancement rather than a replacement of cognitive effort. By fostering a balanced approach that integrates technological support with human mentorship, writing centers in higher education institutions can encourage responsible GenAI usage while preserving the foundational principles of independent thought, critical inquiry, and academic integrity.

## Introduction

The integration of generative artificial intelligence (GenAI) in academic writing has transformed how students approach their coursework, particularly in STEM disciplines. While GenAI tools like Grammarly and ChatGPT offer invaluable support for language proficiency and structural accuracy, overreliance on them can inadvertently undermine key motivational drivers critical to writing success, such as curiosity, creativity, and self-efficacy. Motivational consequences of GenAI are particularly evident in STEM students, whose technical focus often sidelines the development of essential academic writing skills.

Writing centers play a pivotal role in addressing these challenges. Beyond improving technical writing skills, they act as hubs for fostering intrinsic motivation by emphasizing the writing process, promoting active engagement, and helping students navigate the ethical use of GenAI tools. Drawing on observations and experiences from a specific Academic Writing Center (AWC), this think piece highlights how writing centers can mitigate GenAI-induced motivational challenges while catering to the unique needs of STEM students. Findings are further contextualized within the broader cultural and educational framework of the Gulf Cooperation Countries (GCC), where writing centers are often

underutilized yet essential for bridging skill gaps. The Academic Writing Center will be referred to as the AWC throughout this discussion.

By examining local challenges and practical strategies, this piece aims to provide actionable insights into how writing centers can become catalysts for motivation and skill development in the AI era. Ultimately, this piece seeks to reframe writing centers, often perceived by many STEM students as just remedial spaces focused only on fixing errors — as transformative environments where STEM students can regain their intrinsic motivation to write.

## About the Academic Writing Center

The AWC is dedicated to supporting students across all programs in the Business, Health Science, Engineering, General Education, and IT Colleges at the University of Doha for Science and Technology. Staffed by skilled writing mentors, the center assists students at every stage of their writing—whether it is planning, revising, editing, referencing, or proofreading. The center also offers tailored skill development sessions designed to enhance academic writing performance. Most recently, support services have expanded into the Business and Accounting Help Centers to cater to a high demand for business course support, and the English Success Zone to assist foundation students transition to their bachelor's degree program.

AWC services cover a wide range of student needs, including brainstorming, general writing consultations, personalized guidance, report formatting, citation and referencing help, proofreading, presentation content support, and speech script writing. These offerings are continually refined based on student feedback and demand. Beyond individual consultations, the AWC also provides in-class writing support and hosts workshops and discussions on academic integrity and personal skill development. The AWC's comprehensive approach ensures that students have the right tools, resources, and confidence to succeed in their academic writing endeavors. In the following section, the specific case of GCC students' motivation in regard to academic writing will be elaborated upon.

## STEM Students in the GCC Region

The integration of GenAI in academic writing has revolutionized how students approach their coursework. GenAI writing tools have provided support in areas such as grammar, structure, and idea generation. However, their increasing use—particularly among STEM students—has exposed a critical challenge: the potential wearing down of intrinsic motivation. Based on our observations, reduced motivation is especially pronounced among STEM students, who often prioritize technical accuracy over developing robust writing skills. However, Dyrberg and Holmegaard (2019) found that integrating STEM content with real-world problems boosts students perceived value of education, leading to higher engagement and effort. This connection is particularly relevant in the context of growing reliance on GenAI tools, which may offer quick solutions but rarely promote the kind of deep, applied thinking that real-world tasks require. Beyond that, the AWC is rooted in an

environment that emphasizes applied STEM learning, further complicating the already challenging balance between their academic and professional aspirations. Thus, enhancing the real-world relevance of writing assignments could improve students' motivation (Pulford, 2016).

The AWC is uniquely positioned to address these challenges. Beyond offering technical writing support, they act as transformative spaces that promote intrinsic motivation, encourage active engagement with the writing process, and provide ethical guidance on GenAI use. In the context of the GCC, where STEM education plays a pivotal role in driving national development, writing centers face the additional challenge of navigating a culturally and linguistically diverse student body. This think piece responds to the gap identified by Kayan-Fadlelmula et al. (2021) by offering practitioner-based insights into STEM student motivation which is an area that remains significantly under-researched in the region.

The GCC's rapid push toward knowledge-based economies has positioned STEM education as a cornerstone of national progress (Kayan-Fadlelmula et al., 2021). However, STEM students in the region face distinct challenges. Many are non-native English speakers studying in English-dominant academic environments, creating a dual cognitive burden that complicates their ability to write critically and analytically. Additionally, the region's education systems have traditionally emphasized rote learning over interdisciplinary and creative approaches (Al-Kuwari et al., 2022), further hindering the development of writing skills critical for STEM disciplines.

Overreliance on GenAI tools worsens these challenges, offering quick solutions but diminishing opportunities for students to develop originality and engage deeply with the academic writing process. Writing centers counteract these trends by adopting a culturally nuanced and student-focused approach. For instance, the AWC currently consists of bilingual mentors fluent in both Arabic and English. Given that a significant portion of the student population in the GCC are native Arabic speakers for whom English is a second language, this linguistic accessibility helps foster stronger connections and makes academic writing support more inclusive and effective. Moreover, tailored workshops open to all univesity students, as well as interdisciplinary collaborations between the AWC, academic colleges, and faculty members bridge the gap between STEM and humanities education. These initiatives emphasize the value of writing as a critical thinking process, encouraging students to see writing not just as a task, but as an intellectual and creative pursuit.

In the GCC, where over 300,000 international STEM students are enrolled annually (Umar & Rahman, 2023), addressing writing-related challenges requires writing centers to move beyond the 'remedial' framing. While often viewed as places for fixing grammar or polishing final drafts, writing centers — particularly at our institution — are being reimagined as transformative hubs for motivation and skill development. By helping students navigate the balance between leveraging GenAI and preserving intrinsic learning, writing centers empower them to meet academic demands with greater confidence and ownership. In the next section, two main sources of motivation are identified and discussed.

## Understanding Motivation in the Context of the AWC

Motivation, as perceived by the AWC, is a blend of intrinsic and extrinsic factors that drive students to excel in academic writing. Intrinsic motivation, which stems from genuine interest and personal satisfaction, promotes perseverance, improvement, and pride in one's work. According to Augustyniak et al. (2016), intrinsic motivation is associated with greater determination and productivity; students who are intrinsically motivated are more likely to persist through challenges, which can lead to higher achievement and academic success. The AWC promotes intrinsic motivation through personalized and group assistance, one-on-one consultations, and engaging workshops that help students build skills and confidence. By offering constructive feedback and a supportive environment, the AWC inspires students to embrace the writing process, find meaning in their efforts, and achieve their academic writing goals.

Students who are extrinsically motivated focus on achieving outcomes separate from the activity itself, rather than enjoying the task for its own sake (Khaliq et al., 2023). While valuable in competitive fields like STEM, extrinsic motivation often drives students to meet external expectations, such as high grades or minimal requirements, without regard for the process or the essential soft skills they should be acquiring along the way. Extrinsically motivated students are more susceptible to focusing solely on the end goal, often dismissing how they achieve it. The AWC acknowledges this dynamic and works to help students balance extrinsic pressures with intrinsic engagement. Through tailored guidance and resources, the AWC encourages extrinsically motivated students to engage more deeply with their coursework, fostering stronger writing skills and a deeper sense of purpose. The following section explores key AWC observations and their implications for improving writing support tailored to students' diverse motivational needs.

## AWC Observations and Implications for Writing Support

### *Use of AI Tools*

Since ChatGPT's release, the AWC has observed a profound shift in how students approach writing assignments, particularly with the widespread adoption of GenAI tools. These tools, celebrated for their accessibility and efficiency, have empowered students to work independently, often reducing their reliance on specific AWC consultations. For many, GenAI has enhanced motivation by alleviating tedious aspects of the writing process, such as grammar checks, idea generation, and referencing. By streamlining these tasks, students can devote more time and energy to challenging elements like analysis and argumentation, boosting their confidence in managing assignments.

However, the increased reliance on GenAI tools has also revealed a troubling trend: a decline in intrinsic motivation among some students. This observation is based on consistent trends in service utilization that we tracked over several academic terms. General Writing Consultations still make

up the largest share of visits, but shifts in other categories point to changing patterns of student engagement. Students appear to be turning to GenAI tools for early stage writing support, while increasingly using AWC services for tasks closer to the final stage – particularly for assistance with citations, formatting, and proofreading.

The convenience of GenAI has, in certain cases, cultivated a shortcut mentality, where students perceive these tools as substitutes for their efforts. This has resulted in draft submissions that lack originality, deviate from assignment instructions, or reflect minimal engagement with the writing process. In these cases, motivation appears extrinsically driven, focused on meeting deadlines or achieving grades, rather than rooted in a genuine desire to learn or improve.

The dual impact of GenAI tools on student motivation presents both opportunities and challenges for the AWC. On one hand, GenAI offers a supplement to student learning, fostering independence and confidence. On the other hand, its overuse risks undermining key motivational drivers like curiosity, creativity, and self-efficacy, particularly in disciplines where writing is often seen as secondary, such as STEM fields. Darwin et al. (2023) note that over-reliance on GenAI can hinder critical thinking and creativity, leading to superficial understanding.

To address these concerns, the AWC has adopted a proactive, comprehensive approach. Workshops, classroom visits, and peer discussions emphasize the value of originality, critical thinking, and ethical GenAI use. For example, GenAI can be used to brainstorm ideas, refine drafts, or enhance clarity, but it should not overshadow the importance of personal input and intellectual engagement. Additionally, the AWC raises awareness about plagiarism, academic dishonesty, and GenAI overdependence, while offering strategies for time management and skill development.

### *Motivation Disparities*

Based on our understanding of motivation, the AWC has observed notable disparities in student engagement across different majors and colleges. These variations appear to stem from several factors, including the courses students enroll in, the relevance of those courses to their majors, and their personal interests.

We have observed that Health Science and Business students show higher intrinsic and extrinsic motivation for academic writing compared to IT and Engineering students. Health Science and Business students better understand the requirements and long-term benefits of writing tasks, especially in mandatory and elective courses related to social sciences and humanities. The courses mentioned in this paragraph focus on writing processes, report writing, academic research, and presentation skills. Students in Health Science and Business recognize the importance of strong written communication for their careers, which boosts their motivation to excel.

In contrast, IT and Engineering students often show less motivation for academic writing. Demotivation may stem from a perceived disconnect between writing tasks and their future roles,

which emphasize technical skills over communication. Students in IT and Engineering have limited opportunities for writing beyond lab reports, which are rarely assigned. As a result, students may undervalue writing skills and put less effort into these tasks, whilst also sporadically seeking help from the AWC, viewing writing as less relevant to their discipline. Consequently, these students often rely heavily on GenAI tools to draft lab reports, enabling them to focus on the technical and logical demands of coding and experiments.

Motivation disparities are also observed in the frequency of bookings for different AWC services. Students who choose Brainstorming & Writing Process and General or Personal Writing Consultation are often driven by innate curiosity and personal skill development. Such students are highly involved in the writing process, and many come back for Presentation Content Support and Speech Script Writing after completing their reports with the AWC's guidance. Though such students use GenAI tools, they understand their limitations and maintain academic honesty by disclosing their use of GenAI and cross-checking AI-generated content.

In contrast, the most in-demand AWC services—Citations & References, Report Formatting, and Review & Proofreading—tend to attract students who are less engaged with the writing process itself. Instead, their primary goal is to complete their academic requirements. While some students using these services have advanced writing skills such that they do not need the AWC's assistance besides secondary review, many students often use GenAI primarily to expedite their tasks rather than as a complementary tool to enhance their writing skills.

Based on the AWC mentors' experience, students are noticeably more motivated to write when the topics align with their majors or spark genuine interest. These students often approach the AWC, seeking support for minor issues like grammar, spelling, or citation corrections, demonstrating a strong grasp of the writing and research process. Conversely, students who view writing assignments as a chore tend to rely heavily on grades and credits as their primary motivation. For them, GenAI tools become a convenient way to complete tasks they deem unnecessary. While this approach may yield polished outputs, it often reflects minimal engagement with the content, with some submissions being entirely AI-generated— a clear indication of disinterest.

## The Role of the Academic Writing Center

To address the unique challenges faced by STEM students in the GCC concerning GenAI, the AWC provides tailored writing support that bridges the gap between technical and communication skills. Recognizing the distinct demands of their disciplines, the AWC offers specialized resources such as samples and tipsheets aligned with STEM course curricula. By focusing on discipline-specific writing tasks, the AWC equips students with tools to navigate complex assignments while promoting clarity and precision in their writing. By implementing a personalized approach, the AWC tackles the issue of motivation disparities and assists students from all majors, including STEM, to help them receive targeted assistance that complements their core and communication courses. Additionally, AWC

mentors emphasize understanding assignment rubrics and handouts, helping students meet specific requirements and perform effectively across their academic writing journey.

Beyond individual and group consultations, the AWC extends its reach through workshops and in-class visits, fostering a culture of academic integrity and skill development. The workshops, which are part of a semesterly Learning Series, specifically teach students about prompt engineering, ethical use of GenAI in academia, and improving public speaking and presentation development. The Learning Series is strategically designed to introduce first-year students to foundational academic skills and incorporate the services formally offered at the AWC in a fun and interactive way, making them accessible to a larger audience.

The AWC also ramps up its efforts during critical academic periods, setting up booths around final exams, project submissions, and presentations to provide timely, accessible support. Additionally, upon instructors' request, AWC mentors visit classes to give presentations and directly assist students, focusing on ethical and effective use of GenAI tools. By offering targeted assistance at pivotal moments, the AWC ensures students are equipped to meet their academic demands while maintaining ethical practices.

The impact of the AWC's initiatives is reflected in measurable improvements in students' writing abilities and grades, particularly for those who engage with the center regularly. By building a solid foundation in writing during the early years, the AWC supports students' transition from beginner to advanced writers, preparing them for the rigorous expectations of final-year capstone projects and theses. Progression in writing skills not only boosts academic performance but also instills confidence in students, enabling them to approach complex tasks with clarity and precision. The next section explores key recommendations and future directions for academic writing centers to further enhance their impact.

## Suggestions and Future Expectations for Academic Writing Centers

Building on the AWC's observations above, it is crucial to assess and identify the best next steps to pave the way for future expectations. To address the unique challenges faced by STEM students in the GCC, academic writing centers are encouraged to evolve to provide customized support across all disciplines. By collaborating closely with university professors, writing centers can develop resources that meet the specific needs of STEM fields while reinforcing critical thinking and novelty relevant to their course content. Workshops and in-class visits should focus on critical review and revision to ensure that students' work portrays their voice and understanding. Additionally, assignments that align with academic goals can help students better appreciate strong writing skills, potentially boosting their engagement with the subject matter.

Furthermore, we strongly recommend that writing centers involve faculty members more actively in shaping writing support decisions. Such collaboration would ensure that course rubrics and guidelines are regularly followed to ensure students receive timely support. By incorporating faculty

voices, course objectives can be followed, creating a fruitful blend of both technical and non-technical skills development.

As the role of AI continues to rapidly expand, writing centers also need to address its impact on students' learning processes. While GenAI can significantly enhance learning experiences by supplementing traditional learning methods, it falls short of replicating the personalized guidance, emotional connection, and nuanced understanding that only human interaction can provide. Victor (2023) emphasizes that while GenAI tools like ChatGPT can support learning, they cannot replace the vital role of educators, who offer the human touch necessary for effective and ethical education. Initiatives such as hosting regular workshops and in-class visits are essential in bridging this gap and to reinforce the irreplaceable role of humans in shaping holistic learning experiences. Examples offer workshops are outlined in the section on the role of academic writing centers.

In view of the increasing reliance on GenAI, it is also crucial for writing centers to deliver workshops customized for STEM students that promote ethical and responsible use of these tools. Writing competitions can encourage students to highlight their natural writing abilities, fostering both confidence and academic reputation. Furthermore, educating students on the limitations of AI-powered writing tools, such as data hallucination, wrong material, and missing references (Gimpel et al., 2023, p. 36) will ensure they develop critical thinking skills alongside their technical knowledge. Writing centers can stimulate skill development by creating detailed guidelines that offer students a step-by-step approach to the writing process.

To conclude, we have explored the growing reliance on GenAI by STEM students in academic writing, along with its potential to hinder the development of creative and authentic ideas. Future research must focus on balancing AI-assisted writing with traditional methods to enhance core educational goals, like effective writing, while addressing ethical concerns related to academic integrity. By tailoring resources to meet students' needs, fostering intrinsic motivation, and promoting ethical GenAI use, writing centers can ensure that technology complements the growth of skilled, independent writers. A tailored approach aligns with the broader goals of GCC universities: to prepare students not only for academic excellence but also for meaningful contributions to their fields.

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