

The Impact of AI Writing Correction Tools on University Students' Self-Regulation and Academic Integrity Awareness

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ABSTRACT: The increasing reliance on AI writing correction tools has significantly transformed academic writing practices among college and university students, raising critical questions regarding self-regulated learning and academic integrity. Using a quantitative, cross-sectional survey design, this study examined the relationship between the use of AI writing correction tools (e.g., Grammarly, QuillBot) and both self-regulated writing behavior and academic integrity awareness among university students in Pakistan. Data were collected via a structured, validated questionnaire distributed using convenience sampling (N=237). Linear regression and correlation analyses revealed that a positive attitude toward AI significantly predicted self-regulation. Furthermore, AI attitude demonstrated a strong positive correlation with self-regulated writing behavior, a moderate correlation with academic integrity awareness, and a slight positive correlation with actual AI usage behavior. Crucially, academic integrity awareness was significantly predicted by actual AI usage behavior rather than general attitude. Exploratory analyses indicated no significant differences across age groups or degree programs. However, female students reported slightly higher awareness of academic integrity, and private university students consistently outperformed their public university peers across both outcome variables. Overall, the findings suggest that AI writing correction tools support stronger self-regulated writing behavior without compromising academic integrity awareness, supporting their pedagogically framed integration into higher education institutions.

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Introduction

The rapid development of artificial intelligence (AI) has significantly transformed academic writing practices in higher education. University students are also increasingly using AI writing correction systems like Grammarly, QuillBot, and large language model-assisted editors to enhance grammar, coherence, and clarity, as well as the overall quality of their writing (Black & Tomlinson, 2025; Roe et al., 2023). The tools offer real-time feedback and editing services, thus redefining the way students interact with academic writing and learning activities.

Self-regulated learning (SRL), which is the capacity of learners to plan, monitor, and assess their learning activities, is an essential precursor of academic success (Sullivan et al., 2023). It has also been found that AI-assisted feedback may positively influence the improvement of cognitive and metacognitive regulation, namely, by facilitating goal setting, revision, and reflection when facing a writing task (Akiba & Garte, 2024; Zheldibayeva et al., 2025). Simultaneously, it has also been noted that the uncritical or overreliance on AI tools can compromise learner autonomy and cause dependency (Sykes, 2024; Fošner, 2024).

Academic integrity awareness has been a significant issue in AI-mediated learning environments alongside self-regulation. Even though Henchiri & Al Aamri (2025) claim that AI tools can decrease cases of plagiarism by enhancing the accuracy of paraphrasing and citing references, other researchers note that there is also a greater risk of engaging in unethical conduct if the use of AI tools hinges on vague institutional policies and ethical guidance (Lund et al., 2025; Secreto et al., 2025). Such a twofold effect makes AI an educational potential and a societal issue. Although there is an increasing interest on a global level, the number of empirical studies that investigate the joint effect of AI writing correction tools on self-regulation and academic integrity awareness is insufficient, especially in non-Western settings. The majority of current research is centered on generative AI or the Western education system, and there is a substantial knowledge gap in the evidence available for the region (Bittle & El-Gayar, 2025; Gustilo et al., 2024). To fill this gap, the study under analysis will explore how AI writing correction software affects self-regulation and awareness of academic integrity in Pakistani higher education students, which will add context-specific empirical research to the growing body of responsible AI integration literature.

The objectives of the study were to examine the extent to which AI writing correction tools influence students' self-regulation, with particular attention to cognitive, metacognitive, social, and motivational dimensions; to investigate whether AI writing correction tools enhance or undermine students' academic integrity awareness, distinguishing between attitudinal and behavioral components. Correspondingly, the study addressed four null hypotheses.

H₀₁: AI attitude does not significantly predict university students' self-regulation in academic writing.

H₀₂: AI attitude and AI use behavior do not significantly predict students' academic integrity Awareness.

H₀₃: Self-regulation and academic integrity awareness do not differ significantly by gender, university type, or degree program.

H₀₄: Self-regulation and academic integrity awareness do not differ significantly by age group.

Literature Review

The rapid diffusion of generative and AI-based writing correction tools into higher education has reshaped how university students draft, revise, and submit written academic work. This review synthesizes recent empirical and conceptual literature organized into three thematic aspects: self-regulated learning in AI-assisted writing, academic integrity awareness and AI tool use, and broader student and educator perceptions of AI-assisted writing, before drawing out the synthesis, the gap in the existing evidence base, and the rationale for the present study.

AI Writing Correction Tools and Students' Self-Regulated Learning

A growing body of work frames AI writing tools primarily through the lens of self-regulated learning (SRL), examining whether these tools support or substitute for students' own metacognitive, cognitive, and behavioural regulation. Jin et al. (2023), using an exploratory speed-dating design with storyboards of AI applications and semi-structured interviews with sixteen undergraduates, found that students perceived AI tools as useful for metacognitive, cognitive, and behavioural regulation, but not for regulating motivation, and argued that effective design must attend

to learner identity, learner activeness, and learner position. In a similarly SRL-oriented survey, Amani and Bisriyah (2025) reported that university students viewed AI-assisted writing tools as helpful for planning, revising, and monitoring their writing, concluding that such tools can support self-regulation when used responsibly rather than passively.

Multiple studies offer attention with direct evidence of regulatory functions. Zheldibayeva et al. (2025) analyzed surveys with writing performance of undergraduate language learners after A.I.-generated feedback. Findings revealed that the feedback strengthened goal-setting and reflective behaviour but did not do much to help students become more autonomous in correcting their errors. This suggests a partial rather than wholesale transfer of regulatory capacity. Akiba and Garte (2024) reported similar findings in their quasi-experimental study with pre/post surveys of two sections of the same course; when offered structured AI feedback, participants produced higher quality revisions and became more independent learners. AI feedback reduced pressure on learners experienced when revising. However, the authors state that this reduction in pressure, and the consequent transfer of self-regulatory capacity, was not tested in the present study. Budiyo et al. (2025) expanded the construct of SRL by demonstrating that self-regulation in the use of AI mediated the relationship between AI-supported writing and students' critical thinking and problem-solving.

Sullivan et al. (2023) find more generally that metacognitive self-regulation mediates undergraduate students' learning perceptions in blended environments. This finding lends theoretical support to the expectation that self-regulation is an important mechanism whereby AI-assisted writing tools matter for learning. Malik et al. (2023) researched and interviewed undergraduates from various tertiary institutions; students' views about AI writing-correction tools are supportive but, at the same time, may be a hindrance to self-regulated learning. The study recommends using instructional scaffolding and clearer guidelines rather than assuming that benefits of self-regulatory use automatically occur. Cunha et al. (2023), though situated in an elementary rather than a higher-education context, suggest another comparison. A teacher-led self-regulation intervention improved students' self-control and engagement. This was taken as evidence that self-regulation becomes enhanced through a supporting tool or agent. But it does not follow automatically. This happens through the design and mediation of the intervention, human or artificial.

AI Writing Correction Tools and Academic Integrity Awareness

A parallel and larger body of literature deals with academic integrity and concludes that AI writing is ethically undecided. That is, these tools are useful for learning but risky for authorship and originality. In a survey of EFL university students in Southeast Asia, Marzuki et al. (2023) found relatively moderate levels of awareness of the issues with integrity but frequent uncritical use of AI writing tools. This suggests that knowledge did not translate into ethical practice. Bittle and El-Gayar (2025) conducted a systematic review of studies published between 2018 and 2024; generative AI presents both opportunities and risks for academic integrity in higher education. They argue that more structured institutional policies and empirical frameworks are needed. Gustilo et al. (2024) interviews and policy analysis with educators revealed that instructors appreciate the teaching potential of AI. However, they remain concerned about plagiarism, authorship, and the absence of clear institutional guidance.

In a large stratified cross-sectional survey of Australian university students, Gruenhagen et al. (2024) find that more than a third had used chatbots for assessed work and that many did not view this as misconduct, suggesting a gap in integrity awareness that is normative rather than more knowledge-based. A correlational link between greater dependence on AI tools by tertiary learners and increasing cheating and paraphrasing behaviour was reported by Secreto et al. (2025). Meanwhile, Lund et al. (2025), surveying attitudes toward AI-generated writing among United

States learners, found that full-paper generation was considered serious misconduct and that awareness of integrity was closely linked to prior ethical education among students. Khrisat (2025), in a mixed-methods study of a survey of 250 students and 25 interviews, provided a more nuanced picture: 82% of students used generative AI for brainstorming or essay refinement, which was supported by greater engagement and motivation. However, 65% reported concern over undetected plagiarism and over-reliance. Only 12% were fully aware of their institution's AI-use policies, although guided AI use predicted greater self-efficacy. Henchiri and Al Aamri (2025) conducted a controlled trial with undergraduates; when participants used AI tools, plagiarism scores dropped by 70% and citations became more accurate. This suggests that, under the right conditions, AI can help with integrity outcomes.

Other studies examine the perceptual and contextual dimensions of integrity concerns. Karkoulou and Sayegh (2024), through qualitative interviews with students and faculty, found that AI tools were viewed simultaneously as enablers of learning and as threats to academic honesty, capturing the ambivalence that recurs across this literature. Sevnanarayan and Potter (2024) and Sullivan et al. (2023), on ChatGPT specifically) both point to the need for institutional frameworks to keep pace with generative AI's rapid uptake in distance and campus-based education, respectively. Wiredu et al. (2024) and Ortiz-Bonnin and Blahopoulou (2025) each documented the coexistence of positive learning outcomes with persistent plagiarism or dishonesty concerns in their respective regional contexts.

Student and Educator Perceptions of AI-Assisted Writing in Higher Education

A third thematic area situates self-regulation and integrity within the wider context of how AI writing tools are perceived and used. Stanford (2025), using a mixed-methods approach and, in a related study, a UTAUT-based structural equation model, found that AI tools significantly alter students' writing behaviours and improve efficiency and grammar or structural accuracy, while simultaneously raising concerns about dependency and ethical awareness in higher-order writing tasks. Fošner (2024) reported broadly positive undergraduate attitudes toward AI tools alongside concerns over ethical use and a perceived decline in critical thinking. As certain integrations of AI-related applications have boosted creative engagement, it may lead to anxiety over fairness and academic integrity (Chanpetch & Songserm, 2023). Gültekin Talayhan et al. (2023) discovered that from the instructor perspective, EFL instructors perceived that content cohesion (e.g., do not plagiarize). Sykes (2024) compared conversational ChatGPT-enhanced to unassisted drafts of students and found that using AI led to better readability but risked dependency. Conversely, a narrative review by Deep and Chen (2025), which synthesized approximately 150 articles, concluded that if proper safeguards are taken, AI feedback can enhance self-directed learning, but if those safeguards aren't taken, then critical thinking can be undermined by AI feedback.

There is consistent evidence for gains in the mechanical and cognitive dimensions of self-regulation planning, monitoring, goal-setting, and revision due to using AI writing correction tools (Akiba & Garte, 2024; Amani & Bisriyah, 2025; Jin et al., 2023; Zheldibayeva et al., 2025). We may gain these benefits, but there seems to be some level of conditionality rather than automaticity involved. Motivational regulation, in particular, seems to be relatively unsupported by existing tools (Jin et al., 2023). Students and even educators see the potential worth of AI writing tools as ethically ambiguous. However, actual awareness of institutional policy is often low (Gruenhagen et al., 2024; Khrisat, 2025). Moreover, uncritical and undisclosed use takes place even where there is some awareness (Marzuki et al., 2023).

While previous research has established the direct effect of AI assistance on overall writing performance (Tariq & Naseem, 2026) and highlighted the need for policy adaptation (Javaid & Naseem, 2026), there remains a critical gap in understanding how continuous reliance on AI editing affects students' underlying metacognitive self-regulation. The relationship between self-regulation and integrity awareness is rarely studied jointly: most self-

regulation studies (Amani & Bisriyah, 2025; Budiyo et al., 2025; Jin et al., 2023) do not measure integrity outcomes, and most integrity studies (Bittle & El-Gayar, 2025; Gruenhagen et al., 2024; Secreto et al., 2025) do not measure self-regulatory capacity, leaving the mechanism connecting the two whether stronger self-regulation reduces integrity risk, or whether the two develop independently largely unexamined.

Research Gap

Despite the breadth of recent work, three gaps are apparent. *First*, as Jin et al. (2023) note directly, current research has not empirically examined how AI-driven writing-correction tools influence university students' self-regulation and their awareness of academic-integrity issues within a single, integrated study; the two constructs are almost always studied in isolation. *Second*, longitudinal evidence is scarce: several studies explicitly flag the absence of data on whether self-regulatory gains persist over time or transfer beyond a single course or task (Akiba & Garte, 2024; Deep & Chen, 2025; Khrisat, 2025). *Third*, most of the available evidence comes from Western, East Asian, or Southeast Asian higher-education contexts (e.g., Gruenhagen et al., 2024, Australia; Lund et al., 2025, United States; Marzuki et al., 2023, Southeast Asia), with comparatively little empirical attention to how these dynamics play out in South Asian, and specifically Pakistani, university settings, where institutional AI-use policy, academic culture, and prior exposure to AI tools may differ substantially.

Rationale of the Study

These gaps provide the rationale for the present study. By jointly examining the impact of AI writing correction tools on both students' self-regulation and their academic-integrity awareness, the study addresses the integrated-constructs gap identified by Jin et al. (2023) and echoed across the self-regulation and integrity literatures reviewed above. In doing so, it responds to repeated calls in this literature for research that moves beyond documenting perceptions or single-construct outcomes (Bittle & El-Gayar, 2025; Gustilo et al., 2024) toward evidence that can inform concrete institutional policy and pedagogical scaffolding for the responsible use of AI writing tools in higher education, an area of clear and growing relevance to university contexts, including those in Pakistan, that are only beginning to formalize their guidance on generative AI use in student writing.

Theoretical Framework

This study is grounded in Self-Regulated Learning Theory (Zimmerman, 1989, 2000), Self-Determination Theory (Deci & Ryan, 1985; Ryan & Deci, 2000), and Moral Self-Regulation Theory (Bandura, 1991, 1999), aligned with SDG 4's focus on quality, ethical, digital education.

Self-Regulated Learning Theory frames the first dependent variable, self-regulation, across four dimensions. Cognitively, AI tools enable a prompt–preview–revise cycle through immediate grammar and clarity corrections (Deep & Chen, 2025). Metacognitively, they help learners track progress and identify weaknesses (Zheldibayeva et al., 2025). Socially, AI supplements teacher and peer feedback (Gültekin Talayhan et al., 2023). Motivationally, AI reduces writing anxiety and builds competence, supporting persistence (Akiba & Garte, 2024). Self-Determination Theory sharpens the motivational dimension: autonomy, competence, and relatedness drive intrinsic motivation (Chanpetch & Songserm, 2023). AI feedback builds competence, but over-reliance can erode autonomy (Fošner, 2024), and blur the line between motivational support and dependency (Sykes, 2024).

The second dependent variable, academic integrity awareness, rests on Moral Self-Regulation Theory. AI use can reduce plagiarism via better paraphrasing and citation (Henchiri & Al Aamri, 2025), or enable misconduct where ethical awareness is weak (Secreto et al., 2025; Lund et al., 2025), explaining variation in responsible versus

irresponsible use. This framework supports SDG 4's emphasis on ethical, digitally literate learning (Fošner, 2024), extending that evidence to the underexplored Pakistani context.

Methodology

This study is grounded in the positivist research paradigm, which assumes that social phenomena can be objectively measured and analyzed through observable and quantifiable data. The positivist approach was considered suitable for this research as it allows a descriptive assessment of the impact of AI writing correction tools on students' self-regulation and their awareness of academic integrity, and supports hypothesis-driven inquiry and generalization of findings from a representative sample to a wider population.

The quantitative approach to research was taken to observe perceptions and behavior of university students with regard to AI writing correction tools, since attitudes, self-regulatory practices, and integrity awareness can be numerically measured, facilitating the identification of patterns, comparisons, and analysis of impact with the help of statistical means. This study involved a cross-sectional survey design. Information was gathered with the help of a structured questionnaire that included closed-ended Likert scale questions. The survey design was chosen because it is used in the collection of data from a significant population within a limited time frame.

This study targeted the population of undergraduate (final-year) and graduate (MPhil-level) students in higher education institutions. This group was chosen because these students regularly use academic writing tools and presumably possess relatively developed self-regulatory skills and awareness of academic integrity. The study used a non-probability convenience sampling technique: the questionnaire was distributed electronically to students reachable through university networks and social media platforms, and all willing and eligible students who received the survey link could participate.

Instrumentation

The questionnaire comprised 35 questions, containing three major parts based on already validated instruments from previous studies. Part I: Artificial Intelligence Writing Correction Tools (6 items) by Putra (2023) assessed students' perceptions of artificial intelligence writing correction programs (e.g., Grammarly, QuillBot), including acceptability, perceived usefulness, ethical issues, and inclusion in teaching and learning. Section II: Students' Self-Regulation (14 items), adapted from Bisriyah (2025), measured self-regulated learning practices across four dimensions: cognitive regulation, metacognitive regulation, social behavior control, and motivational regulation. Section III measured students' awareness and use behavior regarding academic integrity involving artificial intelligence. Specifically, it included ten items on behavior-use and five items on attitude, adapted from Lund et al. (2025), to assess abilities of use and attitudinal factors. After pilot testing, the reliability of the instrument was assessed using Cronbach's alpha. The instrument was highly reliable with a value of 0.89. The reliability coefficients for the three sections were Artificial Intelligence Writing Correction Tools (0.67), Students' Self-Regulation (0.88), and Artificial Intelligence Use Behaviour and Academic Integrity (0.87).

Data Collection

The data were collected with the help of an online questionnaire, which was sent electronically to the respondents. Before the respondents could participate, they were informed about the purpose of the study, their confidentiality was assured, and they were told that they had a choice to participate. All respondents filled out the questionnaire after providing electronic informed consent.

Data Analysis and Results

Data were analyzed using descriptive as well as inferential statistics. The participants' demographic characteristics were summarized using descriptive statistics and Table 1 presents them. Frequencies and percentages were calculated for the demographic variables and the study variables were summarized using appropriate descriptive measures. T-test, ANOVA, Pearson correlation and regression were used.

Table 1

Demographic Profile of Respondents

Demographic	N	Percentage %
Gender		
Female	172	72.6
Male	65	27.4
Age		
20–25	178	75.1
26–30	31	13.1
31–35	10	4.2
36–40	6	2.5
Above 40	12	5.1
University		
Private	140	59.1
Public	97	40.9
Degree Program		
Undergraduate	150	63.3
Graduate	87	36.7

(*N* = 237)

The demographic characteristics of respondents were presented in Table 1. Female respondents constituted the majority of the sample at 72.6% (*n*=172), while 75.1% (*n*=178) of the respondents were aged between 20 and 25. The institutions represented were evenly divided between private (59.1%) and public (40.9%) universities. Moreover, 63.3% of participants were in undergraduate degree programs, and 36.7% were in graduate degrees.

This section presents the descriptive, correlational, and regression results with regard to the four null hypotheses, followed by exploratory demographic contrasts. Table 2 depicts the Pearson correlations among the four composite scales involved in the hypotheses.

Table 2

Pearson Correlations

Variable	1	2	3	4
1. AI Attitude	—			
2. Self-Regulation	.51**	—		
3. AI Use Behavior	.43**	.47**	—	
4. Integrity Awareness	.26**	.19**	.38**	—

** *p* < .01 (two-tailed). *N* = 237.

AI Attitude was significantly and positively correlated with Self-Regulation ($r = .51, p < .01$), representing a moderate-to-large effect, and more modestly with Academic Integrity Awareness ($r = .26, p < .01$). AI Use Behavior was positively correlated with both Self-Regulation ($r = .47, p < .01$) and Integrity Awareness ($r = .38, p < .01$). These correlations provide preliminary evidence for the relationships tested in H_{01} and H_{02} , indicating that AI writing tools are associated with stronger self-regulation and that their use is associated with higher not lower reported academic integrity awareness.

H_{01} : AI attitude does not significantly predict university students' self-regulation in academic writing.

Table 3

Simple Linear Regression Predicting Students' Self-Regulation from AI Attitude

Predictor	<i>B</i>	<i>SE B</i>	β	<i>t</i>	<i>p</i>
Constant	1.624	0.225		7.22	< .001
AI Attitude	0.585	0.064	.51	9.17	< .001

Note. Dependent variable: Self-Regulation. $R^2 = .264$, Adjusted $R^2 = .260$, $F(1, 235) = 84.09$, $p < .001$.

A simple linear regression analysis was conducted to examine whether AI attitude predicted students' self-regulation. The regression model was statistically significant, $F(1, 235) = 84.09$, $p < .001$, explaining 26.4% of the variance in students' self-regulation ($R^2 = .264$, adjusted $R^2 = .260$). AI attitude was a significant positive predictor of self-regulation, $B = 0.585$, $SE = 0.064$,

$\beta = .51$, $t = 9.17$, $p < .001$. This indicates that a one-unit increase in AI attitude was associated with a 0.585-unit increase in self-regulation. Thus, AI attitude significantly predicted students' self-regulation. Therefore, H_{01} is rejected.

H_{02} : AI attitude and AI use behavior do not significantly predict students' academic integrity Awareness.

Table 4

Multiple Linear Regression Predicting Academic Integrity Awareness from AI Attitude and AI Use Behavior

Predictor	<i>B</i>	<i>SE B</i>	β	<i>t</i>	<i>p</i>
Constant	1.947	0.248		7.86	< .001
AI Attitude	0.137	0.077	.12	1.79	.075
AI Use Behavior	0.254	0.051	.33	5.01	< .001

Note. Dependent variable: Academic Integrity Awareness. $R^2 = .158$, Adjusted $R^2 = .151$, $F(2, 234) = 21.97$, $p < .001$.

A multiple linear regression was conducted to examine whether AI attitude and AI use behavior significantly predicted students' academic integrity awareness. The overall model (Table 4) was statistically significant, $F(2, 234) = 21.97$, $p < .001$, and explained 15.8% of the variance in academic integrity awareness ($R^2 = .158$, adjusted $R^2 = .151$). AI use behavior was a significant positive predictor, $B = 0.254$, $SE = 0.051$, $\beta = 0.33$, $t(234) = 5.01$, $p < .001$. AI attitude was not a significant unique predictor once AI use behavior was controlled, $B = 0.137$, $SE = 0.077$, $\beta = .12$, $t(234) = 1.79$, $p < .075$. Because at least one predictor (AI use behavior) significantly predicted academic integrity awareness, H_{02} was rejected.

H_{03} : Self-regulation and academic integrity awareness do not differ significantly by gender, university type, or degree program

Table 5

Independent-Samples *t* Tests for Differences in Self-Regulation and Academic Integrity Awareness by Demographic Characteristics

Comparison	Group 1 <i>M</i> (<i>SD</i>)	Group 2 <i>M</i> (<i>SD</i>)	<i>t</i>	<i>df</i>	<i>p</i>	<i>d</i>
Self-Regulation × Gender	Female 3.70 (0.56)	Male 3.57 (0.56)	1.63	235	.104	0.24
Integrity Awareness × Gender	Female 3.25 (0.57)	Male 3.07 (0.55)	2.18	235	.030*	0.32
Self-Regulation × Degree Program	Undergrad 3.65 (0.53)	Graduate 3.69 (0.61)	-0.53	235	.596	-0.07
Integrity Awareness × Degree Program	Undergrad 3.21 (0.57)	Graduate 3.19 (0.57)	0.23	235	.820	0.03
Self-Regulation × University Type	Private 3.76 (0.56)	Public 3.54 (0.55)	3.00	235	.003**	0.40
Integrity Awareness × University Type	Private 3.30 (0.62)	Public 3.07 (0.46)	3.29	235	.001**	0.41

Note. *d* = Cohen's *d* (independent-samples). **p* < .05, ***p* < .01

The findings (Table 5) showed a significant gender difference in academic integrity awareness, with female students reporting higher scores than male students, $t(235) = 2.18, p = .030, d = 0.32$. However, the gender difference in self-regulation was not significant, $p = .104$. University type also showed significant differences, with students from private universities reporting higher self-regulation ($p = .003, d = 0.40$) and academic integrity awareness ($p = .001, d = 0.41$) than those from public universities. No significant differences were found between undergraduate and graduate students. Because statistically significant differences were observed for gender on academic integrity awareness and university type on both self-regulation and academic integrity awareness, H_{03} was partially rejected. H_{04} : Self-regulation and academic integrity awareness do not differ significantly across age groups.

Table 6

One-Way ANOVA of Self-Regulation and Academic Integrity Awareness Across Age Groups

Dependent Variable	<i>F</i>	<i>df</i>	<i>p</i>	η^2
Self-Regulation	0.51	4, 232	.812	.009
Integrity Awareness	0.47	4, 232	.755	.008

A one-way analysis of variance (ANOVA) was conducted to examine differences in self-regulation and academic integrity awareness across five age groups (20–25, 26–30, 31–35, 36–40, and above 40). No significant differences were found across age groups for self-regulation, $F(4,232) = 0.51, p = .812, \eta^2 = .009$, or academic integrity awareness, $F(4,232) = 0.47, p = .755, \eta^2 = .008$. Therefore, H_{04} was accepted.

Discussion

Findings show that using writing correction tools with artificial intelligence (e.g Grammarly, QuillBot) is associated with enhanced self-regulated writing behaviours without compromising their academic integrity awareness. The

analysis revealed a strong positive relationship between students' attitudes towards AI and their self-regulation capacities. The result affirms Self-Regulated Learning (SRL) Theory (Zimmerman, 2000) and supports recent findings that the utilization of an automated feedback platform enhances metacognitive and cognitive monitoring during drafting (Amani & Bisriyah, 2025; Zheldibayeva et al., 2025). Tools that provide real-time feedback on mechanics and clarity facilitate a prompt–preview–revise cycle that scaffolds goal setting, self-assessment, and autonomous editing (Deep & Chen, 2025; Jin et al., 2023). According to Self-Determination Theory (Deci & Ryan, 1985), these findings indicate that, when students see AI as a formative aid, it enhances their writing competence without degrading autonomous agency into passive dependency (Akiba & Garte 2024; Fošner 2024).

The actual behaviour of using AI was the primary predictor for academic integrity awareness instead of attitudes. Working with AI tools for legitimate purposes (e.g., enhancing sentence clarity and organizing structural appearance) was positively associated with ethical awareness and challenged the prevailing argument that digital writing assistants are likely to promote ethical apathy (Bittle & El-Gayar, 2025; Gruenhagen et al., 2024). Informed by the Moral Self-Regulation Theory, active engagement with feedback tools may encourage more reflective judgement around the appropriate limits of original authorship and citation accuracy (Henchiri & Al Aamri, 2025).

Demographic comparisons revealed critical contextual distinctions in how students regulate their writing and conceive of academic ethics. There were no differences by age or degree programme, although female students expressed greater academic integrity awareness than male students. The institutional context was even more decisive: compared to their public university counterparts, students from private universities were significantly more self-regulated and aware of integrity. The system-level findings across higher education indicate that the resource availability in the universities, digital infrastructures, class sizes, and AI governance differ sharply by the sector (Gustilo et al., 2024; Sevnarayan & Potter, 2024). Students at private universities probably have more access to guided handling of technology and formal ethics, which helps reduce the uncertainty that often arises with the use of new AI tools (Chanpetch & Songserm, 2023; Karkoulia & Sayegh, 2024).

By showing the intersectionality and complexity of Pakistani higher education and discourses, this analysis addresses an important geographical and empirical gap in South Asian higher education literature (Gustilo et al., 2024; Malik et al., 2023). The construct of joint evaluation of self-regulation and integrity awareness mitigates the limitation pointed out in Jin et al. (2023) and suggests the two constructs may develop dependently, not oppositely. Constructive incorporation of AI writing assistants serves as an operational scaffold that bolsters self-directed learning as well as ethical awareness, rather than engendering passive dependency or uncritical submission (Marzuki et al., 2023; Sykes, 2024). As a result, these findings indicate that blanket or restrictive bans on AI in higher education may be inappropriate. In particular, there may be merit in pedagogically framed integration that combines automated feedback and explicit instruction in academic integrity (Deep & Chen, 2025; Roe et al., 2023; Stanford, 2025).

Conclusion

This study concluded that Pakistani university students who have positive attitudes and more active use of AI writing correction tools exhibit stronger self-regulated writing behaviours and greater awareness of academic integrity. Findings show that when students use AI tools for legitimate operations such as drafting, revising or formative feedback, it is associated with enhanced cognitive engagement with their writing process. Again, this was specifically the case for students in private universities. As a result of the data, writing platforms that use AI can be seen as learning scaffolds that help students, rather than academic fraud facilitators, when used appropriately in higher education workflows. Simultaneously, important methodological constraints temper the conclusions drawn. In view of the study's reliance on cross-sectional design, self-reported data collection, convenience sampling, and lower

internal reliability on certain attitudinal subscales, the results provide a context-specific correlational account rather than definitive proof of causation. Regardless, this work strengthens a case for university administrators and educators, backed by data. Higher education institutions should facilitate structured, pedagogy-based integrations of AI writing tools in ways that build independent writing and strong ethical awareness, rather than pursuing restrictive bans or reactionary prohibitions.

Recommendations

From the results and the method used in this study, some recommendations are made to higher education institutions, teachers, and further researchers.

- ▶ Institutions of higher learning, particularly public universities, must set clearly articulated institutional rules and guidelines stipulating allowable use of AI tools. The digital literacy instruction for students will let them manage their writing and furrow the gaps between public and private.
- ▶ Educators are encouraged to embed AI writing correction tools into course curricula as formative revision aids rather than content-generation shortcuts. Classroom instruction should focus on building student autonomy, active reflection, and critical editing of AI-generated feedback.
- ▶ Future research should utilize longitudinal tracking to determine whether self-regulatory gains and integrity awareness persist across multiple academic years and diverse disciplines.
- ▶ Psychometric developers should pilot-test negatively worded (reverse-scored) survey items more extensively to improve subscale internal consistency prior to large-scale quantitative deployment.

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