**Journal of Education and Educational Research**
ISSN: 2957-9465 | Vol. 21, No. 2, 2026

# The Impact of AI Assistance on the Academic Writing Self-Efficacy of Undergraduates with Different Writing Abilities

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**Abstract:** Against digital education background, generative AI has become common writing assistance for undergraduates. Existing studies mainly focus on second-language writing and ignore stratified comparisons across learners, while the dual effects of AI on academic writing self-efficacy remain understudied. Based on self-efficacy theory, this paper distributes questionnaires and divides respondents into three proficiency groups by CET-4 scores. Descriptive statistics, group difference tests and correlation analysis are adopted for empirical analysis. The results reveal prevalent AI over-dependence despite its polishing functions. Participants' writing self-efficacy stays at medium-upper level yet hampered by writing anxiety. AI delivers short-term confidence promotion but impairs independent writing competence in the long run, with stronger influences on low-proficiency students. This stratified dual-path framework offers empirical references for standardized AI application in university writing teaching.

**Keywords:** Generative AI; AI-assisted Academic Writing; Academic Writing Self-efficacy; Undergraduates; Stratified Writing Ability.

## 1. Introduction

### 1.1. Research Background

Generative AI tools facilitate undergraduates' term papers via idea generation, logical arrangement and format standardization, yet surveys show nearly half students over-rely on such tools and lose independent thinking capacity [1]. Academic writing self-efficacy, derived from Bandura's social cognitive theory, refers to individuals' subjective judgment of their writing competence, which shapes writing motivation and emotions [2]. Current literature concentrates on foreign language writing without grouping students by writing levels, and the dual mechanisms of promotion and inhibition of AI on self-efficacy lack systematic elaboration, leaving research space for this paper.

### 1.2. Problem Statement

Generative AI penetrates full writing procedures, but students differ greatly in usage and dependence [3]. Many rely on AI to construct paper frameworks and core arguments [4]. Though classroom observations note AI's negative influence on independent thinking [1], large-sample evidence about its psychological impacts on writing self-efficacy is insufficient. Prior research treats undergraduates as a unified sample and overlooks proficiency stratification, failing to explain differentiated AI effects or identify risks for low-proficiency learners. AI has both facilitating and damaging functions, but its trigger conditions and boundaries are unclear. Few targeted solutions for students, universities and AI developers are proposed to balance AI utility and independent writing cultivation.

### 1.3. Research Objective and Questions

#### 1.3.1. Research Objective

This study has three targets. First, it describes undergraduates' AI usage status and measures multi-dimensional writing self-efficacy to supplement data on general academic writing. Second, it compares AI behaviors and efficacy perceptions among high, medium and low proficiency groups to unpack stratified heterogeneous mechanisms. Third, it proposes multi-stakeholder optimizing strategies to maximize AI benefits while preventing competence loss and improving both writing ability and self-efficacy.

#### 1.3.2. Research Questions

1. What characteristics feature undergraduates' AI-assisted academic writing usage?
2. What is the overall and dimensional performance of undergraduates' academic writing self-efficacy?
3. What differentiated impacts does AI exert on writing self-efficacy across three proficiency groups?

### 1.4. Thesis Structure

This thesis contains five chapters. Chapter 1 introduces the research background, core problems, research objectives and research questions. Chapter 2 reviews relevant literature covering AI writing applications, tool evaluation systems and studies on writing self-efficacy, and summarizes existing research gaps. Chapter 3 reports questionnaire statistical results, including descriptive, grouped difference and correlation analyses to reveal AI's two-sided effects on students with varied writing proficiency. Chapter 4 discusses the mechanisms behind the empirical findings by comparing prior studies. Chapter 5 concludes major results, states theoretical and practical contributions, addresses research limitations and offers suggestions for future studies.

# 2. Literature Review

## 2.1. Applications of Generative AI in Academic Writing

### 2.1.1. Practical Values and Application Scenarios

Generative AI serves two core fields: writing teaching and practical document creation. In English classrooms, standardized teaching models supported by AI samples fit multi-stage teaching demands [5]. For official and news articles, AI shortens writing cycles and improves text quality [6]. Empirical data from language learners prove diverse human-AI collaboration modes create distinct writing outcomes [7]. Large language models support full second-language writing and formatting, with user preferences altering auxiliary effects [8]. Copilot and ChatGPT raise learners' writing performance and learning motivation [5].

### 2.1.2. Risks and Ethical Disputes

AI-aided writing brings prominent drawbacks: students use AI monotonously, grow dependent and produce low-originality texts [1]. Academically, over-reliance triggers integrity risks, while journal regulations cannot fully restrain wide AI adoption [9].

## 2.2. Evaluation Framework of AI Writing Tools

### 2.2.1. Theoretical Foundations

Two core theories support relevant analysis frameworks. Self-efficacy theory explains links among writing confidence, autonomous learning and writing outcomes, laying foundations for psychological analysis under AI scenarios [2]. Combined with Technology Acceptance Model, it interprets learners' recognition of AI and transmission paths of technical perceptions [6]. Mediation and moderation statistics supply analytical tools for variable relations [10].

### 2.2.2. Ethical & Risk Perception Dimensions

AI evaluation systems must integrate ethical and risk indicators beyond text quality. Scholars regard academic integrity, tool dependence and originality loss as core risks [3]. Over-dependence reduces independent creation [1], while journal rules impose limited restrictions on AI writing [9]. Learners with stronger risk awareness use AI less frequently, forming a subjective psychological evaluation indicator [6].

### 2.2.3. Empirical Measurement Indicators

Evaluation indicators fall into objective text metrics and subjective psychological metrics. Objective items include completeness, accuracy, formatting standardization and originality; subjective ones cover satisfaction, confidence and risk awareness. Validated scales for AI-assisted second-language writing exist [11], yet few exclusive scales target general academic papers. Evaluation research shifts from single text assessment to integrated measurement of text quality, user psychology and ethical risks.

## 2.3. Empirical Studies on AI, Writing Self-Efficacy & Satisfaction

### 2.3.1. Existing Empirical Evidence

#### 2.3.1.1 Basic Research on Writing Self-Efficacy

Mature research confirms writing self-efficacy correlates with evaluation standards, learning strategies and negative emotions [12]. Higher-efficacy students adopt more self-regulated strategies; writing anxiety mediates external guidance's influences on efficacy [12]. Decades of English writing research focus on influencing factors and teaching interventions [13]. Detailed studies verify self-efficacy positively links with autonomous strategies and is shaped by task difficulty and past performance [2], and targeted instruction can significantly improve writing self-efficacy [14].

#### 2.3.1.2 Correlations Between AI and Writing Self-Efficacy

AI feedback and flow experience boost writing self-efficacy [15]. Multiple influence paths are identified: instant and peer AI feedback enhance confidence [16]; self-efficacy mediates the relation between AI acceptance and writing performance and reversely affects tool attitudes [17]. AI-related writing anxiety interacts with self-efficacy among Chinese learners [18].

### 2.3.2. Core Influencing Factors

Three layers of factors affect self-efficacy under AI contexts. Tool layer: generation, revision and feedback functions create differentiated effects via varied human-AI cooperation modes [7]. Individual layer: writing foundation, AI frequency, anxiety and self-regulated strategies jointly shape efficacy; low-proficiency learners are more susceptible to AI [19]. Environmental layer: campus AI rules and curriculum models restrict AI's functions, and scales developed in single contexts cannot be universally applied (Alshahrani A, 2025; Fan L, 2026).

### 2.3.3. Research Gaps

Four limitations remain. First, most experiments focus on second-language writing instead of general coursework papers. Second, studies rarely distinguish AI generating, polishing and feedback functions, ignoring their differentiated impacts [17]. Third, the complete transmission chain and boundary conditions of AI's effects lack in-depth exploration without systematic frameworks. Fourth, research conclusions cannot be generalized across educational backgrounds, and negative mechanisms of AI-induced efficacy decline are insufficiently discussed.

## 2.4. Summary

This chapter sorts literature covering AI writing applications, tool evaluation systems and AI-self-efficacy correlations. It summarizes AI's merits and risks, constructs multi-dimensional evaluation logic and concludes research deficiencies including narrow research scenarios, undifferentiated AI functions and superficial mechanism analysis, which justify the innovation of this stratified empirical research [20,21].

# 3. Data Analysis and Research Findings

## 3.1. Current Status of AI-Assisted Writing

The overall mean reaches 4.13, showing high AI penetration. Scores for auxiliary behavior (4.33), efficiency improvement (4.34) and scenario cognition (4.31) are all above 4, with polishing as the dominant usage (4.19). However, the independent creation dimension only scores 3.49; merely 48.8% students avoid heavy dependence. Long-term AI use weakens independent thinking.

**Table 1.** Descriptive Statistics for Dimensions of AI-Assisted Academic Writing Usage

| Dimension | Mean | Standard Deviation | Percentage Meeting or Exceeding the Threshold (%) |
|---|---|---|---|
| AI-Assisted Writing Behavior | 4.33 | 0.64 | 96.00 |
| AI Enhances Writing Efficiency | 4.34 | 0.66 | 95.20 |
| Appropriate Use of AI in Specific Contexts | 4.31 | 0.63 | 95.20 |
| AI for Writing Polishing | 4.19 | 0.75 | 88.00 |
| AI-Generated Content (Without Overreliance) | 3.49 | 0.88 | 48.80 |

## 3.2. Academic Writing Self-Efficacy Status

The total mean is 3.57 (medium-upper). Task completion and difficulty resilience exceed 3.8, while emotional regulation hits the lowest score 3.28. Only 40% students maintain positive writing mindsets, and negative emotions form a vicious cycle of ability regression.

**Table 2.** Descriptive Statistics for Dimensions of Academic Writing Self-Efficacy

| Dimension | Mean | Standard Deviation | Percentage Meeting or Exceeding the Threshold (%) |
|---|---|---|---|
| Confidence in Task Completion | 3.88 | 0.75 | 68.80 |
| Resilience in Coping with Difficulties | 3.98 | 0.80 | 76.80 |
| Competency Fit Level | 3.66 | 0.81 | 58.40 |
| Satisfaction with Outcomes | 3.80 | 0.80 | 67.20 |
| Learning Needs Met | 3.91 | 0.78 | 69.60 |
| Emotional Regulation Ability | 3.28 | 0.92 | 40.00 |

## 3.3. Correlation Between AI Usage and Self-Efficacy

The combined dimension averages 3.94. AI compensating weaknesses (4.14) and anxiety relief (4.15) show strong positive effects, while independent writing without AI only scores 3.48. Nearly half students cannot sustain writing quality without tools, proving AI's dual promoting and damaging functions.

## 3.4. Perceived Negative Impacts of AI

This section uses reverse scoring (lower scores = stronger negative feelings), total mean = 3.35. The most prominent problem is weakened independent thinking (mean=3.23). Homogenized AI texts increase revision burdens and reduce autonomous literature analysis, further lowering self-confidence.

**Table 3.** Overall Descriptive Statistics for Each Scale

| Scale Dimension | Mean | Standard Deviation |
|---|---|---|
| Current Status of AI-Assisted Academic Writing | 4.13 | 0.49 |
| Self-Efficacy in Academic Writing | 3.75 | 0.58 |
| Association Between AI Assistance and Self-Efficacy | 3.97 | 0.50 |
| Perceived Negative Effects of AI-Assisted Writing (Reversely Scored) | 3.35 | 0.68 |

## 3.5. Intergroup Differences by Writing Proficiency

**Table 4.** Comparison of Scale Scores Across Different Writing Ability Groups

| Scale | High-Ability Group (n=28) | Intermediate Ability Group (n=67) | Low-Ability Group (n=30) |
|---|---|---|---|
| Current AI Usage | 3.81 | 4.15 | 4.42 |
| Self-Efficacy | 3.92 | 3.59 | 3.21 |
| Correlation Between AI and Self-Efficacy | 3.75 | 3.98 | 4.23 |
| Perceived Negative Impact (Reversed) | 3.62 | 3.37 | 3.08 |

Participants are grouped by CET-4 scores: high (≥550), medium (425–549), low (<425). 425 is the official passing score for CET-4, representing basic English competence. The 550 cutoff is set based on sample quartile distribution to evenly separate top performers for comparative analysis.

CET-4 scores serve as a proxy for writing ability. Its writing subsection tests basic logical and linguistic skills needed for academic work. However, CET-4 only contains short essays and cannot measure advanced academic abilities such as literature integration and thesis structuring, so it cannot fully reflect formal academic writing proficiency.

AI usage negatively correlates with proficiency: low=4.42, medium=4.15, high=3.81. Self-efficacy positively correlates with proficiency: high=3.92, medium=3.59, low=3. Low-proficiency students gain short-term confidence but face highest dependence risks; high-proficiency learners are least affected by AI.

## 3.6. Correlation Analysis

Pearson results show significant correlations ($p<0.05$). AI positive perceptions positively predict self-efficacy, while negative risk perceptions predict lower efficacy. Correlation coefficients are larger for low-proficiency students, meaning their confidence is more vulnerable to AI influences.

**Table 5.** Results of Pearson Correlation Analysis Among Scales

| Variable | Current Status of AI-Assisted Academic Writing | Academic Writing Self-Efficacy | Positive Association Between AI and Self-Efficacy | Perceived Negative Impacts of AI |
|---|---|---|---|---|
| Current Status of AI-Assisted Academic Writing | 1 | | | |
| Self-Efficacy in Academic Writing | 0.24** | 1 | | |
| Positive Correlation Between AI and Self-Efficacy | 0.45*** | 0.45*** | 1 | |
| Perceived Negative Impacts of AI | 0.25** | 0.29** | 0.38*** | 1 |

Note: **p < 0.01, ***p < 0.001

# 4. Conclusion

## 4.1. Core Findings

This study's statistical outcomes align with prior research on AI writing tools while offering novel stratified insights. Consistent with existing literature, participants primarily rely on AI for text polishing and show obvious tool dependence [1]. Beyond uniform group observations, this study further verifies that weaker writers face far stronger dependency risks, a phenomenon rarely elaborated in previous unified-sample studies.

In line with self-efficacy theories [2], writing anxiety acts as a key inhibitor of self-efficacy. The negative cycle of emotional avoidance and ability decline uncovered here supplements existing conclusions about writing anxiety's suppressing effects. The dual-path effect of AI also echoes relevant empirical results [15]: short-term confidence compensation stems from AI's function to fix linguistic and logical defects, whereas long-term confidence loss arises from reduced autonomous writing practice, which impairs the core sources of self-efficacy defined by Bandura's theory.

An unexpected finding lies in the varying sensitivity to AI across proficiency groups. Low-proficiency learners' self-efficacy fluctuates drastically with AI usage, while high-proficiency groups maintain stable confidence regardless of tool access. This unreported heterogeneity explains why prior single-group studies reached inconsistent conclusions about AI's overall influence, and provides new boundary conditions for self-efficacy research under AI writing contexts.

## 4.2. Theoretical and Practical Contributions

Theoretically, this study establishes a stratified dual-path framework to clarify AI's heterogeneous influences across proficiency levels, filling gaps in general academic writing research and supplying standardized questionnaire and grouping references for follow-up quantitative studies. Practically, it provides targeted plans: universities can carry out tiered AI writing training; students build rational tool-use habits; AI developers optimize academic functions to reduce text homogenization.

## 4.3. Limitations and Future Research

This study has three shortcomings. First, samples only cover undergraduates from one university, limiting result generalization. Second, cross-sectional data cannot track long-term dynamic changes of AI usage and self-efficacy. Third, only subjective questionnaire data are collected without objective writing quality indicators. Future research can expand multi-school, multi-stage samples, adopt longitudinal tracking and mixed methods combining texts and interviews. Long-term practice suggestions include regular campus AI guidance systems, academic-oriented AI modules and periodic independent writing training for students.

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