The Impact of AI

on the Process of Learning to Write

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How students regulate generative AI use matters more than whether they use it at all.

Supported by

Generative AI is changing not just what students submit.

It is changing how students

plan — **evaluate** — **revise**

Writing development depends on the decisions students make while using the tool — not just on the presence of the tool.

Learning sciences question: when does AI scaffold writing processes, and when does it substitute for them?

Research question and central claim

How do students regulate generative AI use across writing tasks?

Central claim

AI's impact on learning to write depends less on whether students use AI, and more on how they regulate interaction with it.

agency • self-regulation • AI literacy

Study design: broader project, focused analysis

Larger research program

NSF grant
UCI upper-division engineering writing
January 2024–December 2025

California Learning Lab AI Grand Challenge
UCI + CSU Fullerton + community colleges
2025–2027

Data analyzed in this paper

Course
UCI ENGR 190W Communication in the Professional World

Participants
Engineering students in an upper-division writing course

Primary data source
Field notebook reflections across the quarter

Field notebooks and analysis

Field notebook prompt

> *“Do the tools support or hinder the writing or communication goals?”*

Students documented AI use across writing and oral communication assignments over the quarter.

Analytic path

01 **Field notebook reflections**

02 **Inductive + focused coding**

03 **Cross-case comparison**

Codes tracked writing stages, AI uses, and regulatory behaviors — especially evaluation, comparison, and selective adoption.

Patterns of AI use across the writing process (n = 35)

33	29	27	24	14
Feedback	Planning	Revision	Drafting	Editing

students reporting each use · also used for research (n = 18) and reading (n = 16)

32 of 35 described AI as helpful at least once — yet many deliberately chose ***not*** to use it, to preserve independent effort or peer interaction.

FINDINGS

Three patterns of AI-mediated writing

same tool, different regulatory practices

LOW REGULATION — HIGH REGULATION

Offloading

AI as substitute

Reduced engagement with writing processes

Minimal use

AI as optional

Selective non-use limited AI literacy evidence

Intentional use

AI as scaffold

Metacognitive regulation without reduced agency

These are patterns of engagement, not fixed student identities.

Offloading: AI substitutes for early thinking

Low regulation • AI as substitute

> *“The use of the AI definitely helped reduce the time it took to finish the assignment.”*

What this looked like

01 AI starts the process before students develop their own ideas.

02 Common uses include drafting, outlining, summarizing, and research.

03 Learning risk: fewer opportunities to practice ideation and comprehension.

Interpretation: AI becomes directive, reducing opportunities to practice ideation, comprehension, and revision.

Minimal use: non-use can still be agentic

Selective non-use • optional tool

> *“I did not end up using it in my part of the writing.”*

What this looked like

01 Students trusted existing practices or valued independent effort.

02 Some preferred peer interaction for particular tasks.

03 Caveat: less practice evaluating AI-supported writing.

Interpretation: AI literacy includes knowing when not to use AI, but students still need evaluative practice.

Intentional use: AI scaffolds revision and audience awareness

High regulation • AI as scaffold

> *“I asked it to pretend it was the professor and tell me how it would react to my email.”*

What this looked like

01 Students generated initial ideas themselves.

02 AI was used after human feedback or against assignment goals.

03 Students compared, rejected, and selectively adopted suggestions.

Interpretation: AI functions as a scaffold when students keep agency over planning, monitoring, and evaluation.

Reflection helps students regulate AI use

> *“Using AI didn’t just make things easier. It actually made me more careful.”*

Structured reflection appears to support metacognitive awareness: students question output, compare suggestions to intent, and adjust strategy.

01 **Notice effects**

02 **Evaluate fit**

03 **Adjust strategy**

Takeaway: reflection is not just documentation — it is a design mechanism for agency.

Theoretical contribution

Generative AI behaves like more than a tool: it is a quasi-social interlocutor. Because of this, students' self-regulation takes on particular importance.

Sociocultural theory

tools mediate activity

+

Writer(s)-within-community

writing occurs in social + material systems

+

Generative AI

tool + quasi-social interaction

=

Mediational Agent

Pedagogical challenge: build durable habits that preserve agency, judgment, and learning.

Instructional implications: teach regulatory habits

01	**Think first**	Use AI after students have purpose, criteria, or a draft.
02	**Evaluate output**	Model comparison, verification, interrogation, adoption, and rejection.
03	**Reflect on use**	Attention to impact on learning, best practices, choices leads to learning.

Design goal: scaffold regulation rather than automate production.

Thank you

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AI's effect on learning to write depends on how students regulate interaction with it.

Offloading	Minimal use	Intentional use
substitution	agentic non-use	scaffolding

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Link to paper

Human-First AI

THINK FIRST

Generate goals and your own ideas

ASK & ITERATE

Prompt with purpose and refine

TAKE CHARGE

Decide what to use and own it

CHECK YOUR FACTS

Verify accuracy and interrogate for bias

REFLECT & LEARN

Determine what worked and improve

AI can assist, but **you** are in charge of your thinking, judgment, and learning.

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