Don’t Blame Me, Blame ChatGPT: Recognizing Cognitive Debt in Pharmacy Education

Ryan Gibbard, PharmD, BCPS
Maddie Fry, PharmD, BCACP

Disclosures

RG and MF have no relevant conflicts of interest to disclose.

Google Gemini was used in the preparation of these slides to improve visual appearance. All content was generated by RG and MF and all generative actions were reviewed by the authors.

Learning Objectives

1. Recognize examples of cognitive offloading that modern learners may demonstrate
2. Recognize behaviors that put learners at higher risk of cognitive offloading and cognitive debt
3. Identify strategies to mitigate cognitive debt among pharmacy learners

Learning Objectives

We use AI to offload the cognitive burden of making these LOs look pretty.

Assessment Questions

1. Which is the best example of cognitive offloading in a pharmacy learner?

A. Reviewing guideline recommendations before seeing a patient

B. Relying on AI to create a topic discussion handout

C. Discussing options with a preceptor before a recommendation

D. Practicing patient counseling to improve skills

2. Which learner behavior may indicate a higher risk for developing cognitive debt?

A. Asking clarifying questions during case discussions

B. Memorizing drug mechanisms to strengthen knowledge

C. Using AI/search tools without independent problem-solving

D. Reviewing primary literature for recommendations

3. Which teaching strategy is most effective for helping mitigate cognitive debt?

A. Encouraging use of clinical tools for all questions

B. Providing answers quickly for workflow efficiency

C. Providing time for initial reflections before answering

D. Restricting learner access to generative AI tools

Presentation Outline

Key Terms

- Cognitive Load (Wigert, 2023)
  - The amount of "brain power" it takes to do a task, factoring the setting and modifiers of difficulty
- Cognitive Offloading (Gerlich, 2025)
  - Externalization of cognitive tasks to external tools to reduce cognitive load
- Cognitive Debt (Kosmyna, preprint)
  - Accumulated deficits or diminished ability for higher-order thinking due to repeated cognitive offloading, especially as it relates to use of AI tools
- Metacognition (Rivers, 2020)
  - The ability to identify, evaluate, and regulate one's own cognitive processes

Cognitive offloading impacts critical thinking and knowledge retention

Benefits of Cognitive offloading:

- Reduces cognitive load and frees up resources for more complex and dynamic activities
- Shifts the focus away from memorizing information, to remembering where that information can be found when needed (aka "the Google effect")
- Enhances learning and performance (efficiency)

Risks of Over-reliance on external tools:

- Cognitive laziness
- Cognitive dependence
- Loss of cognitive autonomy
- Reduced critical engagement and accountability
- Decline in cognitive functioning and memory retention

Source: Gerlich (2025)

Think-Pair-Share

For You

What types of cognitive activities or tasks have **you** "offloaded" in your practice?

For Learners

What types of cognitive activities or tasks have you seen **learners** "offloading" in your practice site?

Think independently (30 seconds) • **Pair** with a neighbor (1.5 minutes) • **Share** with the group

"[A]utomated decision-support systems in healthcare [...] could result in a workforce that is **highly efficient**, yet potentially **less capable of independent problem-solving and critical evaluation**."

Gerlich (2025)

Signs your learner is cognitively offloading

External Reliance
Frequently adds or refers to their "peripheral brain"

Deferred Retrieval
"I don't know, but I'll look that up and get back to you"

Convenience Searches
Looks for answers online using search engines rather than primary or tertiary references

Generative Shortcuts
Prepares slides or handouts using generative AI

Image: sketchplanations.com/cognitive-offloading

Correlations in the research…

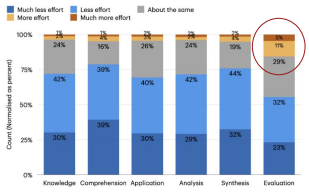
Strong Negative Correlation

Self-reported measures of **cognitive offloading** had a strong negative correlation with validated measures of **critical thinking**.

r = -0.75

Source: Gerlich (2025)

AI tool usage enables cognitive offloading



Distribution of perceived effort (%) in cognitive activities when using generative AI tools compared to not using them.

Source: Lee (2025)

AI tool usage enables cognitive offloading

Positive Correlation

Increased reliance on AI tools is associated with a higher degree of cognitive offloading.

r = +0.72

Negative Correlation

Greater reliance on AI tool is associated with a decline in critical thinking.

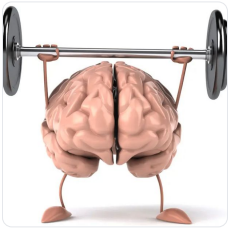
r = -0.68

Source: Gerlich (2025)

"[T]he strong correlations observed suggest that **reliance on AI tools** creates a feedback loop where increased cognitive offloading **exacerbates the decline in critical thinking abilities.**"

Gerlich (2025)

The Brain Responds to Resistance



Neuroplasticity

The brain's ability to change and adapt throughout life by modifying its structure, functions, or neural pathways.

It reorganizes itself in response to learning, experiences, and environmental influences.

The Physical Analogy

Just as physical exercise strengthens muscles, mental challenges help keep the brain sharp.

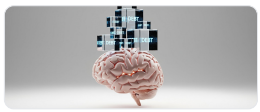
Lack of Resistance = Cognitive Debt

The Path of Least Resistance

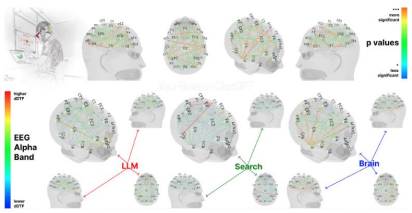
Short-term convenience that leads to a **long-term loss** in:

- Learning and retention
- Information recall ability
- Critical thinking skills

"The absence of difficulty leads to cognitive debt."



Your Brain on ChatGPT: Accumulation of Cognitive Debt when Using an AI Assistant for Essay Writing Task



"Younger and ambitious authors [...] may feel strong pressure to rely on AI. **For some, once dependence begins, it may be difficult to stop.**"

Matsubara (2026)

The Role of Metacognition

Metacognition **mediates** cognitive offloading.

Improved Problem Solving

Occurs when cognitive offloading is **appropriately mediated** by metacognitive processes.

Cognitive Debt

Accumulates when cognitive offloading is **not appropriately mediated**, leading to diminished higher-order thinking.

Metacognition (Simplified)

"Meta-level"

Metacognitive knowledge describes a person's knowledge or beliefs about how they learn.

"Object-level"

Metacognitive monitoring describes a person's "real time" monitoring of their performance (e.g. learning).

Metacognitive control describes a person's actions to regulate their learning based on feedback from internal and external sources.

Guo & Ye (2026); Rivers (2020)

Metacognitive Decision Process

Substitutive Offloading vs. **Duplicative Offloading**

Guo & Ye (2026)

"Students who are confident in their ability to succeed are more likely to set achievable goals and **use effective strategies** to reach them."

Rivers (2020)

So what should we do with our learners?

Gerlich, M. (2025). From Offloading to Engagement: An Experimental Study

(1) Human-Only
Task completed without any AI assistance.

(2) AI-Only
Task completed entirely by ChatGPT.

(3) Human + AI (Unguided)
ChatGPT used without structured instruction.

(4) Human + AI (Guided)
Participants trained to avoid cognitive offloading and stimulate critical thinking.

This structure enabled analysis of how AI interaction influences **argument quality** and **cognitive engagement**.

Beyond Banning: Structured Engagement

> *"As universities and schools debate how to integrate GenAI into curricula, this study shows that simply **allowing or banning its use is insufficient.***
>
> ***Structured, reflective engagement**, not unregulated convenience, must be the pedagogical priority. This has implications for assessment integrity and the cultivation of **metacognitive skills** essential in an age of algorithmic assistance."*

Priority: Shift from **Unregulated Convenience** to **Pedagogical Engagement**

Gerlich, M. (2025). From Offloading to Engagement: An Experimental Study

How Guided/Structured AI use was Defined

1. Initial Reflection
Consider answers without AI. Formulate preliminary hypotheses and argument directions independently.

2. Targeted Research
Use AI exclusively for facts. Prompts restricted to data queries. Activity monitored to prevent direct generation.

3. Argument Construction
Revise responses based on collected data. Do not copy AI text directly; synthesize your own reasoning.

4. Critical Review
Submit arguments to AI to identify missing dimensions or propose counter arguments for critique.

5. Final Revision
Refine arguments using insights while maintaining personal authorship and accountability.

Guided AI use promotes **metacognition** and **personal authorship** through structured pedagogical intervention.

Gerlich, M. (2025). From Offloading to Engagement.

Expert vs. Novice in AI Matters

Experts

Can easily spot:

- Duplication of ideas
- Irrelevant information
- Wrong information

Integration is Low-risk

Novices

Lack the skills to recognize inconsistencies, especially early on.

Usage is High-risk

Example of High Risk vs. Low Risk Activities for the Novice

LOW RISK:

- First Draft, using AI to refine
- Getting suggestions for improvement
- Using for tedious, well-defined tasks

HIGH RISK:

- Starting with AI first instead of thinking
- Replacing thinking or drafting with full content creation
- Over-relying on AI for decisions in unfamiliar domains or tasks

AI Guidelines: School of Pharmacy

Generative AI must be used **critically and thoughtfully** to enhance learning, not replace it. Combine your own intelligence with AI to make informed decisions. Faculty will explicitly state if and how AI tools may be used.

Acknowledgement Examples

Where permitted, you must clearly indicate AI use:

- "I acknowledge the use of [AI tool]... I worked critically with this input by [fact-checking; etc.]... I take full responsibility."
- "The use of [AI tool] was used to create content or assist with this presentation."

Approved AI Tools

Only use Pacific University validated tools for course materials:

- Box AI, Google Gemini
- NotebookLM, Zoom AI Companion

PROHIBITED: ChatGPT and others not listed must NOT be used.

Important Note

Many assignments will NOT allow AI use as it inhibits learning. Assume AI tools are NOT permitted unless specifically instructed otherwise by faculty.

AI Policies in Experiential Setting

Core Strategy for Preceptors

Setting Expectations | Modeling Use | Providing Reasoning

This will go a long way in ensuring that expectations are met by the student.

Student Requirements & Acceptable Use

- **Mandatory Permission:** Students are required to ask for permission before using any AI tools.
- **Structured Use:** Modeling "Brain First" and "Brain Last" approaches might be acceptable to ensure independent thought.
- **Augmentation:** Allowing use for augmentation of learning (e.g., asking clarifying questions on content or refining thinking).

Institutional Alignment

Preceptors should explicitly state if and how AI tools may be used, consistent with the School of Pharmacy guidelines.

Preserving and Advancing Metacognitive Skills

What is Metacognition?

Metacognition is a person's ability to regulate their thinking and learning and consists of the self-assessment skills: **planning, monitoring, and evaluating**.

Strategies for the Experiential Setting

Skills must be further advanced and supported during rotations.

- **Emphasize Mastery:** Set mastery goals and use questioning techniques to promote awareness.
- **Provide Feedback:** Couple awareness with regular feedback about learner efforts.
- **Documentation:** Request clinical documentation accompanied by detailed explanations.
- **Scaffolding:** Support learners through intentional scaffolding during their rotation.

"Brain First" and "Brain Last"

Use "brain first" strategies to ensure AI is used for augmentation of content, not pure generation. Use "brain last" strategies like "documentation" strategy above to have student show how their brain was used throughout the process even if AI was utilized

Medina MS, et al. Am J Pharm Educ. 2017 May;81(3):76.

Assessment Questions

1. Which is the best example of cognitive offloading in a pharmacy learner?

A. Reviewing guideline recommendations before seeing a patient

B. Relying on AI to create a topic discussion handout

C. Discussing options with a preceptor before a recommendation

D. Practicing patient counseling to improve skills

2. Which learner behavior may indicate a higher risk for developing cognitive debt?

A. Asking clarifying questions during case discussions

B. Memorizing drug mechanisms to strengthen knowledge

C. Using AI/search tools without independent problem-solving

D. Reviewing primary literature for recommendations

3. Which teaching strategy is most effective for helping mitigate cognitive debt?

A. Encouraging use of clinical tools for all questions

B. Providing answers quickly for workflow efficiency

C. Providing time for initial reflections before answering

D. Restricting learner access to generative AI tools

References

- Matsubara S. Psychological and mental effects of artificial intelligence: experiments first targeting doctors and authors. *Acta Psychiatr Scand*. 2026 April; 153(4): 304–305.
- Gerlich M. AI tools in society: Impacts on cognitive offloading and the future of critical thinking. *Societies*. 2025; 15(1): NA.
- Ma Y, Fujinami T. Exploring the influence of strategy choice involving cognitive offloading on metacognitive judgements. *Discov Psychol*. 2026; 6: Article 35.
- Wigert BG, Sutton RI. "Too many bosses, too many teams: overcoming the challenges of team innovation in matrix organizations." In: Handbook of Organizational Creativity, 2nd ed. Academic Press, London, UK, 2023: 223-238.
- Rivers ML, Dunlosky J, Perky AM. Measuring metacognitive knowledge, monitoring, and control in the pharmacy classroom and experiential settings. AJPE. 2020; 84(5): 549-559.
- Kosmyna N, et al. Your brain on ChatGPT: Accumulation of cognitive debt when using an AI assistant for essay writing task. 2025 December. Preprint. Available online at: https://doi.org/10.48550/arXiv.2506.08872 (accessed 4/7/2026).
- Guo Y, Ye Q. Meta-cognitive insights into cognitive offloading: mechanisms, interventions, and educational implications. *Humanit Soc Sci Commun*. 2026. Available online at: https://doi.org/10.1057/s41599-026-06621-5 (accessed 4/7/2026).
- Fisher J. Tips to leverage neuroplasticity to maintain cognitive fitness as you age. *Harvard Health Publishing*. *2025*. *Available online at: https://www.health.harvard.edu/mind-and-mood/tips-to-leverage-neuroplasticity-to-maintain-cognitive-fitness-as-you-age*
- Gerlich, M. (2025). From Offloading to Engagement: An Experimental Study on Structured Prompting and Critical Reasoning with Generative AI. *Data*, *10*(11), 172. https://doi.org/10.3390/data10110172
- Lee H, et al. The impact of generative AI on critical thinking: self-reported reductions in cognitive effort and confidence effects from a survey of knowledge workers. CHI '25: Proceedings of the 2025 CHI Conference on Human Factors in Computing Systems. Article No.: 1121, Pages 1 - 22. https://doi.org/10.1145/3706598.3713778
- Medina MS, Castleberry AN, Persky AM. Strategies for Improving Learner Metacognition in Health Professional Education. Am J Pharm Educ. 2017 May;81(4):78. doi: 10.5688/ajpe81478. PMID: 28630519; PMCID: PMC5468716.