Knowledge Matters Campaign

Literacy and the Science of Learning Podcast

Study Guide, Episodes 5-6

Writing is not only a valuable skill. It's also a potentially powerful lever for boosting reading comprehension, learning—and even thinking.

Findings from cognitive science explain why. When students write, they can increase their ability to retain information and retrieve it in the future when they need it. They can also deepen their understanding and build their analytical abilities by elaborating on that information. In addition, they can learn how to use and understand the complex sentence structure of written language, boosting their reading comprehension.

But cognitive science also tells us that writing is hard—so hard that many students don't get its cognitive benefits. The key to unlocking the potential of writing is to modulate the cognitive load it imposes on working memory. One way to modulate cognitive load is to ensure that students have adequate information about a topic before they're asked to write about it. Another is to provide explicit instruction and lots of guided practice in writing strategies, including constructing sentences and creating outlines, before students are expected to engage in them independently. It makes sense to embed writing instruction across all subjects, both to provide students with the writing practice they need and also to boost learning throughout the curriculum.

While it's helpful for teachers to have some understanding of cognitive science, they don't need to be experts in the field to provide their students with the benefits of science-informed instruction. Like the educators in Monroe, Louisiana, a high-poverty school district, they may just be looking for a way to enable their students to express themselves coherently in writing. But if they have a content-rich curriculum and they embed an explicit method of writing instruction in that content, they may see, as the teachers in Monroe have, something "amazing" start to happen. "We realized," one teacher said, "that teaching them to write clearly was actually teaching them to think clearly."

When students learn to write in more complex ways, they can not only understand more complex text but also think in more complex ways. By drawing on principles supported by cognitive science, effective writing instruction can change not only students' academic outcomes but also their life trajectories.

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Big-picture goals

1. Explain why writing is not just a product, but also a process that supports learning.
2. Describe how writing can aid memory and comprehension through retrieval practice and elaboration.
3. Explore how too much cognitive load can interfere with writing's potential benefits and identify strategies to reduce it.
4. Understand how explicit, content-embedded writing instruction can improve student thinking and promote equity.

Episode snapshots

Episode	Core message	Must-know concepts	Illustrative examples
5 – "Memory and the writing effect"	Writing supports long-term learning via retrieval practice, elaboration, and exposure to complex syntax. But cognitive load must be managed.	• Limits of working vs long-term memory • Retrieval practice • Elaboration • Syntax and comprehension • Deliberate practice and writing strategies	• Karpicke's free-recall study • Write-to-learn studies show positive effects on average, but almost one fifth show negative effects • If cognitive load is too heavy, writing may not promote learning • Teaching sentence construction and outlining modulates cognitive load
6 – "How writing promotes clear thinking"	A method of explicit writing instruction aligned with cognitive	• Embedding writing in all subject areas	• Sentence stems in math ("Although fractions…")

	science (such as TWR) boosts student writing and thinking across all subjects.	• Starting at the sentence level • Linear outlines • Deliberate practice • Clear writing leads to clearer thinking	• Inclusion students writing full paragraphs • Students entering higher grade levels with better writing skills • Improved test scores and increased student confidence

Glossary

- **Retrieval practice/testing effect** – Recalling information strengthens future recall more than re-reading.
- **Elaboration** – Connecting new information to prior knowledge, examples, or personal meaning.
- **Cognitive load** – Total demand on working memory during a task.
- **Deliberate practice** – Focused, scaffolded practice with targeted feedback.
- **Appositive** – A phrase or word describing a noun.
- **The Writing Revolution (TWR)** – Example of explicit writing instruction method starting at the sentence level, embedded in all subjects.

Takeaways and teacher moves

Principle	Why it matters	Classroom moves
Writing = learning	Promotes retrieval practice, elaboration, and deeper comprehension.	Teach writing strategies across subjects, embedded in content.

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Manage cognitive load	Inexperienced writers can be overwhelmed by too many demands.	Begin instruction at the sentence level and teach students to create clear outlines.
Embed in content	Writing about known topics deepens curricular knowledge.	Ensure that students have adequate information about a topic before asking them to write.
Teach syntax in context	Learning to use complex sentence structures enables students to understand them.	Explicitly teach structures like appositives and subordinating conjunctions through student writing.
Writing advances thinking	Explicit writing instruction enables students to think in clearer and more complex ways.	Weave writing activities throughout classroom instruction.

Discussion questions

1. What are three distinct ways in which writing aids learning?
2. How does writing function as retrieval practice?
3. Why might writing sometimes hinder rather than help learning?
4. What benefits arise when writing instruction is embedded in math, science, or social studies?
5. How can explicit sentence-level strategies empower struggling writers?
6. What is an example of a content-based sentence stem you could use in your subject and classroom?

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Activities

Purpose	Activity
Retrieval practice	Have students turn fragments into complete sentences by adding information they have learned.
Scaffold cognitive load	Provide sentence stems tied to content and have students complete them using the conjunction *because, but*, and *so*.
Practice syntax	Have students fill in a missing appositive.
Embed across subjects	In math, ask students to finish sentence stems such as: “Although fractions are like decimals…”

Further reading

- Hochman, J. and Wexler, N. (2024) *The Writing Revolution 2.0*.