AT A GLANCE

Designing for Student Awareness of GenAI Impacts

How might we design instructional experiences that build students' awareness of when and how GenAI use is helping or harming their learning?

University of Pittsburgh
Learning Sciences + Emergent Technologies Hub

The Problem Landscape

Students across high school and higher education are using GenAI at rapidly increasing rates, but most do so without pausing to consider how those interactions are shaping their actual learning. This is fundamentally a metacognitive challenge.

Why does this problem exist?

- **The fluency heuristic:** Students mistake the ease of reading AI-generated text for genuine understanding, because GenAI outputs are linguistically fluent and confident.
- **Declining self-regulation:** Students who use GenAI without metacognitive support show deteriorating task strategy and self-evaluation over time.
- **False confidence:** GenAI can create an illusion of understanding — overconfident students show significantly worse calibration of what they actually know.
- **Cognitive offloading:** When students delegate thinking to GenAI, they reduce engagement with the productive struggle that builds deep understanding.
- **Hidden costs:** The benefits of GenAI use are immediately visible (faster, polished outputs), while the costs in reduced learning and weakened skills are invisible and delayed.

What makes it hard to address?

- Metacognition is inherently difficult to observe as instructors cannot easily see whether students are thinking through a GenAI interaction or passively accepting outputs.
- There is enormous variation in how individual students use these tools across contexts. The same tool, used differently, can either enhance or undermine learning.

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What does promising practice look like?

- The most promising approaches share a design principle: they require students to make their thinking visible before, during, or after interacting with GenAI.
- Structured metacognitive supports such as reflection prompts, self-assessment checkpoints, process documentation can counteract the passive tendencies GenAI use encourages.
- GenAI use paired with teacher guidance is much more likely to produce positive learning outcomes than unstructured, student-directed use.
- GenAI works best when treated as an object of inquiry that learners interrogate, not an authority they defer to.

Example Approaches

The three approaches below are design sketches synthesized from research and inspired by documented classroom practice. They are starting points to adapt, combine, or set aside. Each shares a common logic: creating structured moments for students to notice and name what cognitive work they are doing versus what the AI is doing for them. Together they span a range of contexts and student ages, include a no-tech option, and can be implemented at different points in a learning sequence.

Example 1: The AI Interaction Audit
Setting: High school and college

Students complete assignments in two phases: 1) First working independently (GenAI-free) to generate their own thinking; then 2) using GenAI while maintaining a structured interaction log that captures what they asked, what they accepted or rejected and why, and what they learned. The log is submitted alongside the final product and weighted in grading, rewarding deliberate engagement over passive acceptance.

Example 2: Predict-Compare-Reflect Checkpoints
Setting: High school and college (especially effective in STEM and social sciences)

At regular intervals in a unit, students complete a brief three-step checkpoint: 1) predict how well they understand the material, 2) compare that prediction against actual performance using a teacher- or GenAI-generated quiz, and 3) reflect on what the gap reveals. Low-stakes and quick (5–10 minutes), these checkpoints build a longitudinal record of students' calibration accuracy over time.

Example 3: The "Teach the Confused Student" Protocol
Setting: High school and college

Students explain a concept based on a set of teacher pre-written question cards that pose as a confused student (alternatively, students prompt a GenAI tool to act as a "confused student" that asks clarifying questions). Students revise their explanation based on what they struggled to answer, then reflect on the gaps the exercise revealed. This approach leverages the well-established "protégé effect" in which explaining material to others deepens the explainer's own understanding.

This is a summary of the full Resource Packet. The full packet is available on request. The packet contains an expanded description of potential approaches, limitations and contextual considerations, research citations, and a tools & templates section.