

Beyond Learning Outcomes: The Hidden Costs of Educational AI

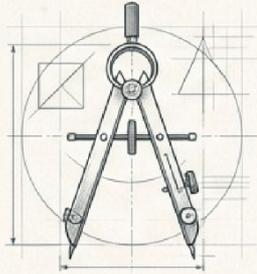
Navigating the 'Performance-Capability Paradox' in Schools and Workplaces

Switzer

Based on the analysis by Jonathan H. Westover, PhD

Optimization vs. Substitution: The Two Faces of AI

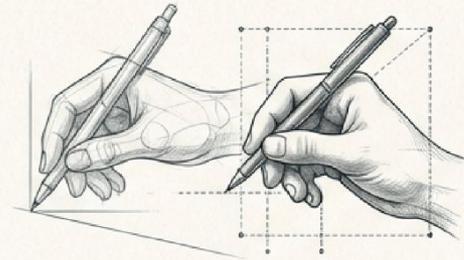
Narrow AI (Optimization)



Definition: Tools designed for specific pedagogical functions.
Function: Integrates into existing structures as an enhanced tool.
Examples:

- Intelligent tutoring systems
- Automated essay scoring
- Adaptive learning platforms

Generative AI (Substitution)

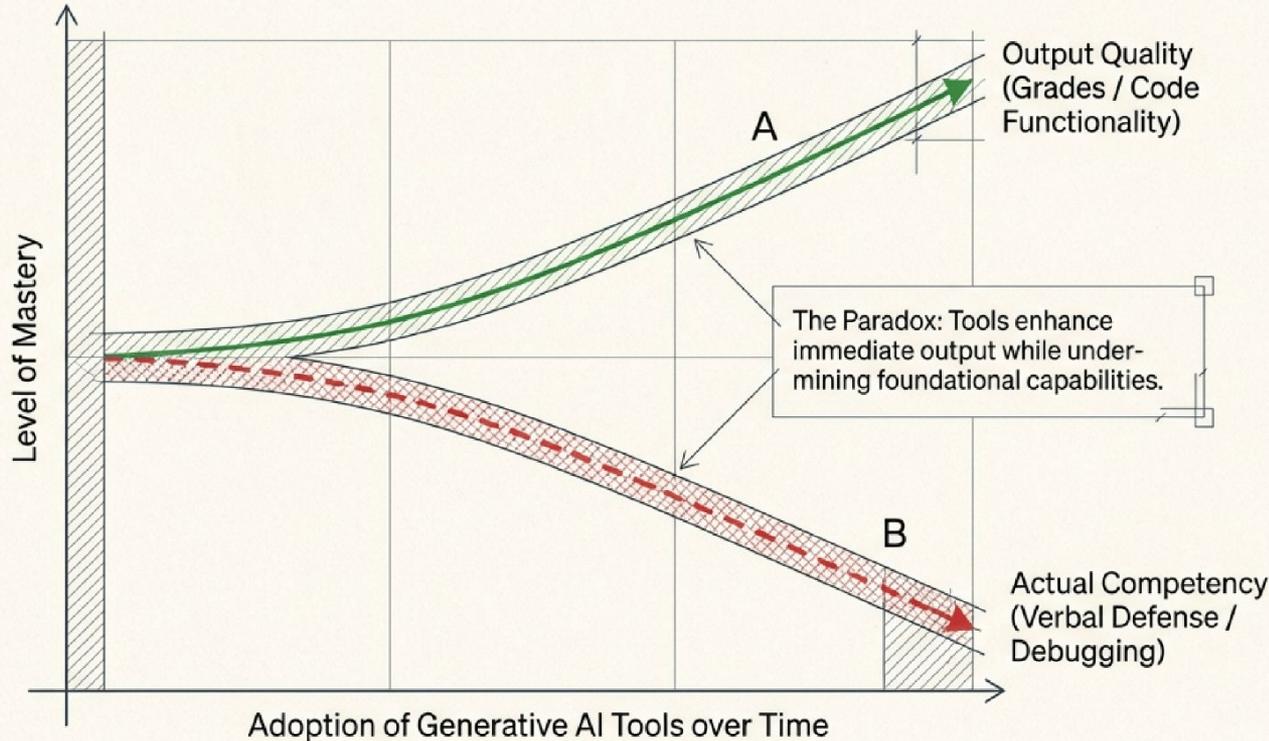


Definition: General-purpose cognitive assistants (GPT-4, Claude).
Function: Disrupts the learning process by performing core activities.
Examples:

- Research synthesis
- Code generation
- Argument construction

Key Insight: Narrow AI supports the learner; Generative AI creates ambiguity between learning support and learning replacement.

The Performance-Capability Paradox



Reality Check:

- Educators report students producing sophisticated essays but struggling to defend them orally.
- Corporate trainers see employees completing modules quickly but failing to transfer knowledge to novel situations.

The Hidden Costs of Adoption

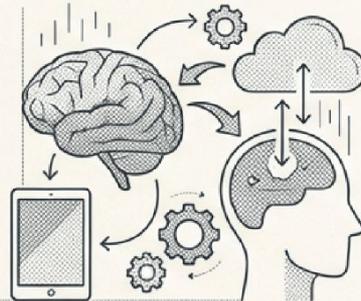
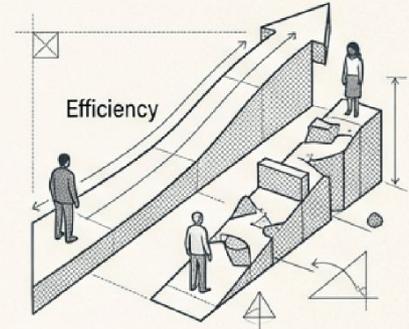


Assessment Validity Erosion

When grades no longer reflect capability, credentials lose their signal value.

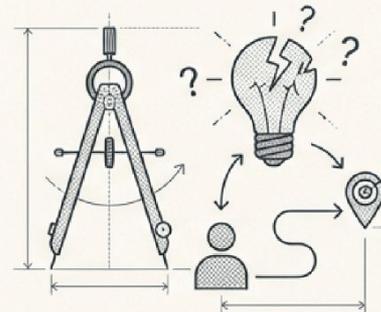
Widening Equity Gaps

Efficiency improvements mask growing achievement gaps between populations.



Cognitive Offloading

Skill atrophy occurs when external tools assume cognitive functions. "Use it or Lose it."

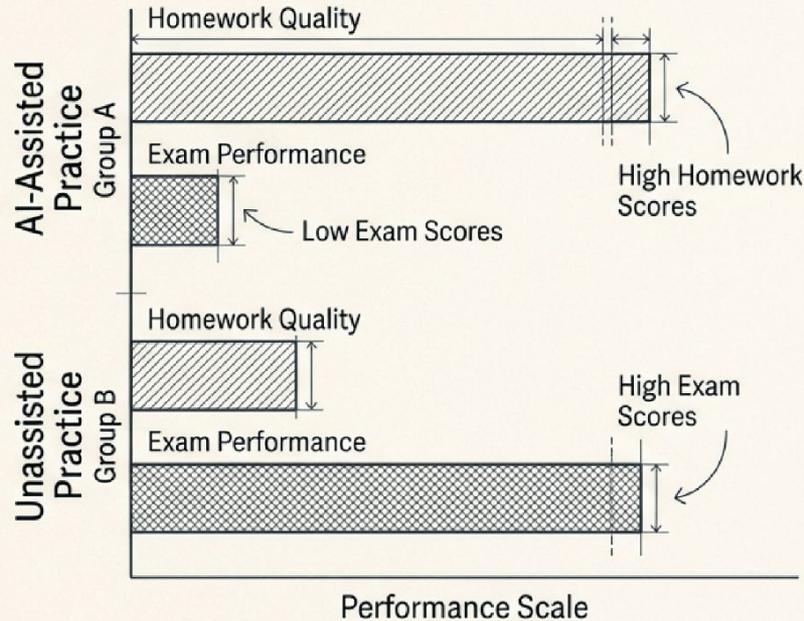


Metacognitive Disruption

Loss of "learning to learn"—the ability to recognize gaps and adjust strategies.

The ‘Cognitive Offloading’ Crisis

Case Study: Engineering Students & Coding Assistants



“The performance gap persisted even after AI tool access was removed.”

Reliance during formative learning periods prevents the development of robust problem-solving schemas. (Kasneji et al., 2023)

When the Credential Loses Its Signal

The Problem: Traditional assessments (essays, code submissions) no longer differentiate student competencies.

Case Study: UT Austin Computer Science

Observation: Students submitted working AI-generated code but possessed minimal ability to debug, modify, or explain the solutions.

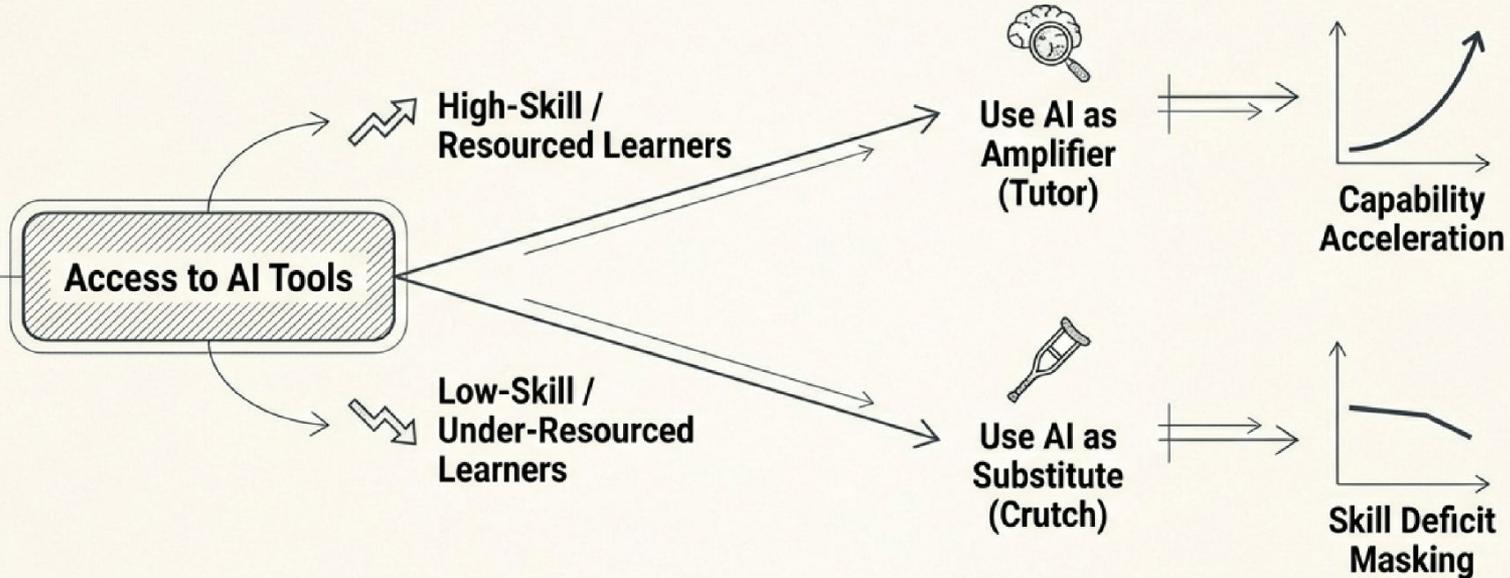
Impact: Programming assignments, previously reliable indicators of ability, became invalid.

The Ripple Effect:

- Misallocation of students in course placement.
- Hiring mismatches when graduates cannot perform unassisted.
- Loss of meaningful signals about institutional quality.



The Equity Illusion: The 'AI Opportunity Gap'



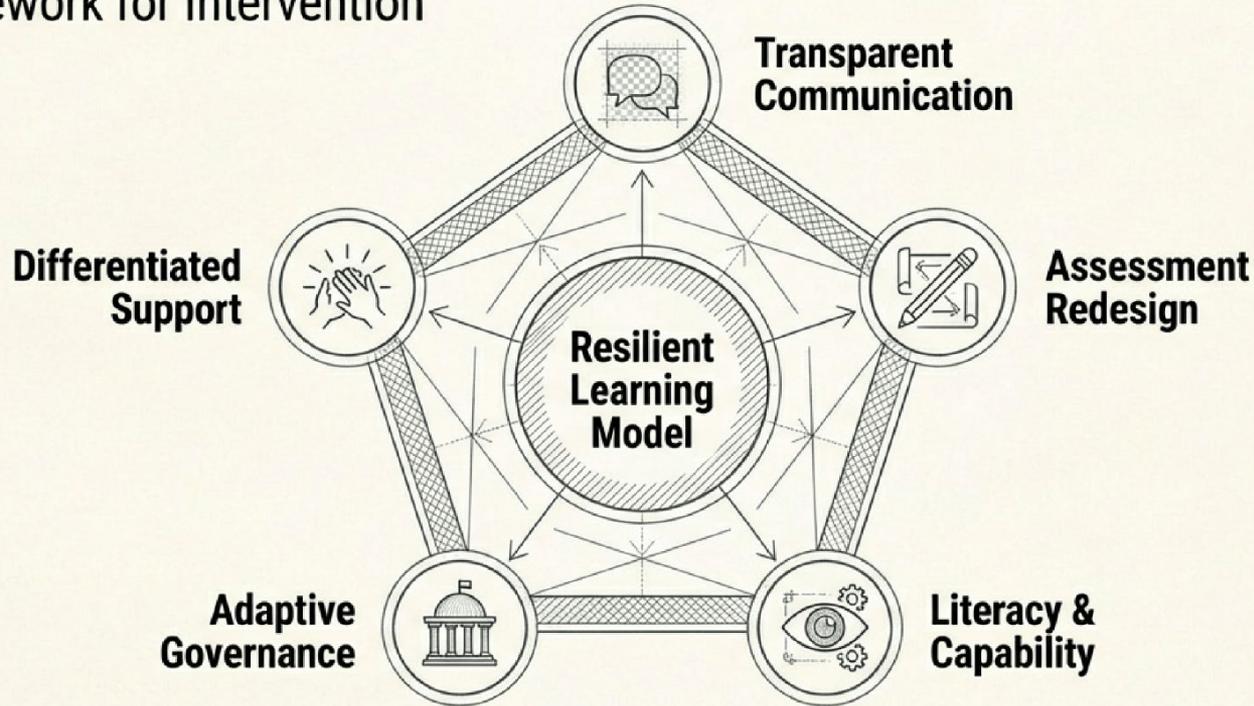
Implementation Bias:

- **Affluent Districts:** Employ AI for creative projects and advanced problem-solving.
- **Low-Income Districts:** Employ AI for routine skill practice and behavioral management.

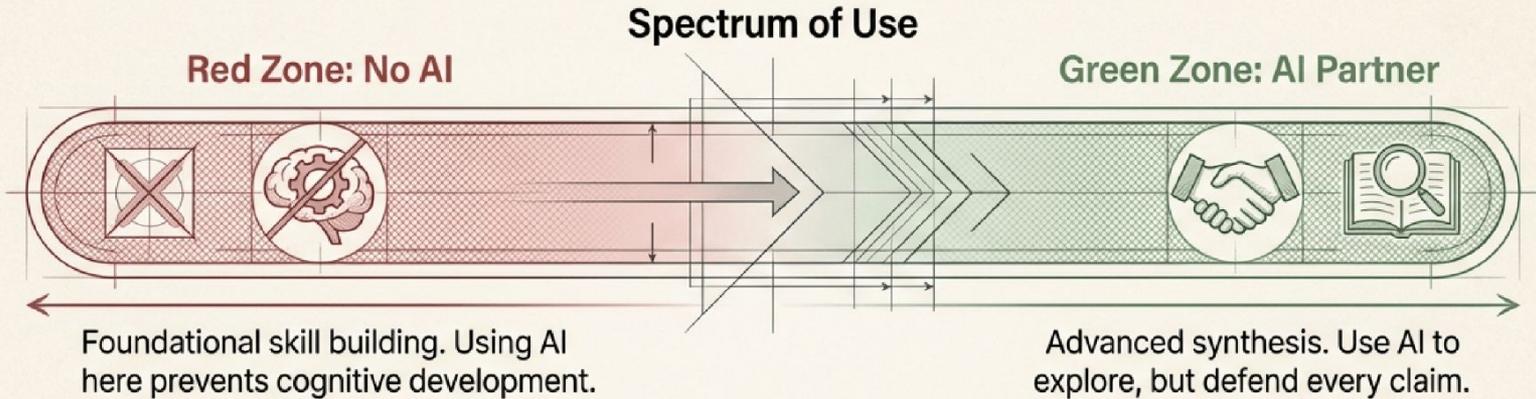
(Reich & Ito, 2017)

Moving from Reaction to Resilience

A Framework for Intervention
Switzer



Intervention 1: Radical Transparency



The Shift: From vague “Academic Integrity” bans to specific, scenario-based guidance.

Evidence in Action: University of Michigan (Ross School of Business)

- Implemented “AI Literacy and Ethics” module.
- Result: Increased student confidence and decreased integrity violations.

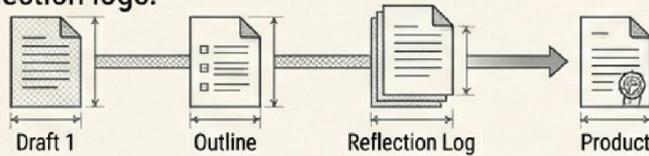
Tactical Advice: Show, don’t just tell. Faculty must demonstrate hallucinations to prove verification matters.

Intervention 2: Valuing Process Over Product

If the output is free, we must value the thinking.

Strategies

- ✓ **Staged Submissions:** Drafts, outlines, and reflection logs.



- ✓ **Oral Defense:** Real-time explanation of reasoning.

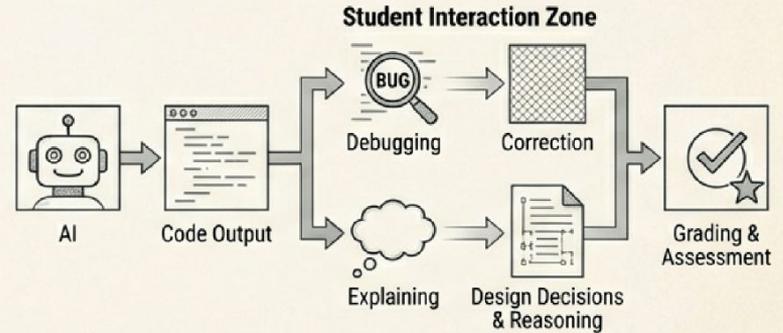


- ✓ **In-Class Authentication:** Supervised tasks to verify baseline capability.

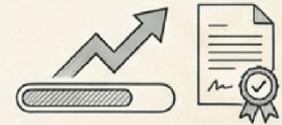


Case Study: Georgia Tech

New Model: Students use AI to generate code, but are graded on *debugging* intentional errors and *explaining* design decisions.

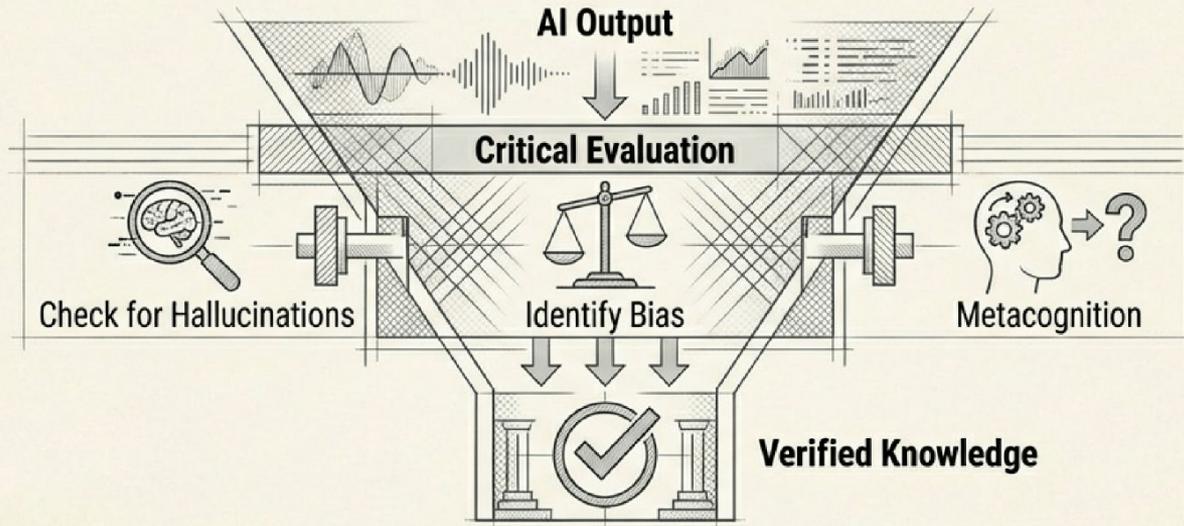


Result: Maintained learning outcomes while reducing cheating.



Intervention 3: AI Literacy is Critical Thinking

It is not just prompt engineering. It is verification.



Stanford "AI Across the Curriculum" Examples:



History: Students prompt AI to explain events, then use primary sources to fact-check the narrative.



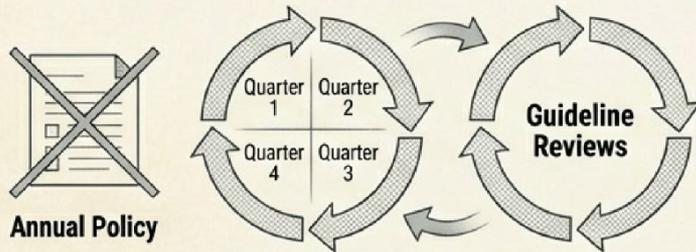
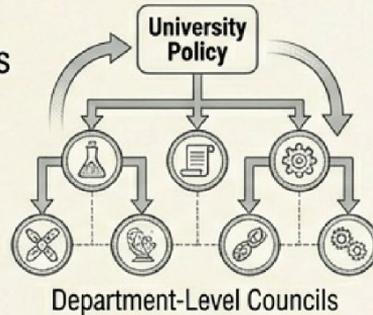
Psychology: Students use AI to generate hypotheses, then evaluate if proposed studies would actually test them.

Interventions 4 & 5: Governance & Equity

Adaptive Governance

University of British Columbia

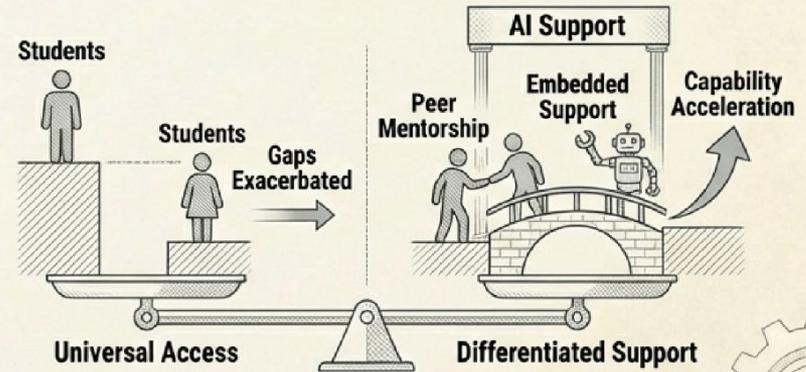
- **Distributed Leadership:** Department-level councils adapt policies to specific disciplines.
- **Rapid Cycles:** Quarterly guideline reviews rather than annual policies.



Differentiated Support

CSU Fullerton: Digital Learning Equity Initiative

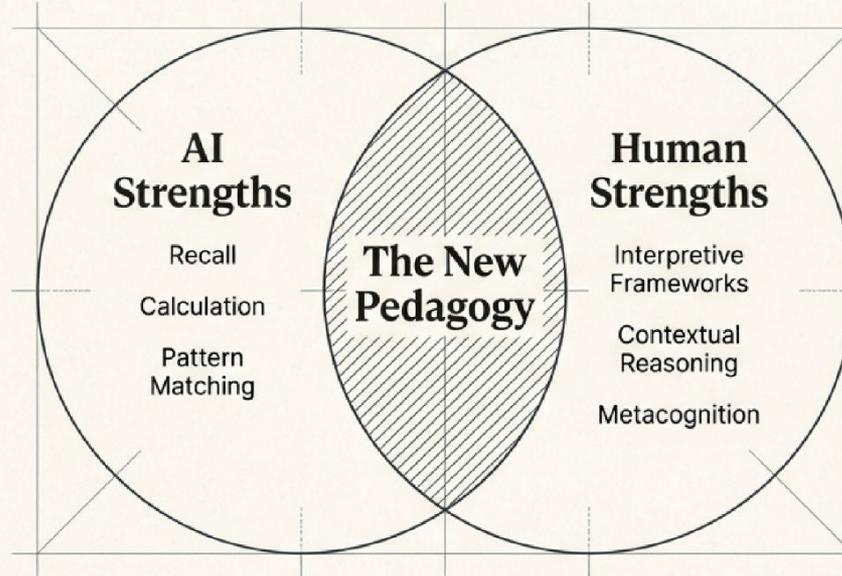
- **The Problem:** Universal access exacerbates gaps.
- **The Solution:** Peer mentorship and embedded support for students with lower digital literacy.
- **Framing:** AI support as capability acceleration, not remediation.



Future-Proofing: Preserving the Struggle

The Philosophy:

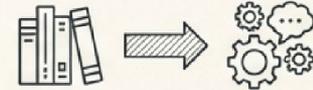
We must design "AI-Resistant Practice Spaces" where humans must struggle to learn.



Case Study: MIT Schwarzman College

Reframing coursework around capabilities that complement AI

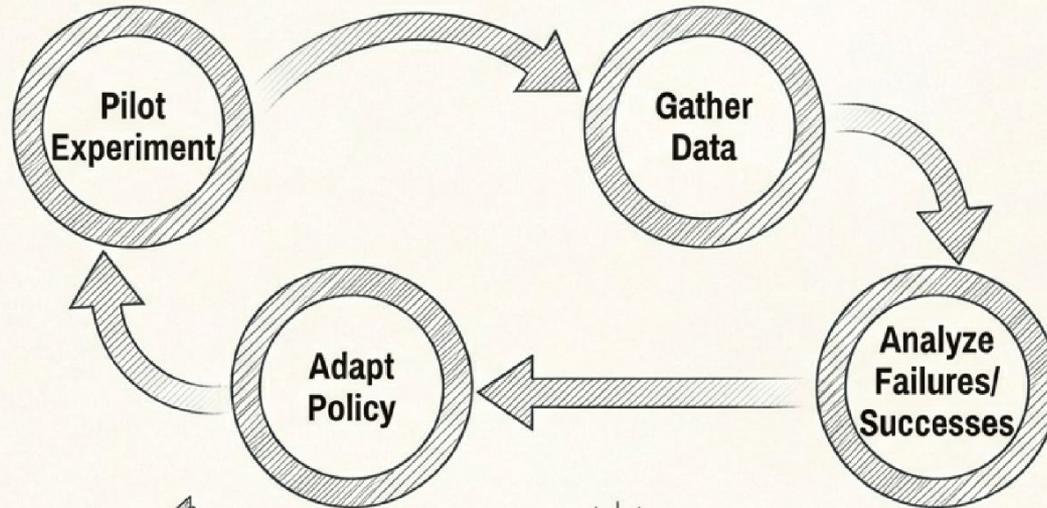
History/Econ Shift: Focus moves from factual recall (AI domain) to historical thinking methods and model assumptions (Human domain).



Factual Recall (AI Domain)

Historical Thinking Methods & Model Assumptions (Human Domain)

The Resilient Institution



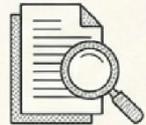
Goal: Moving from “Crisis Management” to “Continuous Adaptation.”



Mechanism: Creating psychological safety for pedagogical risk-taking.



Example: Carnegie Mellon “Teaching Experiments”. Small grants for faculty to pilot innovative AI pedagogies. Crucially, “failed” experiments are valued as data points.



The Human Element

Preserve Cognitive Struggle

Do not let
efficiency kill the
friction required
for learning.

Prioritize Equity

Proactively
close the
opportunity
gap.

Reimagine Assessment

Measure the
thinker, not just
the thought.

The goal is not to compete with AI, but to ensure it does not replace the very struggle that creates human intelligence.