

Virtual Workshop: Field Notes from AI in STEM Education

Integrating Artificial Intelligence into STEM Education: Inspiring Creativity and Critical Thinking
Toolkit (Educator Resource)

Purpose

This toolkit equips educators across STEM disciplines with practical strategies, tools, and resources to meaningfully integrate Artificial Intelligence (AI) into teaching. The emphasis is on fostering critical thinking, creativity, and ethical awareness.

Core Components

A. AI Tools by STEM Discipline

- **Mathematics:** Symbolab, Wolfram Alpha, GeoGebra AI tutor
 - **Biology/Health Sciences/Health Information Management (HIM):** ChatGPT for case study generation & creative assignments using gamification framework, Elicit for research reviews, BioRender for AI-assisted diagrams, Audacity for research & thought-question generation.
 - **Engineering/Physics:** MATLAB AI features, CAD design with AI-driven simulations (e.g., Autodesk AI tools)
 - **Computer Science:** GitHub Copilot, Replit Ghostwriter, AI-based debugging tools
 - **Chemistry:** ChemRxiv + AI for predicting reactions, LabArchives with AI lab notebook integration
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B. Designing AI-Enhanced Activities

- **Socratic Dialogue:** Use AI to pose challenging “what if” scenarios that students must critique.
 - **Simulation & Modeling:** Generate data sets with AI and ask students to analyze validity.
 - **Creative STEM Challenges:** Have students co-create a project idea with AI, then refine and defend it without AI input.
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C. Promoting Critical Thinking

- Assignments should:
 - Require justification of answers generated with AI.
 - Compare AI outputs to human-authored sources.
 - Ask students to identify limitations and potential bias in AI responses.
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D. Ethics & Responsible Use

- Framework for classroom conversations:
 - Bias: How training data affects AI results.
 - Privacy: Handling student and patient/research data responsibly.
 - Ownership: Who “owns” AI-generated work?
 - Accuracy: Is the work produced by AI always, correct?
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E. Practical Steps for Educators

1. Start small: use AI to brainstorm, then expand.
2. Pilot in one unit, assess impact, then scale up.
3. Build reflection prompts into assignments (e.g., “What could the AI not do well, and why?” “Where resources used valid and correct?”).
4. Document lessons learned and share with peers.