



Facilitating Mindful Engagement with GenAI in Knowledge Building

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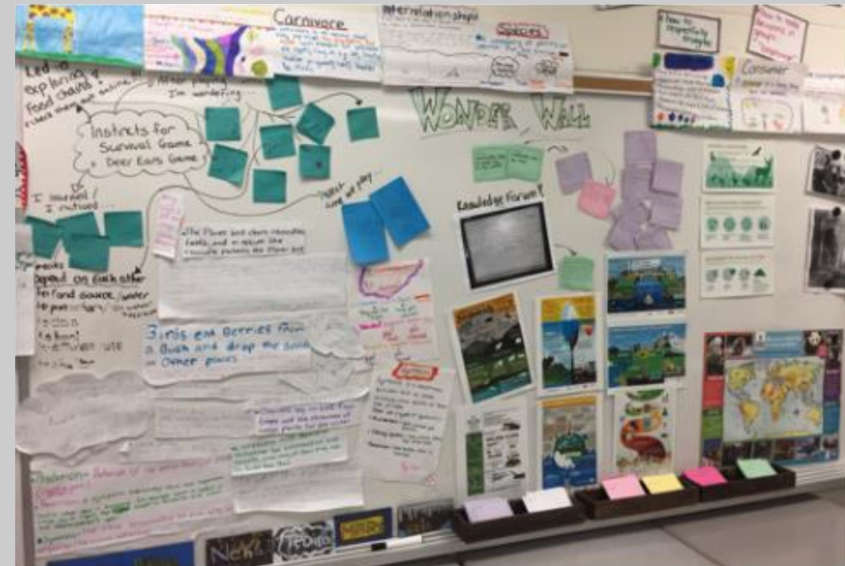
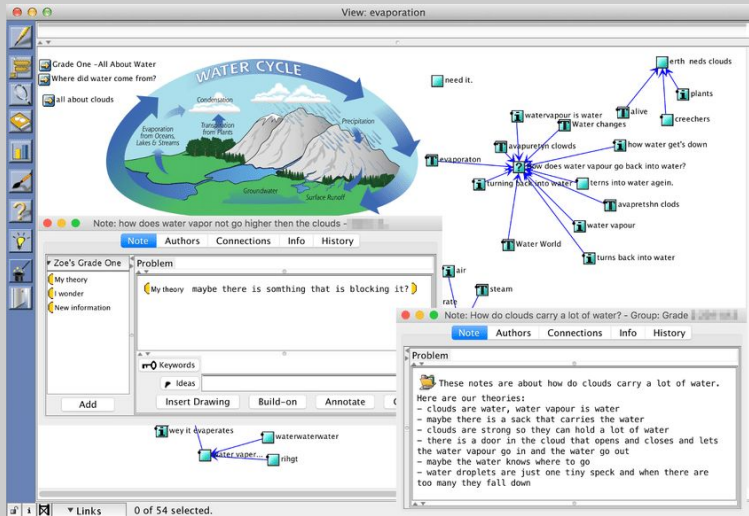
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Knowledge Building (KB)—based on a constellation of philosophical perspectives, theories, design principles, and practices—**engages *students in continually improving ideas as a collective.***



(Chan & Aalst, 2018; Chen & Hong, 2016; Scardamalia & Bereiter, 2022)



Knowledge Forum (KF) and 'KB Wall'
for continual idea improvement

Augmented Intelligence:

Human intelligence is always ‘augmented’.

To improve human capabilities, we improve **the system** in which a human operates.



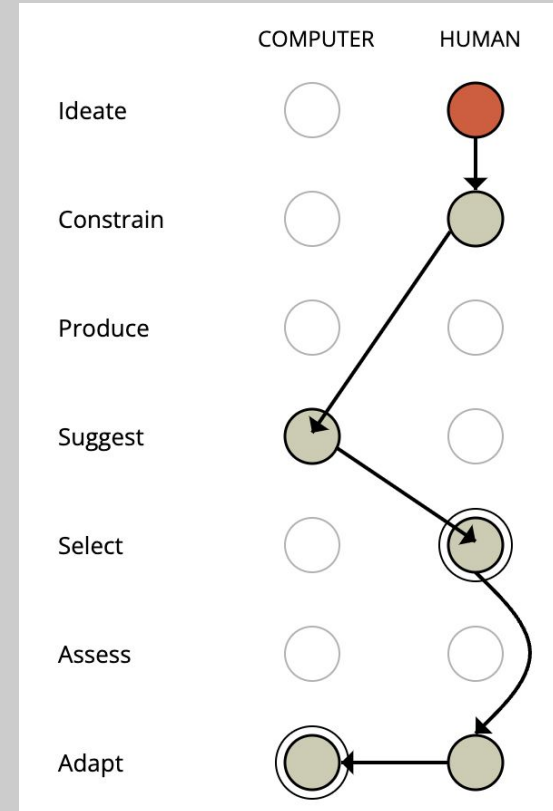
(Engelbart, 1962)



Autodesk Dreamcatcher (2016, [video](#))
for generative design

Mixed Initiative Creative Interfaces

(Deterding et al., 2017; Muller et al., 2020)



Using AI for Augmented Intelligence requires:

- Learn *about* AI (aka. 'AI literacy')
- Learn *with* AI (aka. 'AI competency')
- Redesign the system

Research Context:

- A high-school course about World Religions
- One teacher and his students ($n=10$)
- Students were expected to examine various religions and develop religious literacy
- The class used a range of digital tools (e.g., KF, Miro)

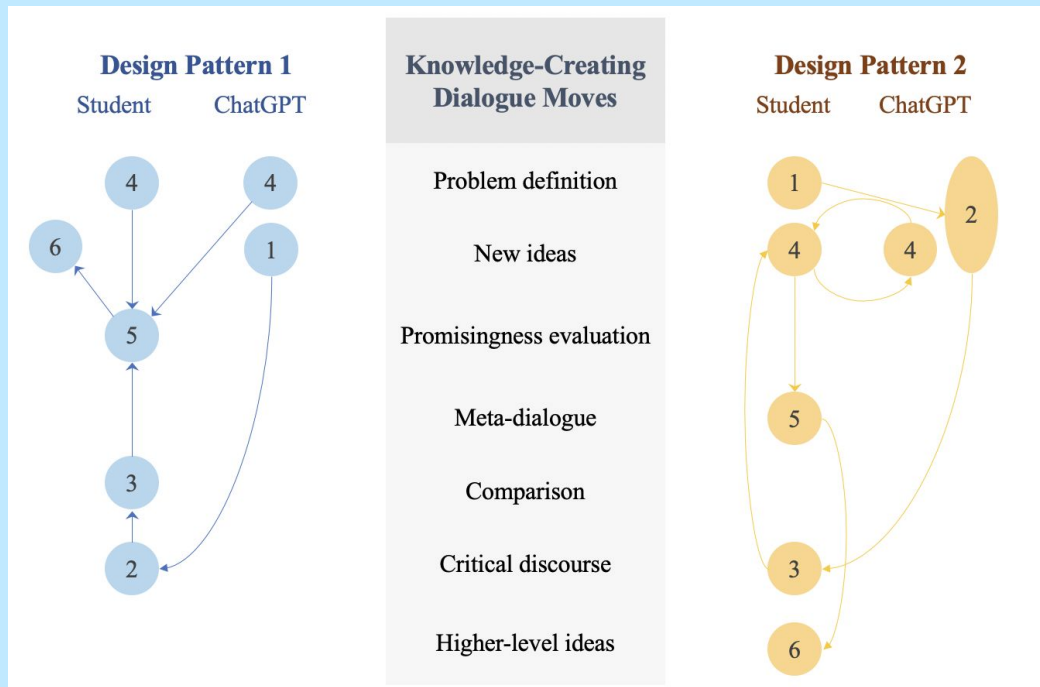
Design

- Situate AI in **Knowledge-Creating Dialogue**

Moves:

- Problem definition
- New ideas
- Promisingness evaluation
- Meta-dialogue
- Comparison
- Critical discourse
- Higher-level ideas

(Bereiter & Scardamalia, 2017)



Example ChatGPT Prompts Designed by The Teacher

Mr.F used ChatGPT to create a sample essay for the students to read and reflect on

Mr. F invited students to converse with ChatGPT with a steering prompt

Essay Generation Prompt (Mr. F. gave ChatGPT 3.5 the same prompt he gave the students, without any tailoring for the A.I.)

Write a brief essay that is no more than 600 words long including titles and inline references, but not the bibliography. Your essay should address the following issues based on the readings and discussions we have had in class so far, and it must include complete in-line and bibliographic references to the authoritative sources. You must include the readings addressed in class along with any other sources you use. The sources are:

...

Key questions and issues to address in your essay:

What is religion (and what is not)?

What are the big ideas of religion (those topics or key areas that many religions have in common and we would to address to understand them)?

What are some key questions about these big ideas that you are most interested in?

As with any paper, yours should include a title, introduction, body, conclusion and bibliography.

Steering Prompt

You are a teaching assistant in a high school-level introduction to world religions course.

Students have read chapters in the book "God Is Not One" by Stephen Prothero about specific religions and they have done some independent research online. They will ask you questions to advance their understanding of class topics and their own questions. Answer following this protocol strictly:

1. Provide a brief answer in accessible language for 16-18 year olds, assuming knowledge of themes touched on by Prothero in his book.
2. Highlight disagreements or different points of view on the issue that bring nuance to the discussion.
3. Follow-up with a question that may help the learners understand nuances and complexities of the issue discussed.

Are you ready for a question?

Research Questions

1. In what ways did students demonstrate AI literacy?
2. In what ways did students incorporate AI in their knowledge building?

Data source

- **Primary data: semi-structured interviews with students**
- Secondary data:
 - Student writing and artifacts generated from KF and Miro
 - Teaching planning docs and reflective journals

Data Analysis

- Iterative coding of interview data
 - **AI Literacy:** mechanism, strength, weakness, risk, societal implications, human-AI relationship

(Bearman & Ajjawi, 2023; Laupichler et al., 2023; Long & Magerko, 2020; UNESCO, 2023)
 - **Use AI in Knowledge Building:** utility, process, challenge, coping strategy

Students' AI Literacy

Mechanisms of AI:

- All students recognized ChatGPT as an AI technology
- The majority had 'emerging' understandings of LLMs
 - ChatGPT queries a database of sources in real-time
 - OpenAI developers uploaded files to the database
- A few students dived deeper
 - Computer algorithms behind it
 - Safeguard mechanisms to filter out harmful information

Students' AI Literacy

Strengths:

- Interpreting user prompts
- Responding like a human
- Offering quick and clear responses
- Retrieving information efficiently
- Providing rich information that inspired new ideas

Weaknesses:

- Output quality: inaccurate or dated information, "black box"
- Limited cognitive capabilities

Students' AI Literacy

Risk and Societal Implications:

- **In school:** AI can be misused when students lack AI literacy.
- **Beyond school:** AI + social media intensify cyberbullying and misinformation.
- **Bias:** ChatGPT is designed to stay neutral, responding without personal opinions.

Relationship with ChatGPT:

- Valuable learning aid
- Primary information source
- Usage capped to avoid dependence
- Trust remains limited

Knowledge Building with ChatGPT

Utility of ChatGPT:

- Information search
- Accomplishing mundane learning tasks, such as grammar check
- Supporting knowledge building especially in offering inspirations, generating new ideas, and promoting collaboration

Processes of Using ChatGPT:

- Integrating ChatGPT in writing and discussion processes
- Navigating challenges with prompt engineering
- Need to fact-check & add proper citation

Takeaways

- The use of AI **made learning *harder***—rather than easier—when mindful engagement is needed
- ‘Stochastic parrot’ 🦜 or ‘Grounded owl’ 🦉
- **Students took high-level agency** in the process
- We need more **CSCL design patterns** to purposefully integrate AI in collaborative learning



Thank you!

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<https://penn-wonderlab.github.io/>