

What are best practices for using AI to teach students critical thinking?

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VU AI show and share event

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Overview

Practical example

- The issue
- The solution
- The findings
- Discussion

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Implementation

The issue



Original assignment

Interview someone (a friend, roommate, partner, family member etc.) about their regular sleep routine and sleep hygiene.

1. Summarize this
2. Give advice to them, based on scientific literature and the lectures, explaining
 - what they could change, and
 - why this would improve their mental health (e.g., what are the underlying mechanisms and what potential effect would a change have?).



The solution



New assignments

Step 1. Generate a scholarly text using a Generative AI platform with the following prompt:

Write a scholarly text using a maximum of 250 words and including references in APA 7 format in text, in which you explain (1) in what ways sleep, and more specifically insomnia, may serve as a risk or protective factor for the development of mental health disorders, and (2) which perpetuating factors contribute to the maintenance of insomnia. Integrate at least three scientific sources published between 2021 and 2025.

Step 2: Review the sources that were used to support your AI generated text.

- 3 attributes that ensure credibility
- Alignment of AI text with content in scientific paper
- Reliability conclusion

New assignments

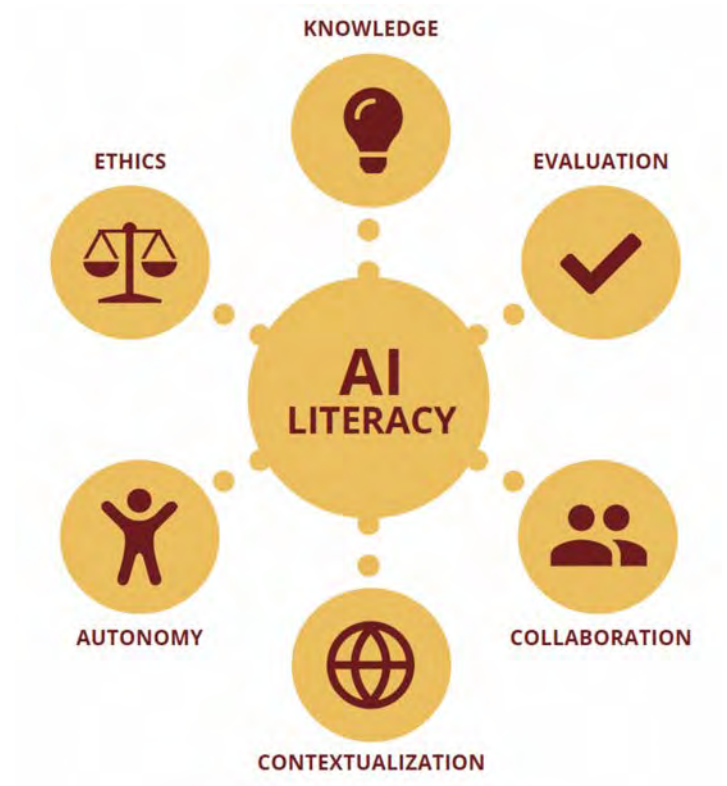
Step 3. read the assigned (course) literature and compare and contrast the AI generated text with the assigned literature papers.

- Explain to what extent the papers agree or disagree with the AI generated text or whether these add new information.
- Integrate information from the assigned literature papers to strengthen and enrich the argumentation/information of the AI generated text.

Step 4. Conclusion

Your roommate is experiencing sleep problems. Based on the findings of step 1-3, what would you explain to them about the relationship between sleep and their mental health? Moreover, based on the literature, what would you advise them to do in order to improve their mental health? Explain why you give this advice and make sure your conclusion is in line with the literature you just discussed (i.e., do not include new information in your conclusion).

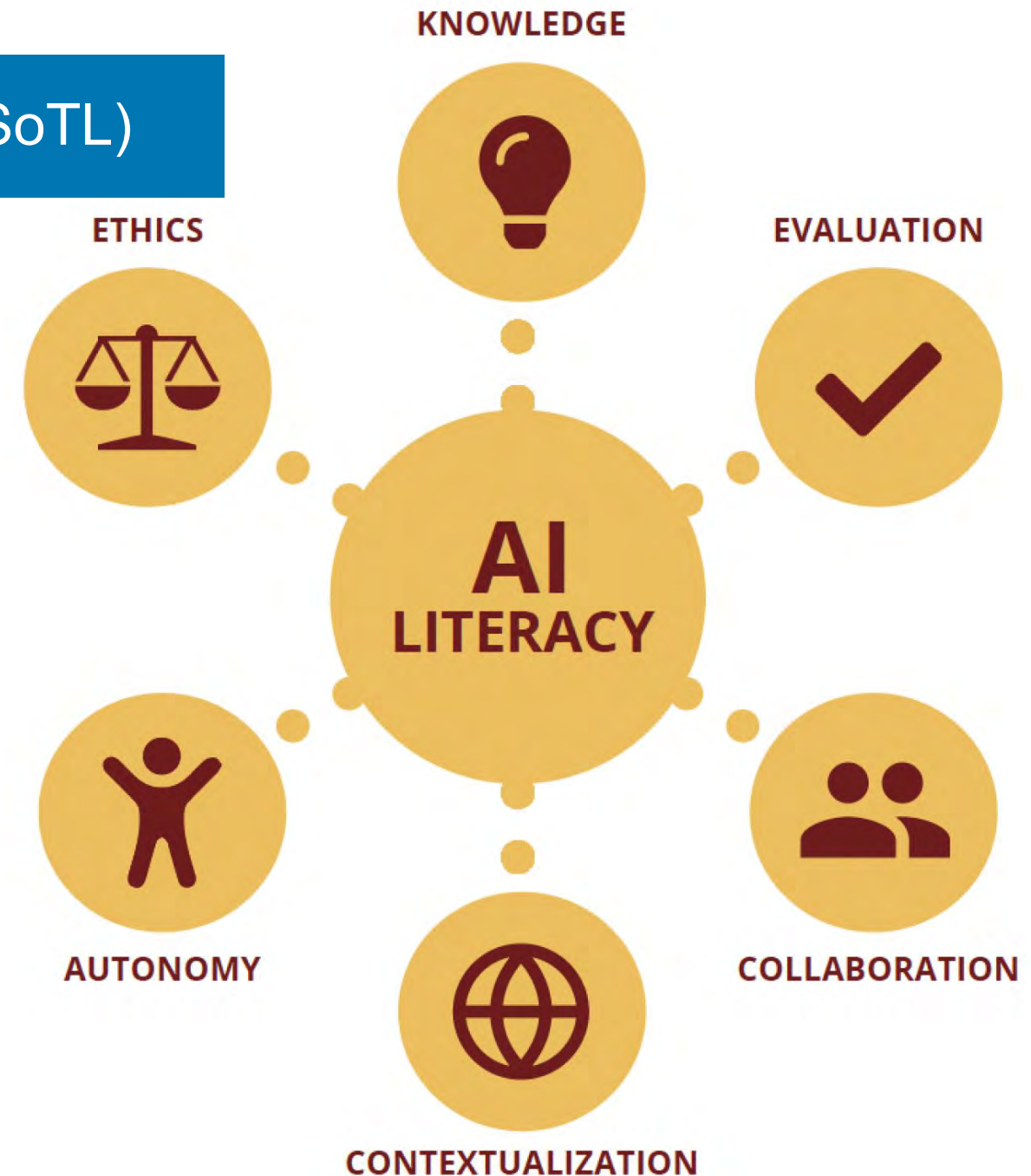
New assignments



Scholarship of Teaching and Learning (SoTL)

Investigate the impact of these assignments on students' genAI literacy.

- ChatGPT literacy scale (pre-post)
- Personal reflection



Methods

61 participants (out of 102 students)

- 51 pre/post test

- ChatGPT literacy scale (Pre/post)
 - Technical proficiency
 - Critical evaluation
 - Communication proficiency
 - Creative application
 - Ethical Competence

□ Controlled for “genAI experience

- Personal reflection (post)

Please reflect on what you have learned about generative AI through the two written assignments in this course.

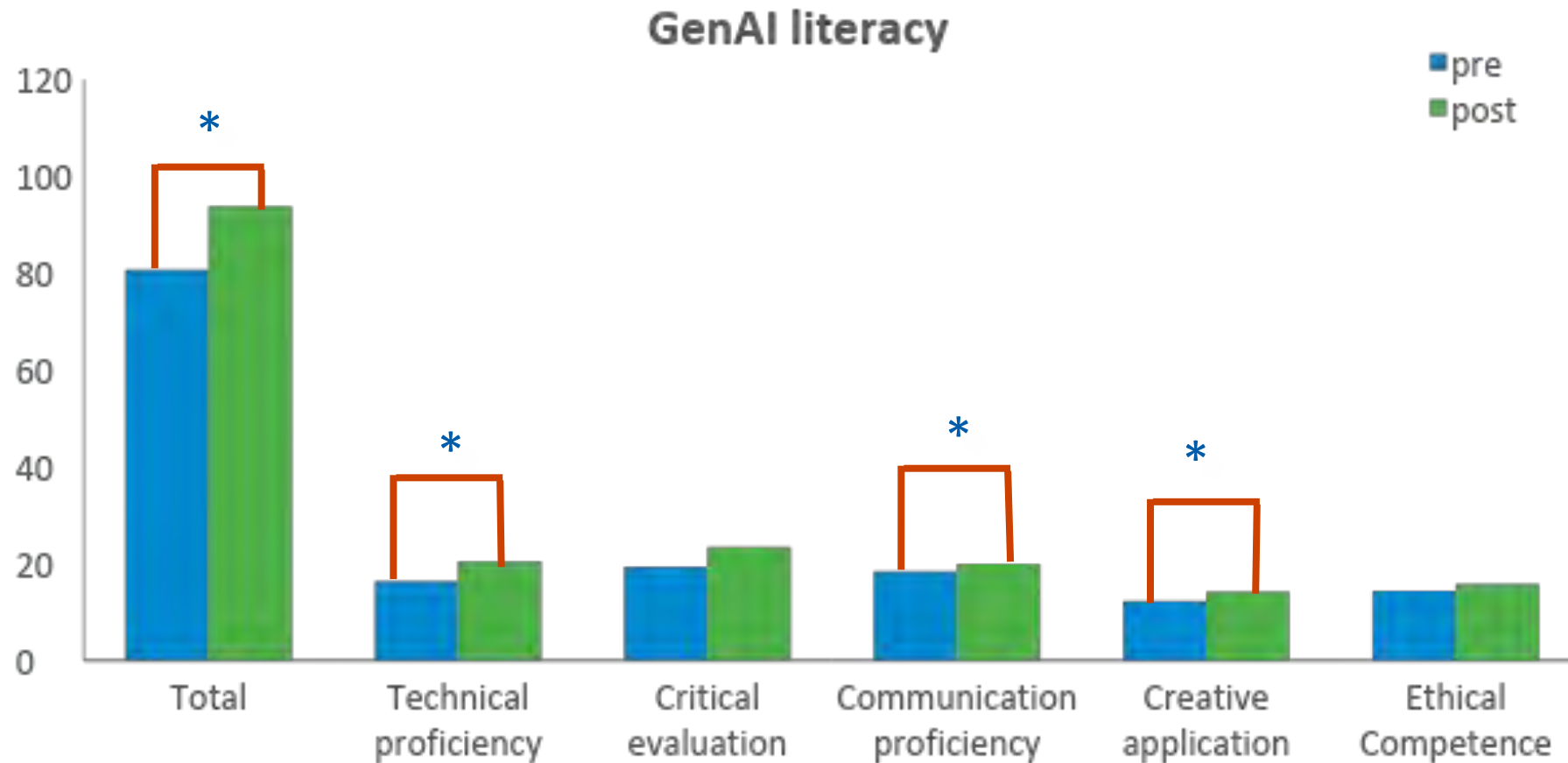
Factor/Item	Factor loading				
	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Factor 1: Technical Proficiency (TP)					
TP1: I can train and fine-tune ChatGPT for specific purposes or applications.	0.763	0.129	0.059	0.236	0.039
TP2: I have the ability to identify and solve technical problems of ChatGPT.	0.754	0.166	0.199	0.084	0.183
TP3: I have the ability to use ChatGPT in conjunction with other tools or technologies.	0.702	0.103	0.256	0.212	0.056
TP4: I can compare and evaluate the functions of ChatGPT and other language models.	0.654	0.144	0.152	0.198	0.091
TP5: I can understand how ChatGPT generates responses.	0.614	0.237	0.175	0.044	0.258
TP6: I can understand how ChatGPT works.	0.576	0.216	0.187	0.014	0.268
Factor 2: Critical Evaluation (CE)					
CE1: I can evaluate the accuracy of ChatGPT responses.	0.125	0.786	0.177	0.151	0.148
CE2: I can determine whether ChatGPT's response is true.	0.121	0.750	0.097	0.103	0.171
CE3: I can evaluate the reliability of ChatGPT's responses.	0.143	0.742	0.261	0.066	0.127
CE4: I can identify errors in ChatGPT's responses.	0.121	0.712	0.212	0.130	0.168
CE5: I can evaluate the completeness of ChatGPT's responses.	0.254	0.679	0.154	0.182	0.058
CE6: I can recognize and explain bias in ChatGPT's responses.	0.337	0.537	-0.109	0.218	0.180
Factor 3: Communication Proficiency (CP)					
CP1: I can communicate effectively with ChatGPT.	0.208	0.150	0.754	0.128	0.156
CP2: I can ask appropriate and effective questions to ChatGPT.	0.188	0.173	0.730	0.176	0.196
CP3: I can use technical terms in conversations with ChatGPT.	0.325	0.110	0.633	0.088	0.096
CP4: I can ask accurate questions to ChatGPT using rich vocabulary.	0.062	0.263	0.582	0.286	0.211
CP5: I can elicit a response from ChatGPT to suit a particular situation.	0.271	0.237	0.541	0.362	0.169
Factor 4: Creative Application					
CA1: I can use ChatGPT to generate new ideas or solutions.	0.137	0.146	0.200	0.779	0.073
CA2: I can do creative writing or storytelling using ChatGPT.	0.172	0.123	0.106	0.729	0.071
CA3: I can use ChatGPT to generate insights and trends on large datasets.	0.238	0.115	0.106	0.705	0.313
CA4: I can improve my creativity or innovation skills using ChatGPT.	0.094	0.217	0.237	0.635	0.046
Factor 5: Ethical Competence (EC)					
EC1: I can identify potential ethical issues associated with the use of ChatGPT.	0.164	0.190	0.188	0.088	0.783
EC2: I can explore legal or ethical considerations related to the use of ChatGPT.	0.204	0.248	0.087	0.088	0.737
EC3: I can recognize potential privacy issues related to the use of ChatGPT.	0.265	0.157	0.080	0.149	0.668
EC4: I can use ChatGPT ethically.	0.019	0.079	0.333	0.136	0.654
Eigen value	1.80	8.98	1.61	1.53	1.25
Explained variance (%)	7.21	35.91	6.44	6.12	4.99
Cronbach's alpha	0.85	0.86	0.82	0.79	0.79

SoTL findings

What do you generally use genAI for in your studies?

Explaining concepts	52%
Writing support	45%
Summarizing	44%
Learning Assistant	18%
Research Support	26%
Generating information	8%
Not using genAI at all	2%

SoTL findings



“The limitations of AI became a pedagogical strength”

...these writing assignment were effective for increasing:

- engagement and comprehension of course content
- genAI literacy
 - emphasizing the need for critical evaluation and verification
 - because of unreliability of genAI

Student quote:

“The inconsistency of genAI was a key insight: the tool's reliability is unpredictable. It can be a powerful research assistant one moment and an inventive storyteller the next. This experience taught me that the quality of the output depends on how I use AI and how carefully I verify it, but also on the inherent unpredictability of the AI itself. From now on, I plan to use AI as a supportive tool to brainstorm or organize my writing, but not as the main source of information”.

Student quote:

“These two assignments involving AI have opened my eyes a lot. I saw it as a helpful tool when I used it for the first assignment as the sources appeared reliable. However, for the second task it really caught me off guard when I realised that all of the references were entirely made up and fake. I’ve become more aware of how convincing AI can sound, even when it is incorrect. I learnt that critical thinking involves more than just analysing different theories or concepts; it also involves challenging information that appears convincing but might be wrong under closer examination. After this, I’ll definitely start viewing AI more as a starting point than as a quick solution. I’ll still use it to help shape ideas and make plans, but I’ll always make sure to double-check everything myself and not over rely on it. When reading the original studies, I had a much better idea of what real proof looks like.”

Discussion



- To what degree is this surprising or insightful?
- How would this apply to your courses?

Other AI exercises

Idea line-up

1. Share a statement about AI:
 - ChatGPT uses up to date data.
 - Using AI has a negative impact on the environment.
 - AI will rival human creativity in the future.
 - ChatGPT will affect my field of work for good in the future.
2. Students choose if they agree or disagree by moving physically to a side of the room.
3. Start a discussion: why did they choose that side?



Idea line-up

Benefits:

- Encourages participation of every student
- All students need to make a choice and think for themselves
- Movement boosts energy
- Contributes to visual learning
- Encourages open and critical discussion



AI scavenger hunt

1. Share different texts of which at least 1 should be generated by AI.
 - Research papers
 - News items
2. Let students analyse and discuss the texts in groups:
 - Can students recognise the text created by AI?
 - What are the differences and similarities with other texts?
 - How reliable are the different sources?
3. Conclude by sharing findings and offer your students tools on how to recognise reliable sources.



AI scavenger hunt

Benefits:

- Supports a safe learning environment
- Contributes to collaborative learning and learning by discovery
- Encourages open and critical discussion



Misconception detective

1. Share a statement around which are many misconceptions.
 - People use only 10% of their brain.
2. Explore the statement live with AI together with your students:
 - What's the origin of this statement?
 - What's the scientific consensus?
3. Discuss the reliability and possible origins of the sources AI uses with your students.
4. Let students do the same with other statements in small groups. Let them research using reliable sources and AI.
5. Conclude with a lessons learned with the whole class.



Misconception detective

Benefits:

- Modeling behaviour
- Encourages collaborative learning
- Students learn to recognise misinformation
- Students learn to work with AI responsibly
- Encourages open and critical discussion



AI Solution Seeker

1. Divide students in small groups and let them come up with a realistic problem in their field of study that requires a solution.
2. Let the students find solutions by using AI.
3. Students discuss the quality and usability of the solutions in their group.
4. Each groups gives a brief presentation on their findings.
5. Finish with a class reflection on AI within their field of studies:
 - How can AI contribute to problem solving within your field?
 - What are the limitations of using AI?



AI Solution Seeker

Benefits:

- Encourages collaborative learning and learning by discovery.
- Teaches students digital skills within their field of study, while also learning about its limitations.
- Encourages open and critical discussion.
- Stimulates presenting relevant information.



Build-a-Bot

1. Let students upload an assignment they had to make in the past in a safe AI tool.
2. Let students ask the AI questions to help them improve the assignment and use it as an AI tutor:
 - Can you give me feedback on how to improve?
 - Are there any perspectives missing?
 - Are there assumptions or biases made I should be aware of?
 - What other angles do you recommend exploring to dive deeper into this topic?
 - Can you ask me critical questions to help me understand this topic better?
3. Reflect together on the experiences:
 - Can AI help improving the assignment?
 - Can AI help you to understand the topic better?
 - Can AI help you gain critical thinking skills?



Build-a-Bot

Benefits:

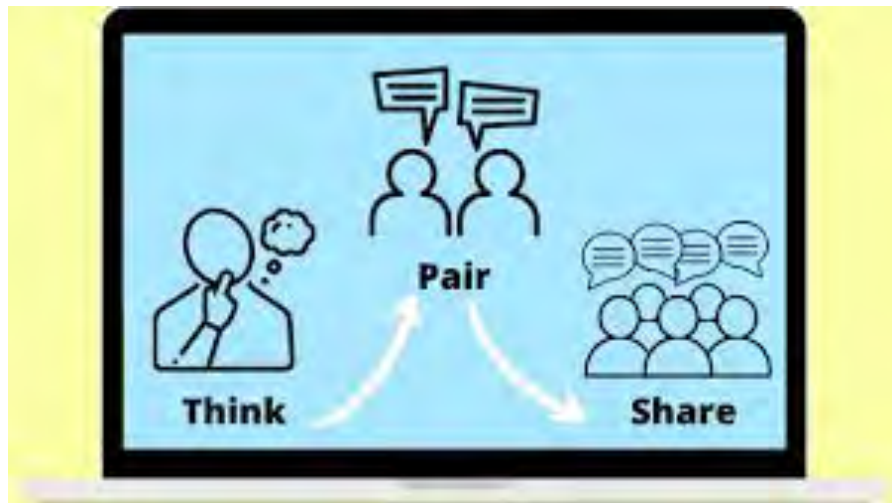
- Students learn to use AI as a partner
- Students gain metacognitive thinking and lifelong learning skills



Implementation

Think-pair-share

Can any of these activities be implemented in your course/program?



1. Think for yourself first
2. Share with your neighbour
3. Share with the whole group