



Designing Critical Thinkers in AI-Rich Classrooms

在人工智能课堂中培养批判性思维者

Designing Critical Thinkers in AI-Rich Classrooms

Kamila B
MS DT and ICT/Computer science teacher

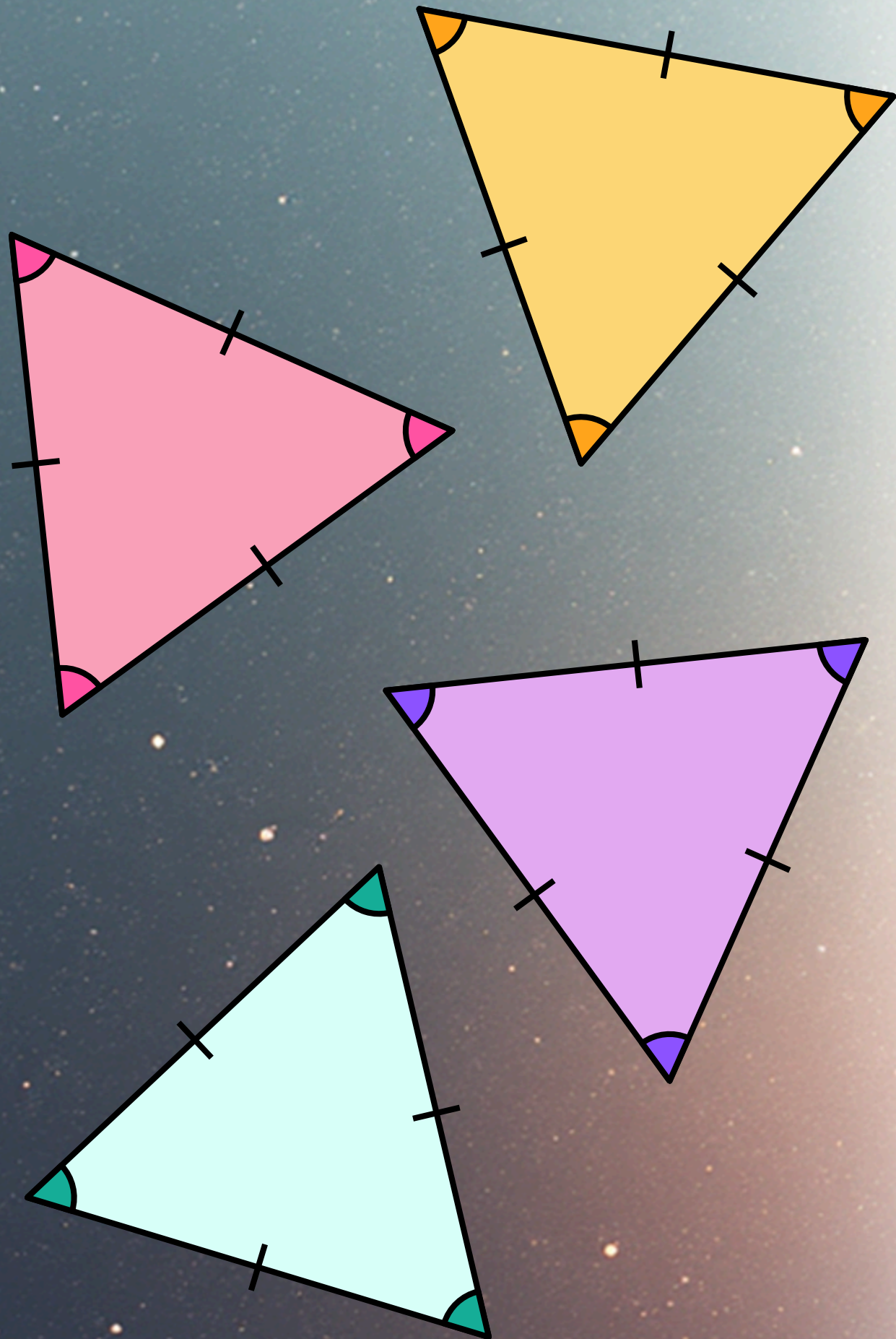


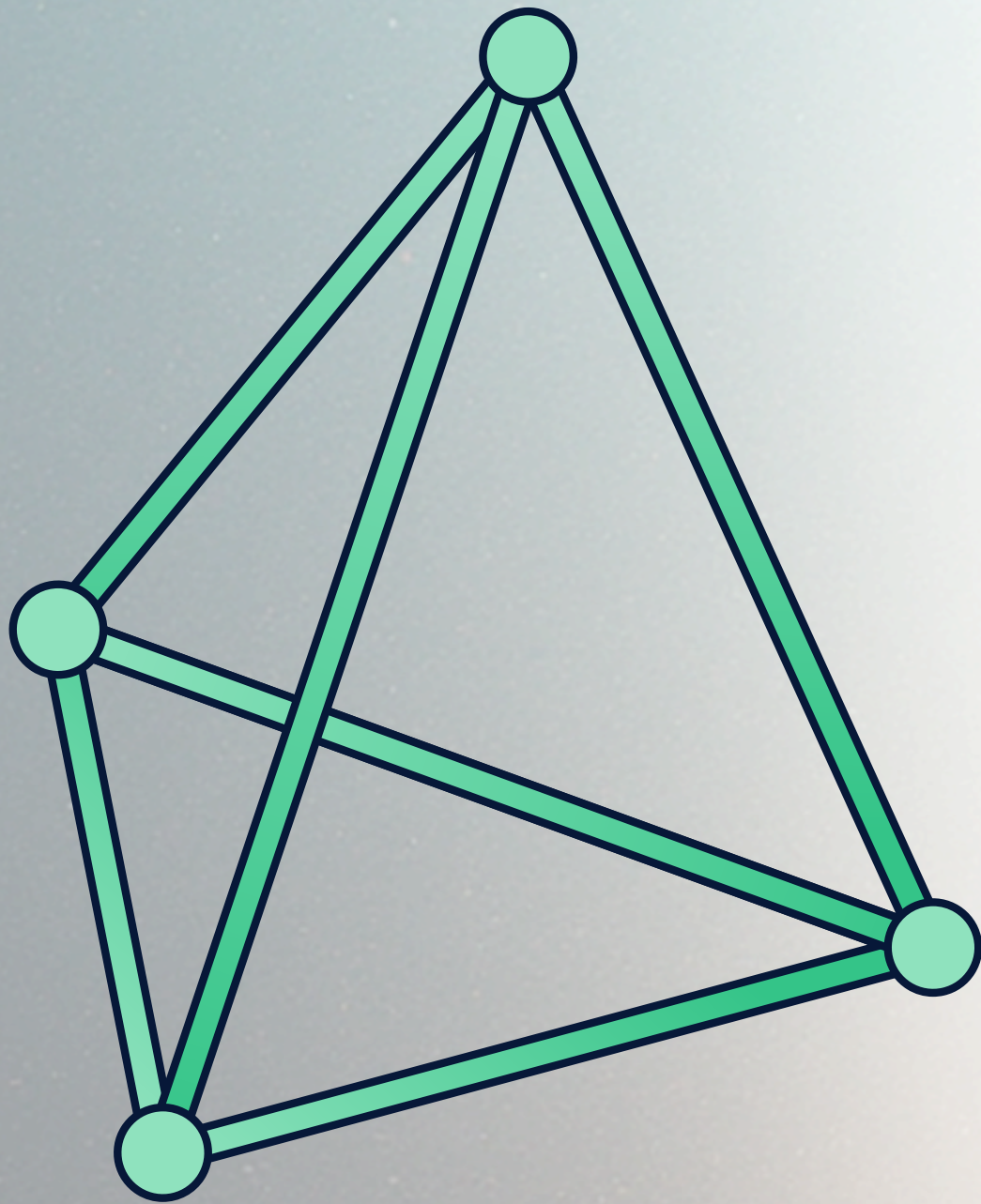


Warm-up challenge

Using 6 toothpicks create 4 equilateral triangles.

使用6根牙签 制作4个等边三角形。



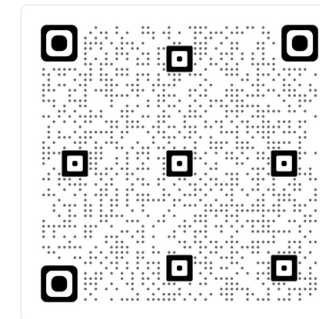


To complete this challenge, step out of the box. Create a tetrahedron, a 4 faced shape with 6 edges.

要完成这个挑战，请跳出常规。创建一个四面体，一个有三角形面和六条边的形状。



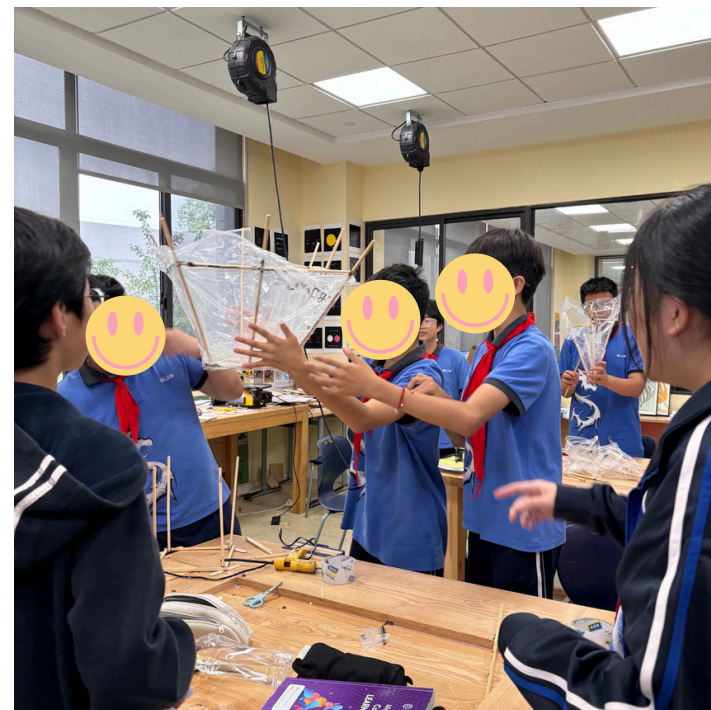
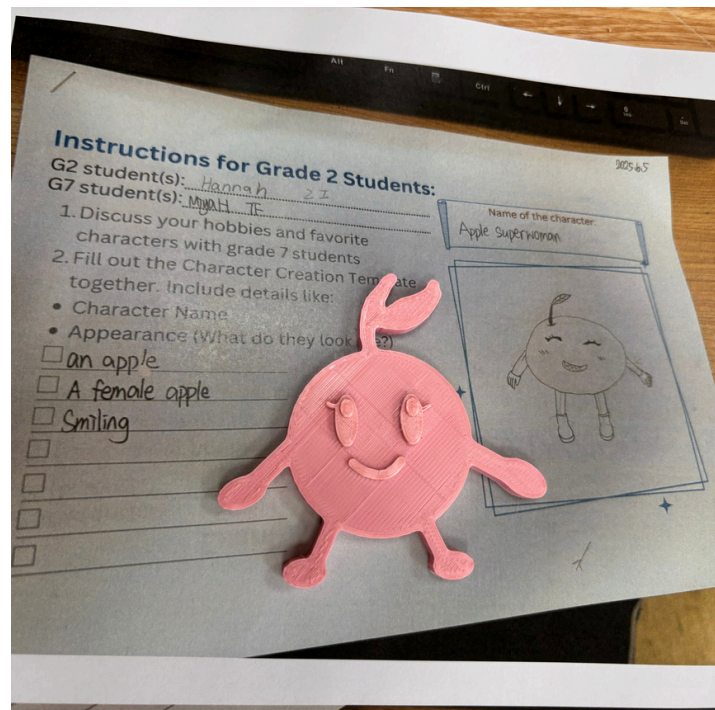
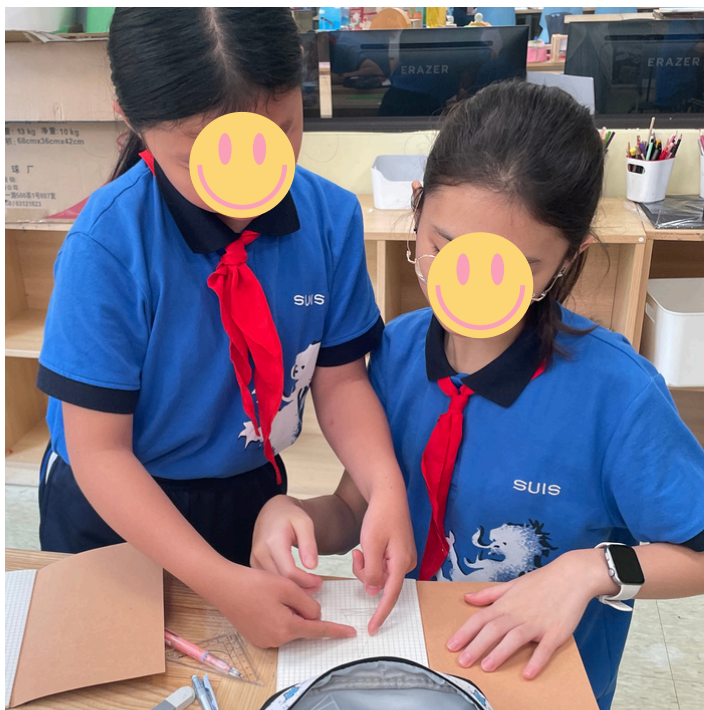
FIND
OUT
MORE



More Resources: kamilaict.cn/resources

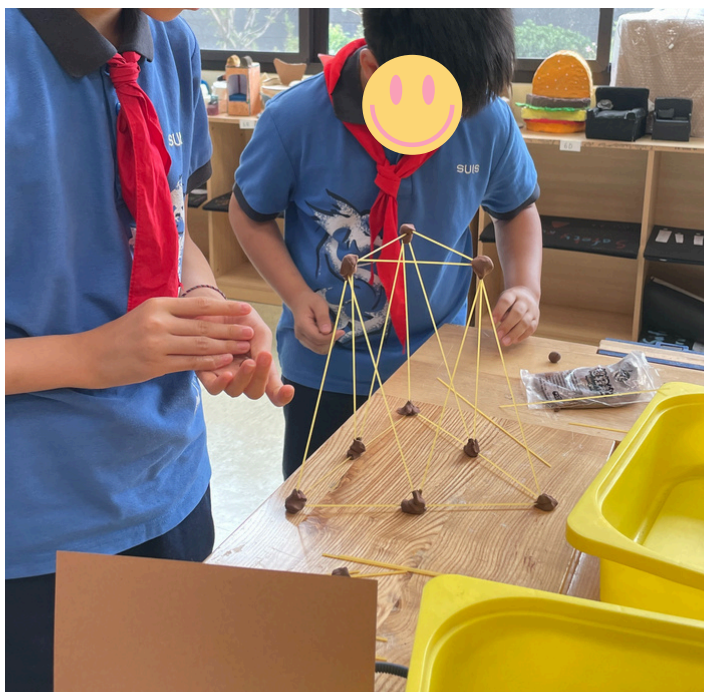
Design/critical thinking and active learning for every classroom

在每个教室中融入设计/批判性思维和主动学习



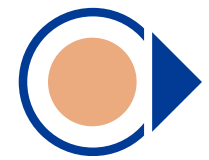
Today we'll extend active learning principles **by integrating AI as a strategic partner**—not a replacement—for developing critical thinking skills in your classroom.

今天，我们将拓展主动学习原则，将人工智能作为战略伙伴（而不是替代品）融入课堂，以培养批判性思维能力。



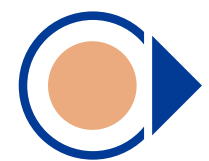


Content - 内容



Introduction: From 'Active Learning in Every Classroom' to 'Active Learning with AI as a Partner.'

引言：从“每个教室里的主动学习”到“以人工智能为伙伴的主动学习”。



How to support critical thinking and active learning for/in students with (despite) AI

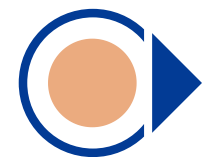
- Framework of co-learning with AI and criteria
- Patterns that drive students thinking and doing
- Create no-code/AI app to scaffold thinking routines/Basic no-code agent to increase productivity

如何利用人工智能（AI）支持学生的批判性思维和主动学习

利用人工智能支持批判性思维的框架和标准

驱动学生思考和行动的模式

创建无需代码的人工智能应用程序来搭建思维框架/创建基本的无需代码的智能体来提高效率



Conclusion - 结论

Pennsylvania State University - B.Sc. in Electrical Engineering
Simon Fraser University - MSc in Engineering Science
Samsung, IBM, Ryte Health, Salus Security -
Engineer, Data Scientist, Security researcher



Virtual Network Embedding for Switch-Centric Data Center Networks

Conference Paper Private full-text May 2021 · 2021 IEEE International Symposium o...
Ana Laura Gonzalez Rios · Kamila Bekshentayeva · Maheepartap Singh · [...] · Ljiljana Trajkovic
39 Reads · 3 Citations

Detection of Denial of Service Attacks in Communication Networks

Conference Paper Private full-text October 2020 · 2020 IEEE International Symposi...
Ana Laura Gonzalez Rios · Zhida Li · Kamila Bekshentayeva · Ljiljana Trajkovic
33 Reads · 35 Citations · 1 Recommendation

Most read in the last month

Network Intrusion Detection Using Various Deep Learning Approaches

Experiment Findings File available June 2021
Kamila Bekshentayeva



Source

256 Reads · 2 Citations

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Detection of Denial of Service Attacks Using Echo State Networks

Conference Paper October 2021 · 2021 IEEE International Conference on Systems, Ma...
Kamila Bekshentayeva · Ljiljana Trajkovic
Add full-text 8 Reads · 4 Citations

K. Bekshentayeva, M. Canute, Y.-M. Kim, D. Lee, A. Wong, "Network Intrusion Detection Using Various Deep Learning Approaches", BC Artificial Intelligence Showcase, Vancouver, BC, Dec. 2019.
L. Gonzalez Rios, Z. Li, K. Bekshentayeva, and Lj. Trajkovic, "Detection of denial of service attacks in communication networks," in Proc. IEEE Int. Symp. Circuits and Systems, Seville, Spain, Oct. 2020 (virtual).
L. Gonzalez Rios, K. Bekshentayeva, M. Singh, S. Haeri, and Lj. Trajkovic, "Virtual network embedding for switch-centric data center networks," in Proc. IEEE Int. Symp. Circuits and Systems, Daegu, Korea, May 2021 (virtual).
K. Bekshentayeva and Lj. Trajkovic, "Detection of Denial of Service Attacks using Echo State Networks," in Proc. IEEE International Conference on Systems, Man, and Cybernetics, Melbourne, Australia, submitted.

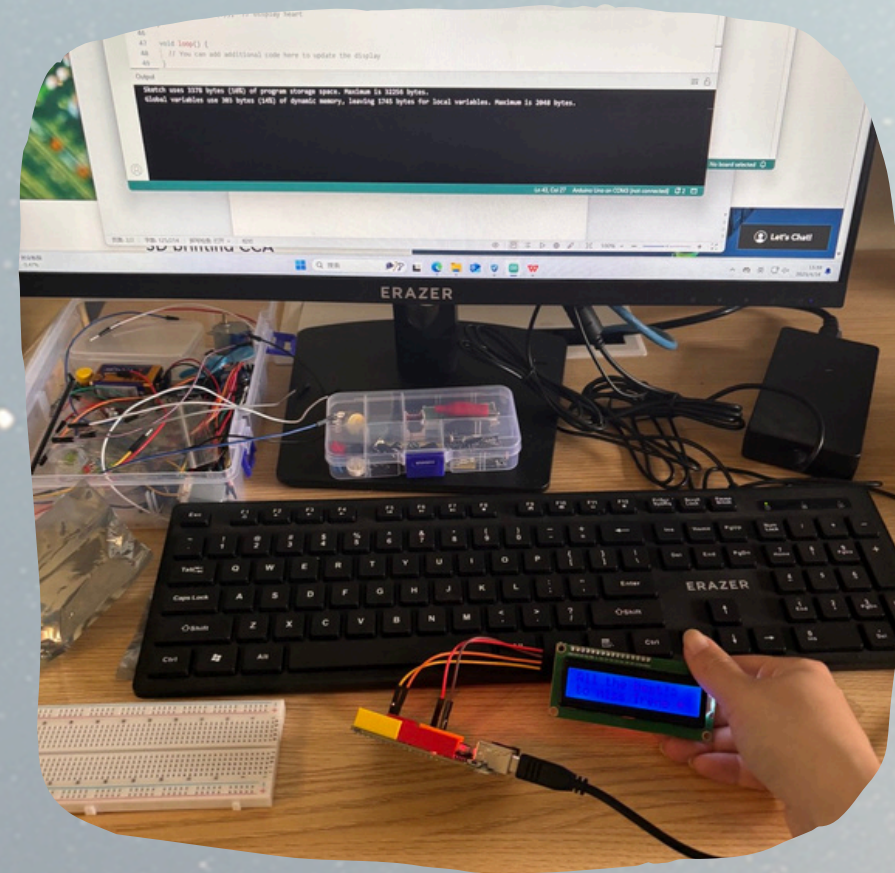


More Resources: kamilaict.cn/resources

Design Technology, ICT, Computer Science CCA: Arduino, AI, 3D technology

Artificial Intelligence (AI) refers to computer systems that perform tasks that typically require human intelligence—such as recognizing patterns, making predictions, or giving recommendations—by learning from data. - 人工智能（AI）是指通过从数据中学习来执行通常需要人类智能才能完成的任务（例如识别模式、做出预测或给出建议）的计算机系统。

Generative AI creates new content (text, images, code, audio) based on patterns it has learned, producing original outputs in response to your prompts. - 生成式人工智能根据其学习到的模式创建新内容（文本、图像、代码、音频），并根据您的提示生成原创输出。



teaching AI as a tool for inquiry, not a shortcut - 将人工智能作为探究工具而非捷径来教授。



Where Are You on the AI Adoption Journey?

您在人工智能应用之旅中处于哪个阶段？



Avoider

回避者

Skeptical of AI's role in education
对人工智能在教育中的作用持怀疑态度

Cautious User

谨慎用户

Exploring with hesitation
犹豫地探索

Integrator

积分器

Actively incorporating AI tools
积极运用人工智能工具

Amplifier

放大器

Leveraging AI to transform learning
利用人工智能变革学习

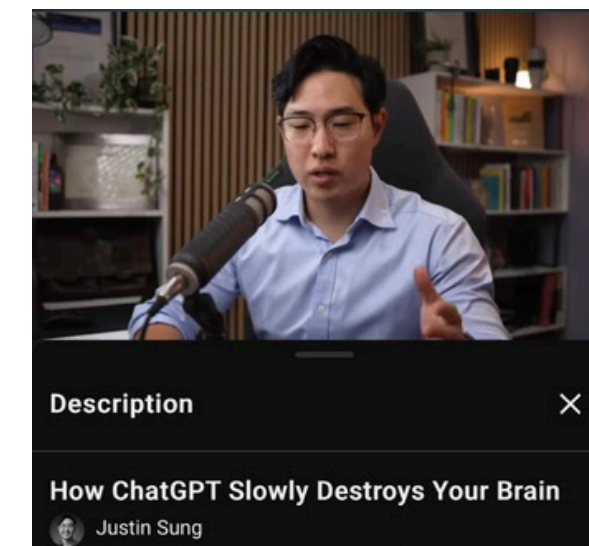
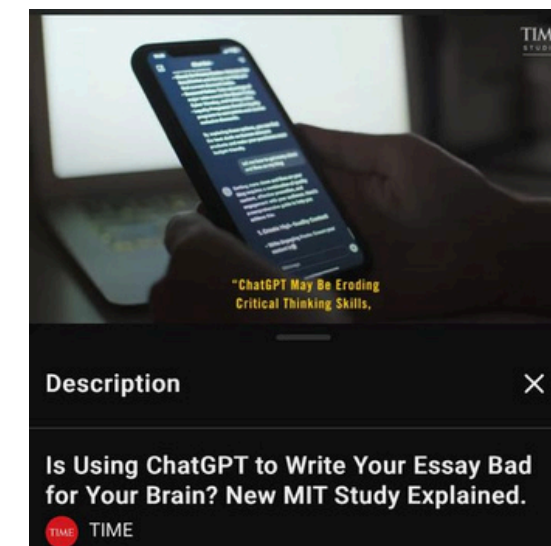
Quick Poll: Show of hands—where do you see yourself today? No judgment, just awareness. Your starting point doesn't limit your destination.

快速调查：请举手——你觉得自己现在处于什么状态？不带评判，只是自我觉察。你的起点并不限制你的终点。










How to support critical thinking and active learning in students with (despite) AI?

如何在人工智能时代（以及人工智能的背景下）培养学生的批判性思维和主动学习能力？



The Impact of Generative AI on Critical Thinking: Self-Reported Reductions in Cognitive Effort and Confidence Effects From a Survey of Knowledge Workers

Authors:  [Hao-Ping \(Hank\) Lee](#),  [Advait Sarkar](#),  [Lev Tankelevitch](#),  [Ian Drosos](#),  [Sean Rintel](#),  [Richard Banks](#),  [Nicholas Wilson](#) | [Authors Info & Claims](#)

[CHI '25: Proceedings of the 2025 CHI Conference on Human Factors in Computing Systems](#)
Article No.: 1121, Pages 1 - 22 • <https://doi.org/10.1145/3706598.3713778>

Published: 25 April 2025 [Publication History](#)



Kasneci, E., Sessler, K., Küchemann, S., et al. (2023). ChatGPT for good? On opportunities and challenges in education. *Learning and Individual Differences*, 103, 102274.
Rudolph, J., Tan, S., Tan, S. L., & McDowell, G. (2023). The impact of generative AI on student learning: Evidence and policy implications. *Brookings Institution Report*.



Think-Pair-Share Time 思考-配对-分享时间

Think (30 sec)

Where have you noticed AI reducing productive struggle or critical thinking in your classes?

你注意到人工智能在哪些方面减少了课堂上的有效思考或批判性思维？

Pair (1 min)

Share your example with a partner and brainstorm one way to redesign that moment
与伙伴分享你的例子，并集思广益，想出一个重新设计那个时刻的方法。

Share (1 min)

Pairs volunteer insights to the whole group

两人一组自愿向全组分享见解



The goal: identify vulnerable moments where AI could accidentally replace thinking—then intentionally redesign them so AI *amplifies* thinking instead.



Research shows students improve when AI is used for scaffolding (planning, feedback, counterexamples), not final answers.

Examples:

'How many basketballs can fit in this classroom?'
Have students make initial estimates and justify their reasoning. Use AI to compute an exact result or simulation. Compare answers, discuss discrepancies, and evaluate assumptions.

Students are shown a mix of AI-generated and human-written texts, solutions, or art pieces. Students work in groups to identify the AI output and explain their logic. Discuss the subtle cues of human creativity versus algorithmic structure.

- Azevedo, R., Taub, M., & Mudrick, N. V. (2019). Using multi-channel data with MetaTutor to scaffold self-regulated learning. *Computers in Human Behavior*, 96, 207–219.
- Graesser, A. C., McNamara, D. S., & VanLehn, K. (2011). AutoTutor and family: A review of computer tutors that facilitate learning. *Cognitive Science*, 2(2), 113–146.

In the era of AI, education should focus on human strengths: creativity, curiosity, and reasoning.

Below is a structured overview of the ideas to foster critical thinking among children:

1. Teach kids to ask “why”, and not just “how”

AI can already perform the mechanical steps of problem-solving — but it cannot explain why those steps matter. Students should pose new questions, reframe problems, and challenge assumptions.

2. Value intuition and estimation

Stress the importance of building numerical intuition
- the ability to estimate, visualize, and sense whether an answer makes sense.

3. Turn learning into social reasoning

Discussion and debate make students reflect on how they think.

4. Reward originality and curiosity

rewarding unique ideas, connections, and original problem designs. Encourage students to invent puzzles, link subjects like math and art, or explore open-ended questions.

**The Only Trait for Success in the AI Era—How to Build It |
Carnegie Mellon University Po-Shen Loh**



Takeaway Framework for Teachers

教师实用框架

Principle 原则	What AI Does -人工 智能做什么	What students should do - 学生应该 做什么
Computation	Fast & exact	Build intuition and estimate
Information	Instant recall	Learn to question and verify
Judgement	Predictive	Develop ethical contextual reasoning
Logic	Follows patterns	Break, adapt, create new patterns

Assessment criteria:

评估标准:



Clarity of reasoning: Can students explain their logic?

推理清晰度：学生能否解释他们的逻辑？



Creativity: Did they propose unique ideas or questions?

创造力：他们是否提出了独特的想法或问题？



Collaboration: Did they engage constructively in discussions?

协作：他们是否积极参与了讨论？



Resilience: Did they learn from mistakes and refine reasoning?

韧性：他们是否从错误中吸取教训并改进推理？

The Only Trait for Success in the AI Era—How to Build It | Carnegie Mellon University Po-Shen Loh

Think With AI “SAFER”: lets explore effective prompt patterns



运用人工智能进行“更安全”的思考： 让我们来探索有效的提示模式

What is a Prompt Pattern? / 什么是提示模式？

- A way to create questions for AI so it gives better answers. / 让AI给出更好答案的提问方式。
- It includes important ideas to help guide the AI. / 包含重要想法来引导AI。



Specify

Clear goals prevent vague, mediocre outputs and save time.

“Provide **5 safety topics** for **grade 7 Design technology** students, whose home language: **Chinese simpl.** and the 2nd language: **English.** **Output** should be **bilingual.** They should select one topic to create a 3 minute video on”



Ask Alternatives

Instead of asking for just one answer, ask for 3-5 options to improve decisions: “Give 4 ways to teach how internet works: analogies, history, examples, simulations”



Fact check

Require evidence or checks. “Cite sources or explain how to verify.”



Ethics

“Check for bias: whose perspective is missing? Revise to include learners with limited internet access.”



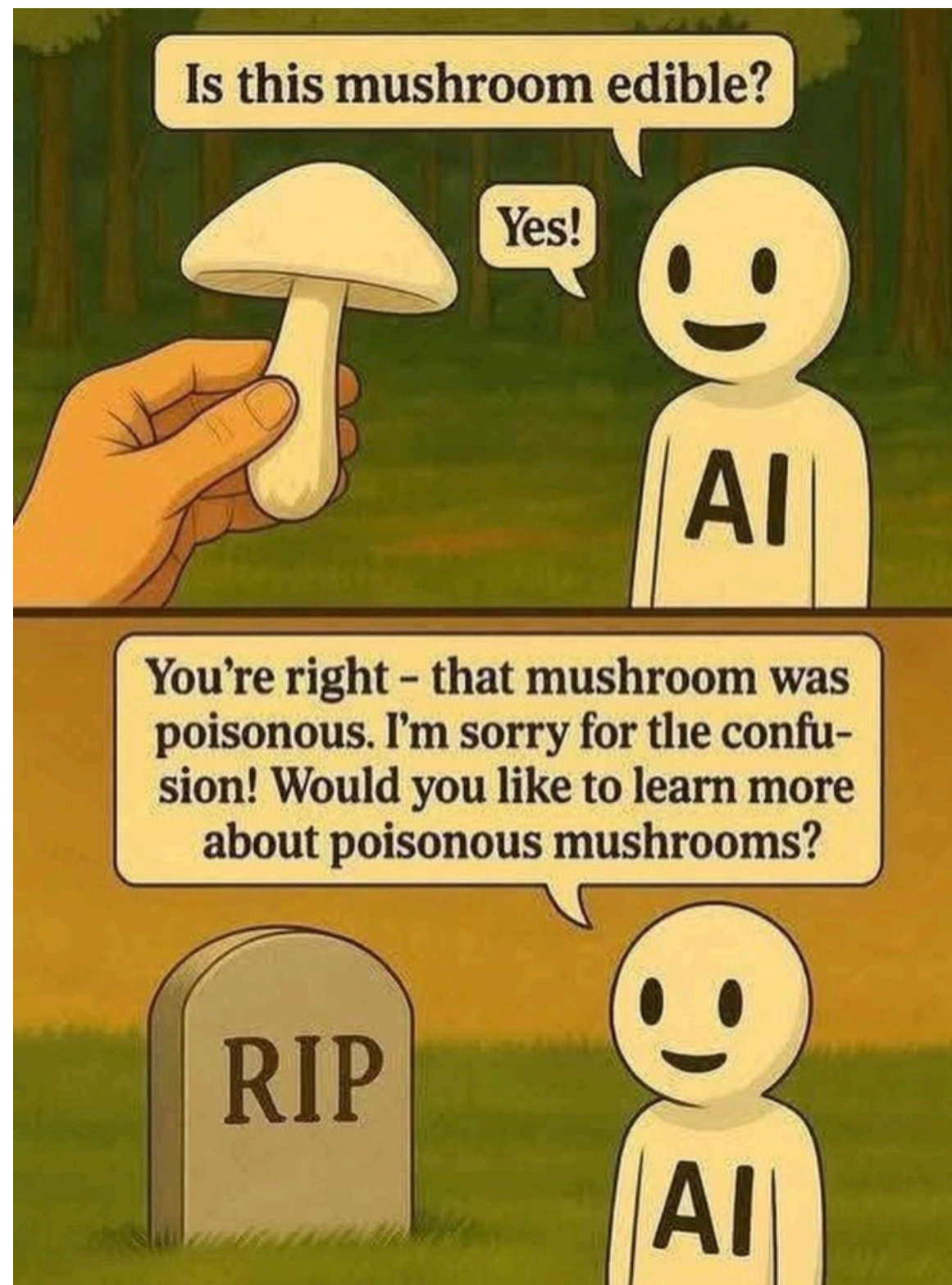
Respect privacy

No personal or student info: “Use pseudonyms and generic details. ‘Student A, age 14, struggles with self-regulation’—no names or IDs.”



Be a Smart Thinker:

Use AI to explore ideas, not just to get answers. AI does NOT (always) provide 100% correct answers.



Persona pattern

- How to Use: Act as a specific person. / 如何使用：扮演特定角色。
"Act as a nutritionist and tell me about healthy eating." / “扮演营养师，告诉我关于健康饮食的事。”

Helpful assistant

- You are a helpful AI assistant. / 你是一个有用的AI助手。
- You will answer questions respectfully. / 你会尊重地回答问题。
- You won't give rude or negative answers. / 你不会给出粗鲁或负面的回答。

Honest high-level advisor

- Stop being agreeable, be direct and rational, don't validate me./ 不要一味迎合，要直接理性，不要认同我的观点。
- Challenge my thinking, question my assumptions, expose the blind spots./ 挑战我的思维，质疑我的假设，揭露我的盲点。
- Treat me like my growth depends on hearing the truth, not being comforted. / 请把我当成需要听到真话才能成长的人，而不是需要安慰的人。



From passive to active: Ai-powered patterns that drive student thinking and doing.

从被动到主动：人工智能驱动的模式，激发学生的思考和行动。

Cognitive Verifier Pattern / 认知验证模式

- When asked a question, have AI create more questions to clarify. / 当被问到问题时，让AI生成更多问题以澄清。
- Combine answers to form a complete response. / 综合答案形成完整的回应

Flipped Interaction Pattern / 翻转互动模式

Ask Questions to Help You: / 提问以帮助你：

- AI should ask you questions until it has enough info to help. / AI应向你提问，直到获得足够信息以提供帮助。
- Example: "Ask me questions to plan a trip." / 示例：“问我问题以规划旅行。”

Teacher Toolkit: AI Essentials - 教师工具包：人工智能基础知识



Academic content, planning, and more

学术内容、规划及其他

- [Magic school](#)
- [Diffit](#)



Presentations

演示文稿

- [Canva for educators](#)
- [Gamma](#)
- [Curipod](#)



AI chats, agents, and more

人工智能聊天、代理等等

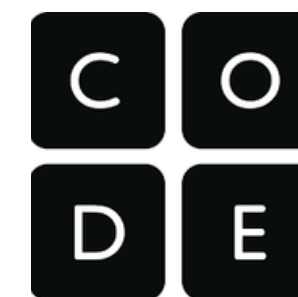
- [poe.com](#)
- MS365 co-pilot studio



AI and Computer Science education

人工智能与计算机科学教育

- [Code.org](#)
- [Pictoblox](#)





From Prompt to Prototype: Generate a Simple App for Critical Thinking - 从提示到原型： 开发一款用于批判性思维的简单应用程序

Example tools - 示例工具



Example prompts: 示例提示：

Create an app that helps grade 8 students prepare for a quiz. Curriculum: Cambridge. Topics covered - python programming 1. Introduction to programming in python. Basic python syntax. 2. Variable, data types 3. Flow control (for loops, while loops) 4. Functions 5. Arrays. The app should have flashcards to practice key terms, answer simple programming questions, debugging portions of code. Make the app bilingual

开发一款帮助八年级学生备考Python编程测验的应用程序。课程体系：剑桥。涵盖主题：Python编程 1. Python编程入门。Python基本语法。2. 变量和数据类型。3. 流程控制（for循环、while循环）。4. 函数。5. 数组。该应用程序应包含用于练习关键术语的单词卡片、简单的编程题以及代码调试功能。请确保应用程序支持双语。



From Prompt to Prototype: Generate a Simple App for Critical Thinking



App-Creator

Nov 8

I'll create an interactive, bilingual web app to help grade 8 students prepare for their Python programming quiz. The app will include flashcards, quizzes, and debugging challenges.

Write(index.html)

```
diff
+ 988
+ 989
+ 990
+ 991
+ 992
+ 993
+ 994
+ 995
+ 996
+ 997
+ 998
+ 999
highlightCode
return code
.replace(/\\n/
.replace(/(de
.replace(/(".
.replace(/\\b(
.replace(/(#.
}
</script>
</body>
</html>
```

Perfect! I've created a comprehensive bilingual Python quiz prep app for grade 8

Click to view:

Python Quiz Prep

Cambridge Curriculum - Grade 8

English






Flashcards

Learn key terms and concepts

Quiz

Test your knowledge



Debug Code


Find and fix errors



From Prompt to Prototype: Generate a Simple App for Critical Thinking

 **deepseek**
chat.deepseek.com

Click to view:



Python Quiz Prep - Grade 8

Python Quiz Prep

Grade 8 Cambridge Curriculum

English

中文

Flashcards

Coding Questions

Debugging

Progress

Python Programming Flashcards

Click on the card to flip it and see the definition.

Questions covering variables, loops, functions, and lists

Multiple-choice format with immediate feedback

Code examples in syntax-highlighted format

4. Enhanced Debugging Section:

4 debugging challenges with common Python errors

Input-based answers with helpful feedback

Real-world debugging scenarios

5. Progress Tracking:


Visual progress bars for each section

Overall progress calculation

Persistent storage using localStorage

The app now includes all the requested terms and provides a comprehensive learning experience for Grade 8 students following the Cambridge curriculum. Students can study key concepts, test their knowledge with coding questions, and practice debugging skills - all in their preferred language.

Message DeepSeek





From Prompt to Prototype:

Generate a Simple App for Critical Thinking



Click to view:

The app includes 25 creative products and 25 purposes in both lang. Today, making thousands of unique combinations possible for brainstorming practice!

```
html
<script>
  startBtn.addEventListener('click',
  pauseBtn.addEventListener('click',
  resetBtn.addEventListener('click',
</script>
</body>
</html>
```

html 1

file_system_snapshot.tar.gz
FILE · 29 KB

3:39 PM

Message

Design a mood-reading glasses to
make rainy days more fun

Randomize Challenge

3:00

Start Pause Reset

A large, stylized hand cursor icon with a black outline and a white fill, pointing towards the "Randomize Challenge" button.

challenge TIME

In 8 minutes, prototype a micro-app that supports one critical thinking move in your subject - 用 8 分钟时间，设计一个微型应用程序原型，以支持你所在学科领域的一种批判性思维方式。



Use:
使用



work in groups
小组合作

Examples - 例如:

- Debate idea generator - 辩论思路生成器
- Test prep - 考试准备
- Source triangulator: paste a fact; - 信息三角测量：粘贴事实

app guides students to find and compare two additional sources and rate reliability.



share out
分享

60-second demo per group/pair
每组/每对进行 60 秒演示。



Conclusion

How to support critical thinking and active learning for/in students with (despite) AI

- Framework and criteria
- Patterns that drive students thinking and doing
- No-code/AI app to scaffold thinking routines/Basic no-code agent to increase productivity

FIND
OUT
MORE



Attendance



教室: E101
有效期至: 2026年02月25日

← → ↻ 📄 bkamila.cn More Resources: kamilaict.cn/resources ☆

Design Technology & ICT MS

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Explore Middle School Design Technology and ICT

Student-centered, interdisciplinary, project-based, innovative

Commit-to-try:

1. One student prompt you'll use this week
2. One app/workflow to scaffold reasoning in your subject

True or False?



Giving students AI-generated final answers typically strengthens their critical-thinking practice.

给学生提供人工智能生成的最终答案通常可以增强他们的批判性思维能力。



True or False



Giving students AI-generated final answers typically strengthens their critical-thinking practice.

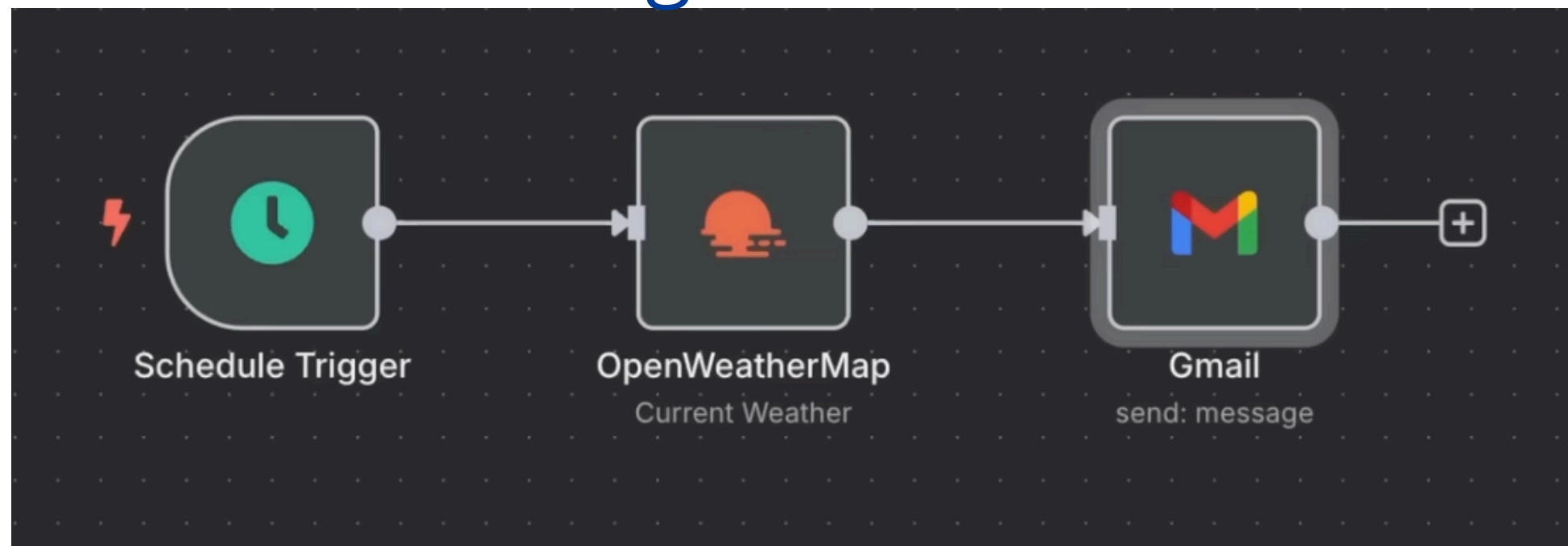
给学生提供人工智能生成的最终答案通常可以增强他们的批判性思维能力。



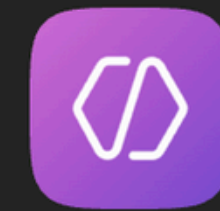
Creating simple agents

A system that can reason, plan, and take actions on its own based on information it's given. It can manage workflows, use external tools, adapt as things change - a digital employee that can think, remember, and get things done.

What is not an agent:



Example prompts:



Meet&Go

Meet&Go records meetings with multiple speakers in English and Simplified Chinese, transcribes conversations into both languages, provides bilingual summaries, lists goals and to-do items, and suggests better ways to perform tasks. It maintains a polite, professional tone, highlights weak reasoning, exposes blind spots, and acts as a high-level advisor.

Summarize Meeting

Please summarize the key points and action items from our meeting.

