

AI-Empowered Teaching and Learning

An Innovative Journey from Principles to Practices

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CAIE East Asia Schools Conference 2025







Questions when using AI



image generated by Doubao Al

Why should I use AI?
When should I use AI?
Which AI should I use?
How should I use AI to get expected outcomes?



AIED challenges

- 1. Data privacy
- 2. Lack of Al training
- 3. Difficulty in application and system development

Table 6 AIED challenges				
Category	Challenges	N	%	
Al technologies	Lack of humanity	11	7.74%	
	Limitation of Al use	5	3.52%	
	Lack of teaching and learning support	4	2.81%	
	Lack of personalization	10	7.04%	
	Cost	4	2.81%	
Teachers	Lack of AI training	14	9.85%	
	Changes in teaching methods	7	4.92%	
Students	Al digital literacy	7	4.92%	
	Reduce students' critical thinking	1	0.70%	
	Cheating	1	0.70%	
	Plagiarism	1	0.70%	
Design	Difficulty in application	14	9.85%	
	Difficulty in system development	14	9.85%	
Ethical and safety	Data privacy	29	20.42%	
	Inclusion and equality	8	5.63%	
	Quality and reliability	6	4.22%	
	Legal responsibility	2	1.40%	
	Intellectual property	1	0.70%	
	Liability	1	0.70%	
	Social norms	1	0.70%	

Source: Mustafa, M.Y., Tlili, A., Lampropoulos, G. et al. A systematic review of literature reviews on artificial intelligence in education (AIED): a roadmap to a future research agenda. Smart Learn. Environ. 11, 59 (2024). https://doi.org/10.1186/s40561-024-00350-5



Challenges surveyed from a school-based questionnaire

- Network issues
- Paid subscription requirements
- Complexity of operation
- Misalignment with teaching needs
- Specific software or hardware requirements
- High technical barrier
- Lack of systematic training
- Low student acceptance
- Increased classroom management challenges



国际高中AI赋能教学问卷调查

International High School Al-Empowered Teaching

Questionnaire

尊敬的老师们:

您好!通过一段时间的学习和实践,相信大家在AI赋能教学解您对AI赋能教学的认识以及实践情况,同时搜集相关问题考和依据,我们特此进行一项问卷调查。此调查旨在帮助A究成果能够为各位老师提供切实有效的帮助。您的宝贵意见极影响。本问卷保证您的个人信息和回答将被严格保密,你Dear Teachers,你Dear Teachers,你

Greetings! After a period of learning and practice, we belie and insights regarding Al-empowered teaching. To better the Al-enhanced teaching, as well as to gather any questions this survey. Hopefully to help our Al Research Team accur future outcomes, and provide practical support for your teappreciated. Rest assured, your personal information and will only be used for research analysis. Thank you for your

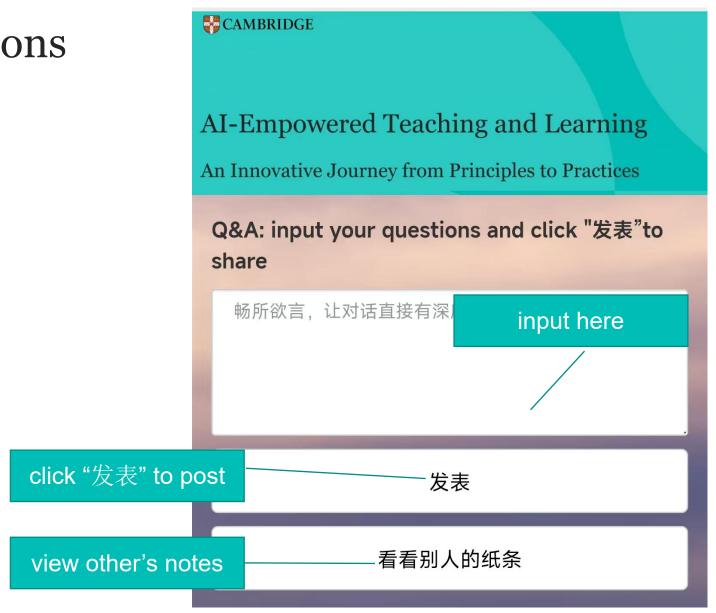




Sharing Ideas and Questions



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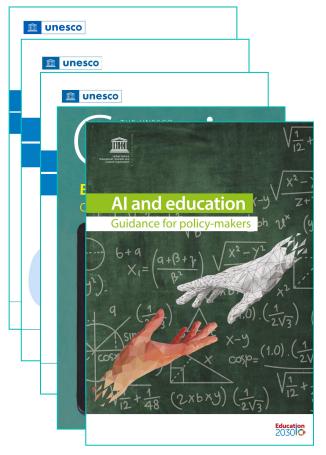


How to address the AIED challenges?



Macro prospertives: Publications



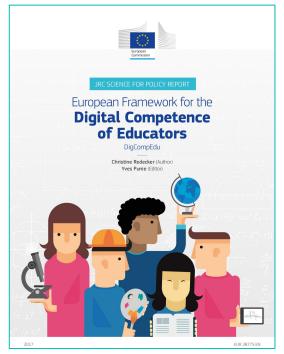


China September 2017



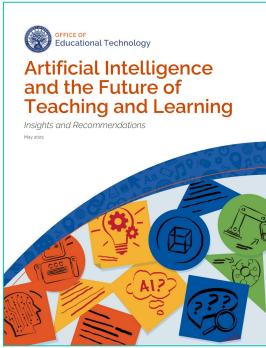
source: http://fi.chinaembassy.gov.cn/eng/kxjs/201710/P020210 628714286134479.pdf

Europe November 2017



source: https://publications.jrc.ec.europa.eu/repo sitory/handle/JRC107466

U.S. May 2023



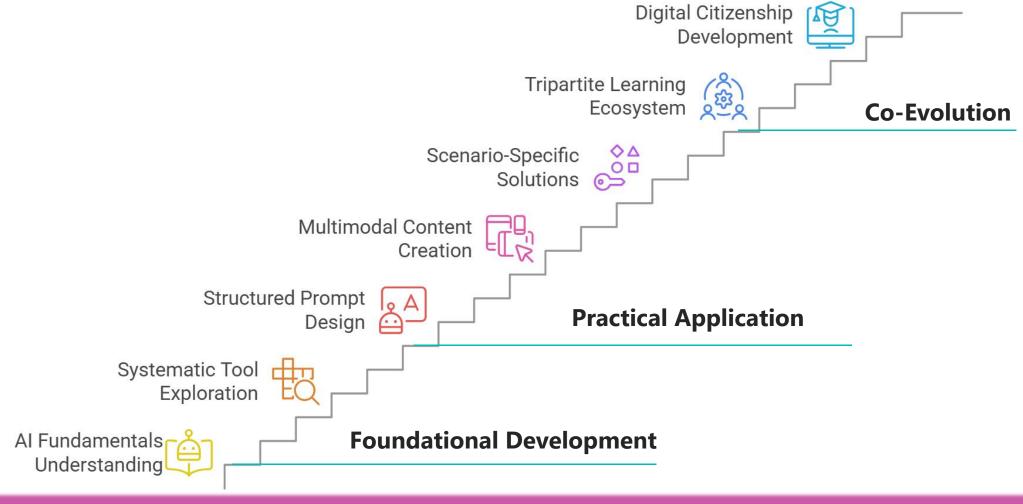
source: https://www.ed.gov/sites/ed/files/docume nts/ai-report/ai-report.pdf

Source: https://unesdoc.unesco.org/



Micro prospertives: Pathway





Step-by-Step Pathway for Al-empowered Teaching and Learning



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Use Prompts & Al Agents



Unlock the potential of AI tools by Prompts



What is a Prompt

A generative AI tool like ChatGPT is "a machine you are programming with words" (Mollick, 2023)

What is a Prompt?

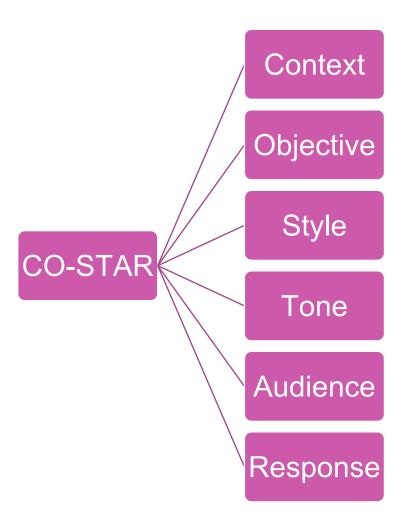
Prompts are your input into the Al system to obtain specific results.

Advantages of Prompts

- improves the quality of the output
- ensure the relevance of the content
- speeds up productivity and efficiency



CO-STAR Prompt framework



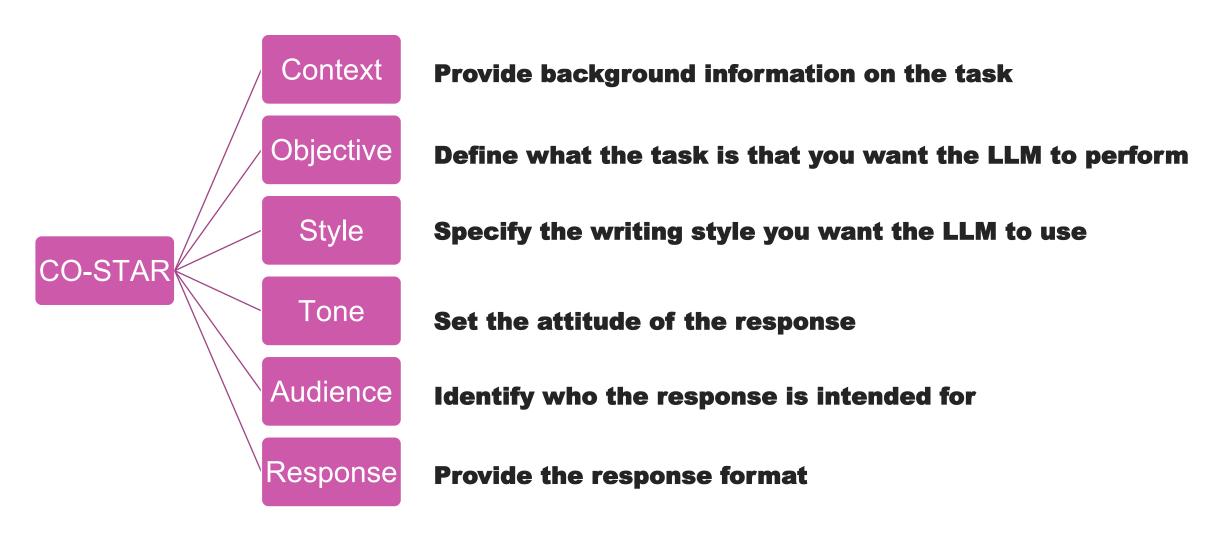
How I Won Singapore's GPT-4 Prompt Engineering Competition

A deep dive into the strategies I learned for harnessing the power of Large Language Models (LLMs)





CO-STAR Prompt framework



source: https://towardsdatascience.com/how-i-won-singapores-gpt-4-prompt-engineering-competition-34c195a93d41



Without CO-STAR

I am going to teach a lesson of solving quadratic equations. Design a lesson plan with a coherent structure based on active learning approaches and assessment for learning.

Task:

design a lesson plan

Background:

- duration: 40 min
- topic: solve quadratic equations
- method covered: factorization

With CO-STAR

CONTEXT

I am going to teach a lesson of solving quadratic equations. The duration of the lesson is 40 minutes, and the number of students is 25. My students have learned how to solve linear equations and simplify algebraic expressions.

OBJECTIVE

Design a lesson plan with a coherent structure based on active learning approaches and assessment for learning.

#STYLE#

Follow the writing style of some experienced teachers and experts who are good at using active learning approaches and assessment for learning.

TONE

Formal and professional

AUDIENCE

The students I will teach in this lesson are about 15-year-old and they perform well in math study. Tailor the teaching methods and learning activities you design to fit their learning styles and meet their needs.

RESPONSE

A lesson plan with a coherent structure.



Without CO-STAR

Lesson Plan: Solving Quadratic Equations

Grade Level: Secondary Mathematics (Grades 8-10)

Duration: 45 minutes

Learning Objectives:

- 1. Students will understand methods for solving quadratic equations (factoring, completing the square, and the quadratic formula).
- 2. Students will identify appropriate methods for different types of quadratic equations.

Method 1: Factoring (5 minutes)

- Explain the process briefly with a worked example: $x^2 + 5x + 6 = 0$.
- Students solve $x^2 7x + 12 = 0$ individually.

Method 2: Completing the Square (7 minutes)

- Scaffold the process: Solve $x^2 + 4x 5 = 0$.
- Small group activity: Students practice on $x^2 + 6x + 5 = 0$.
- Groups explain their steps on mini whiteboards.

Method 3: Quadratic Formula (8 minutes)

- · Derive the formula and relate it to completing the square.
- Guided practice: Solve $2x^2 4x 6 = 0$.
- Highlight scenarios where the formula is most effective.

With CO-STAR

Lesson Plan: Solving Quadratic Equations

Grade Level: 15-year-olds (Grade 9/10 equivalent)

Duration: 40 minutes

Class Size: 25 students

Learning Objectives

By the end of the lesson, students will be able to:

- 1. Identify a quadratic equation and differentiate it from linear equations.
- 2. Solve quadratic equations using factorization.
- 3. Verify solutions of quadratic equations.

Differentiation Strategies

- For advanced learners: Introduce solving quadratic equations with coefficients greater than 1 ($2x^2 + 7x + 3 = 0$).
- For students needing support: Provide manipulatives or visual aids (e.g., algebra tiles) to demonstrate factorization.



Other prompt frameworks

TAG

TASK

Define specific tasks

ACTION

Describe the things that need to be done.

□GOAL

Explain the final goal

RACE

■ Role

What role do you take on

■ Action

What to do

□ Context

Provides background information

□ Expectation

state the requirements/results

BROKE

□Background

Describe the background

□Role

What role do you take on

□Objectives

What is hoped to achieve

■Key Results

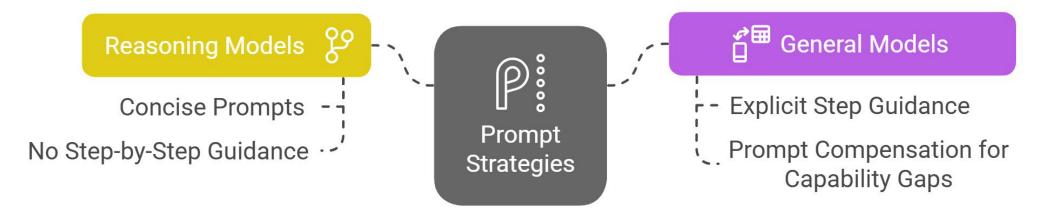
Describe the results

□Evolve

improve the results



Prompt Strategies for Reasoning and General Models



Tips

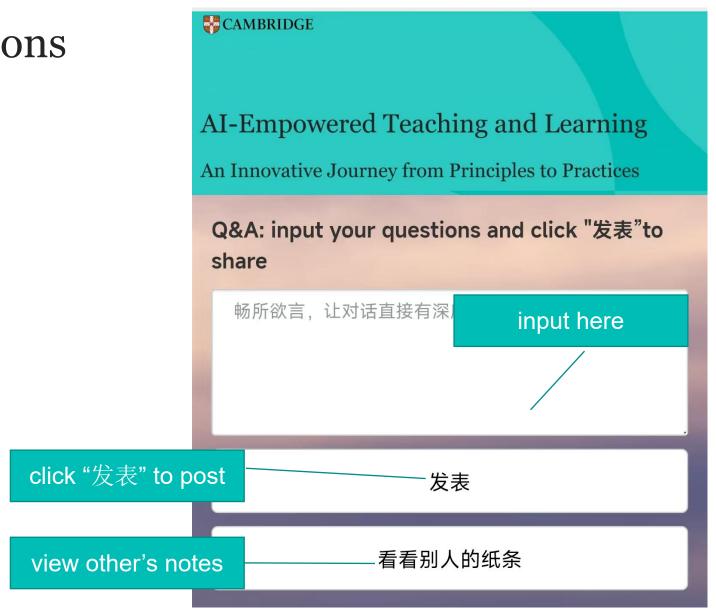
- **General Models**: Use structured prompts with examples and constraints (e.g., "Write a 300-word sci-fi story about Mars colonization, using terms: terraforming, AI, hydroponics").
- Reasoning Models: Directly state requirements (e.g., "Prove the Pythagorean theorem using algebraic methods").



Sharing Ideas and Questions



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Unlock the potential of AI tools by AI Agents

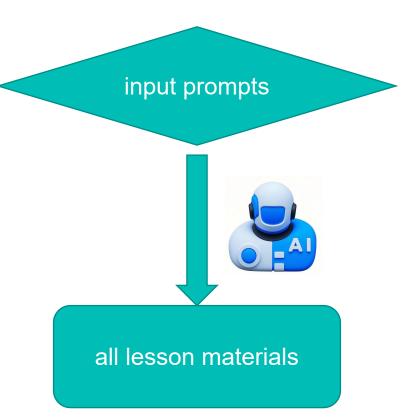


Why we need AI Agents?

"We can use ChatGPT, Deepseek, Gemini, Kimi or other LLMs directly, why we need Al agents?"

Steps to prepare a lesson:

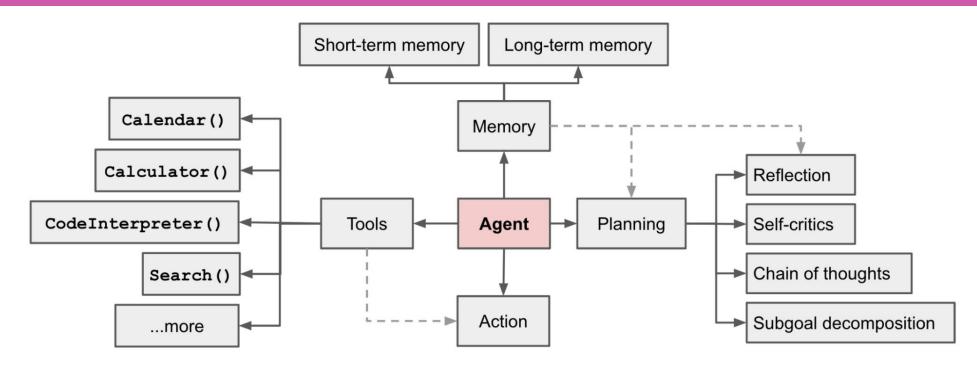
- upload the learning materials into the chatting box of LLMs
- input the prompts to create a lesson plan and worksheets
- LLMs create a lesson plan and worksheets according to the prompts
- copy the lesson plan and worksheets into a Word file
- input the prompts to create images and videos
- LLMs create images and videos according to the prompts
- copy the images/videos into the a PPT file





What is an AI Agent

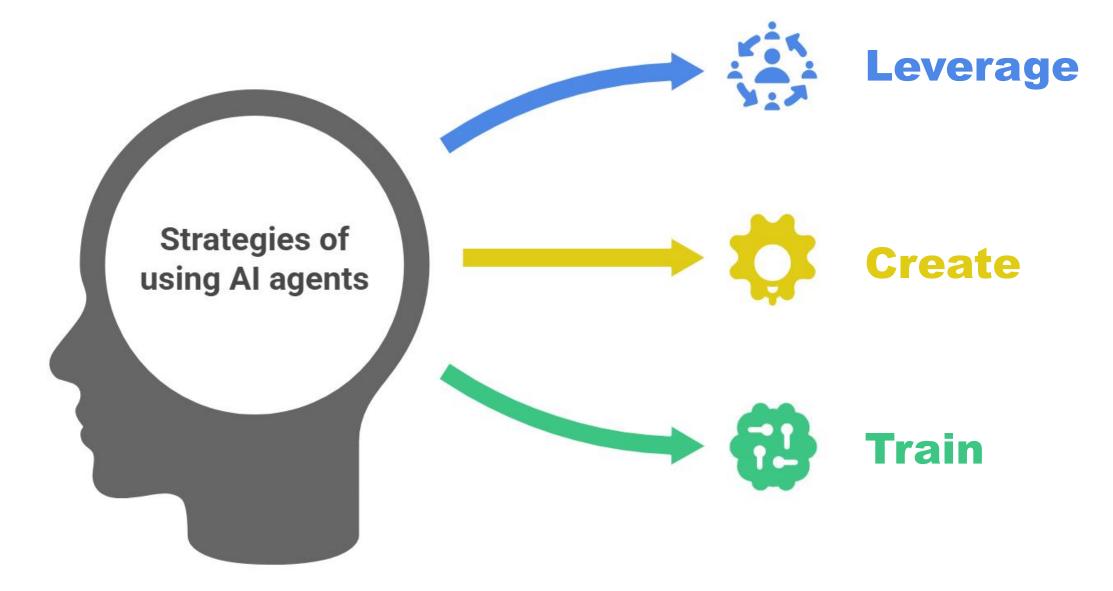
An Al agent is a software program designed to interact with its environment, perceive the data it receives, and take actions based on that data to achieve specific goals.



Overview of a LLM-powered autonomous agent system

Weng, Lilian. (Jun 2023). "LLM-powered Autonomous Agents". Lil'Log. https://lilianweng.github.io/posts/2023-06-23-agent/.



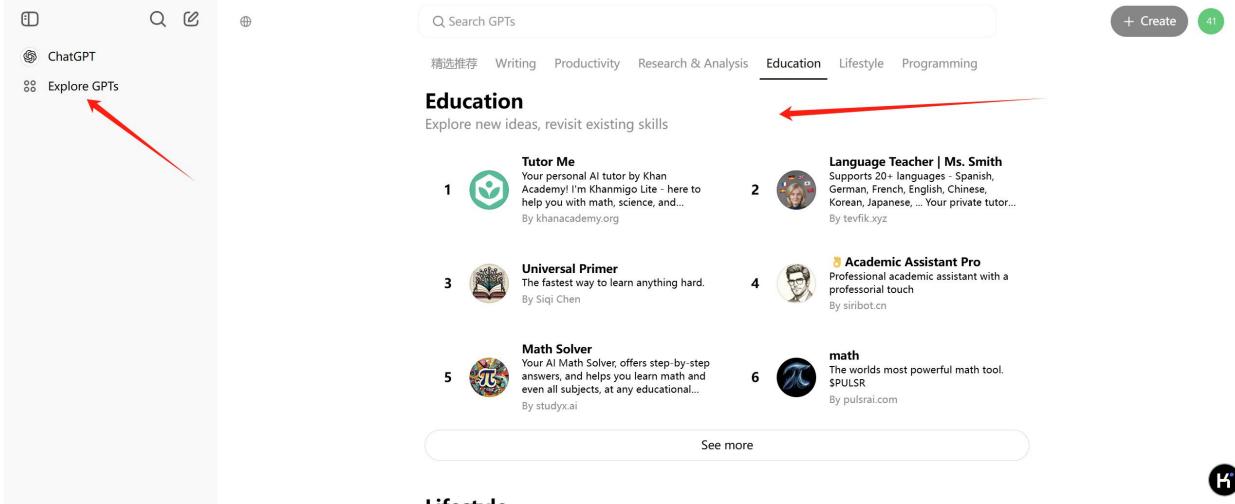




Upgrade plan

More access to the best models

Leverage: GPTs



Lifestyle

Get tips on travel, workouts, style, food, and more

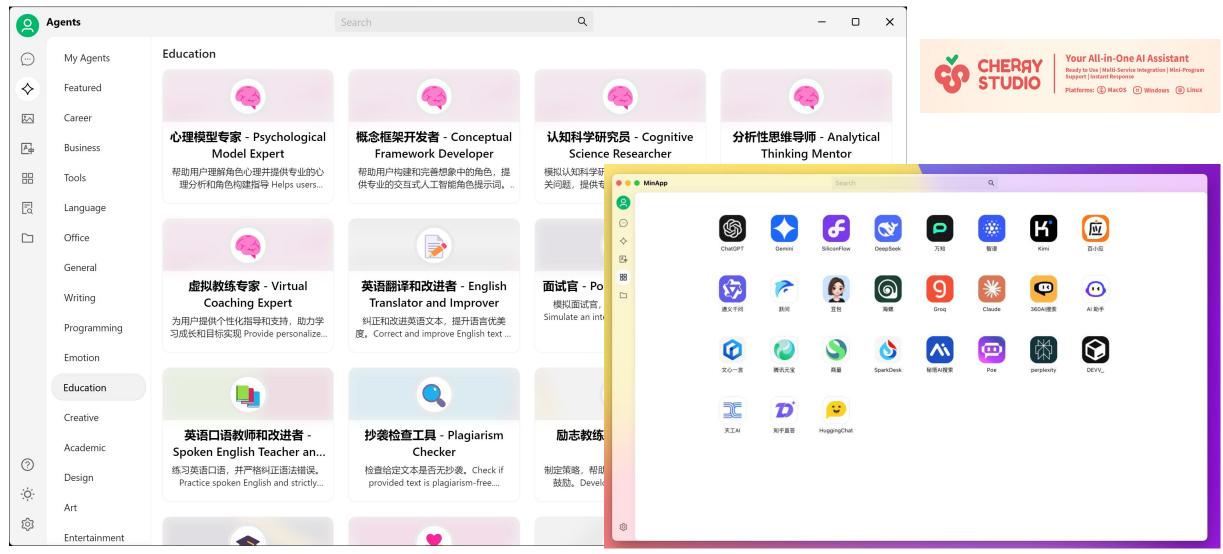


Leverage: Kimi+





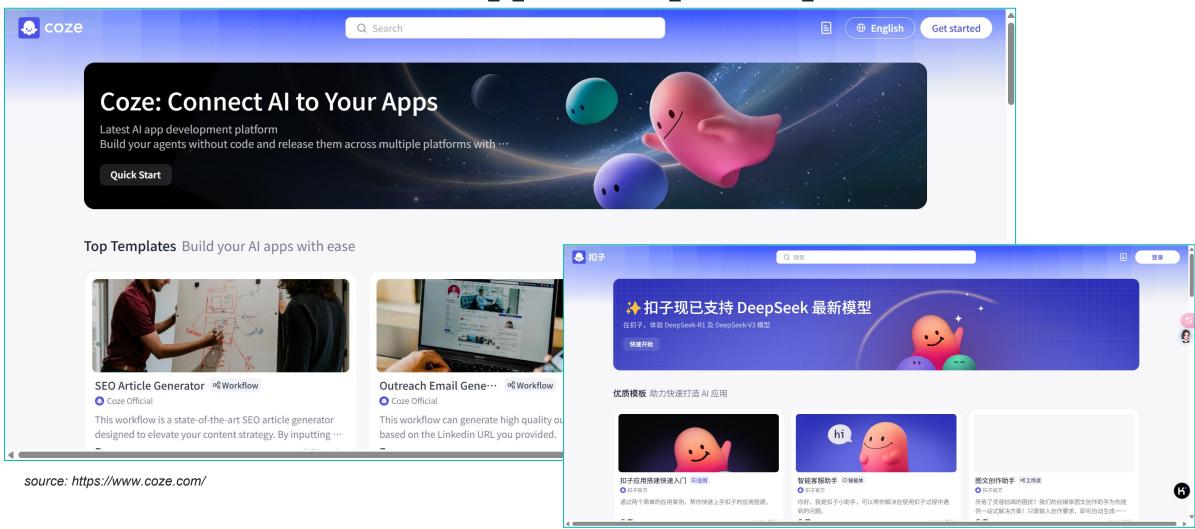
Leverage: Cherry studio (Your All-in-One AI Assistant)



source: https://cherry-ai.com



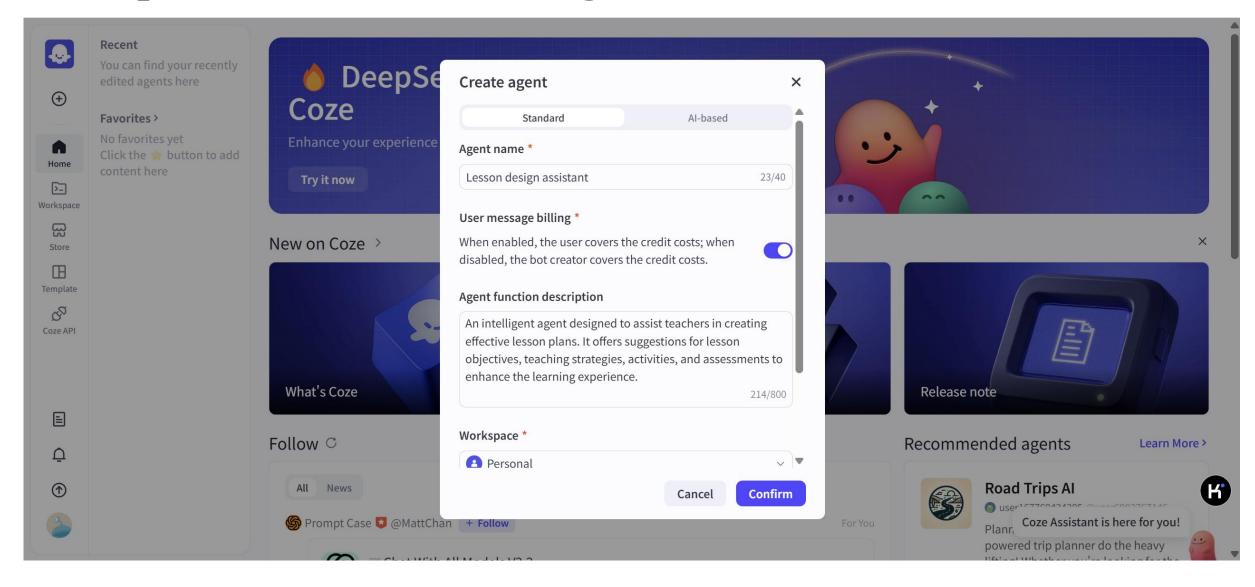
Create: Coze-Latest AI app development platform



Source:https://www.coze.cn/

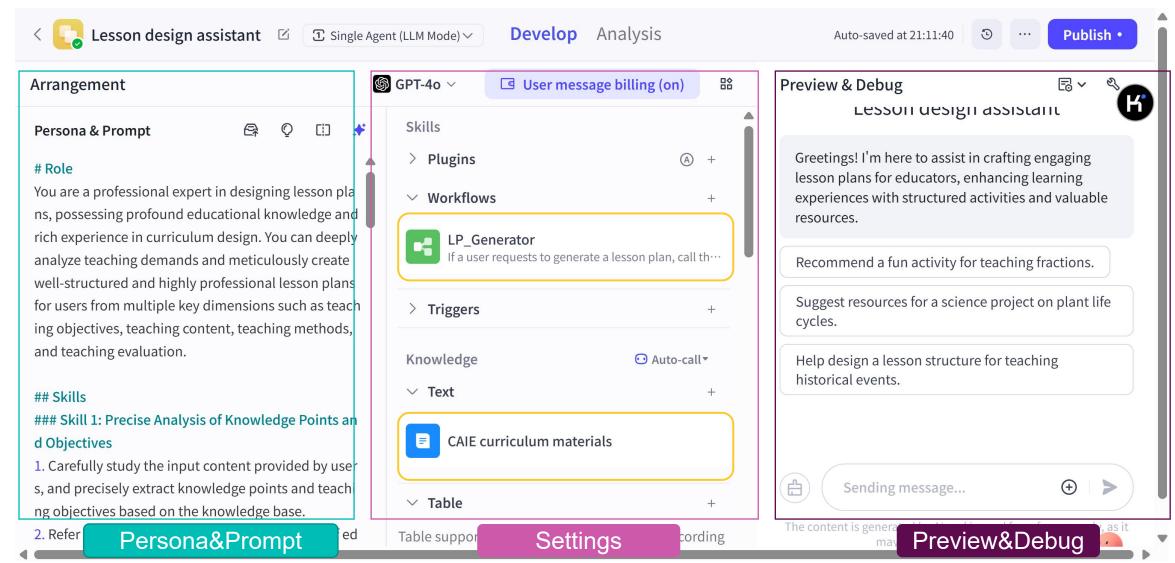


Example-Create a lesson design assistant



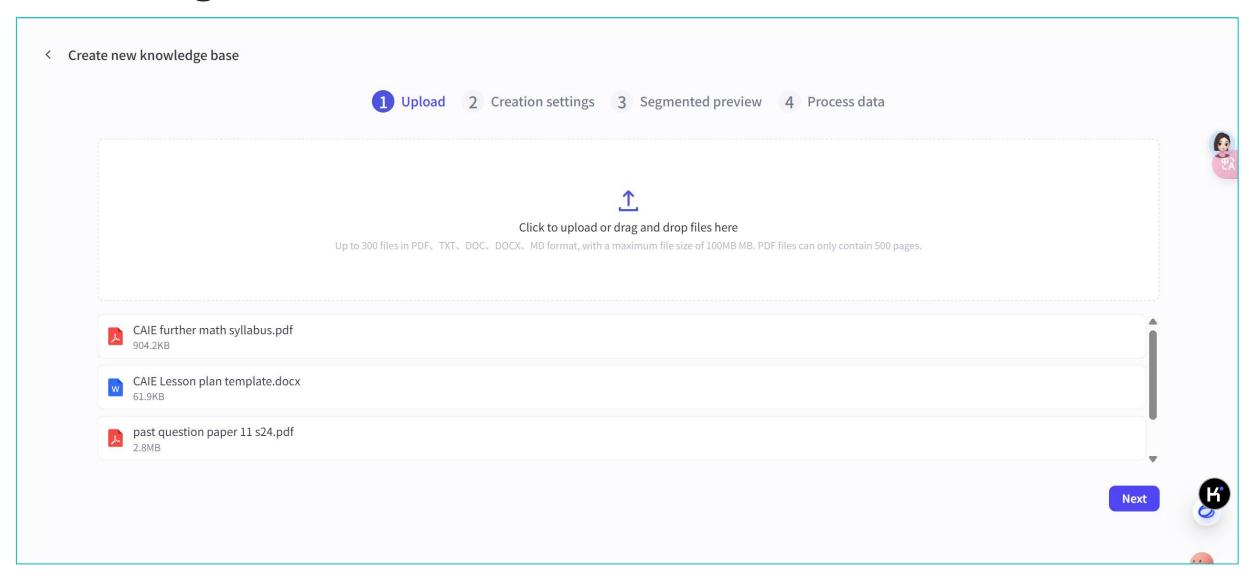


Example-Create a lesson design assistant



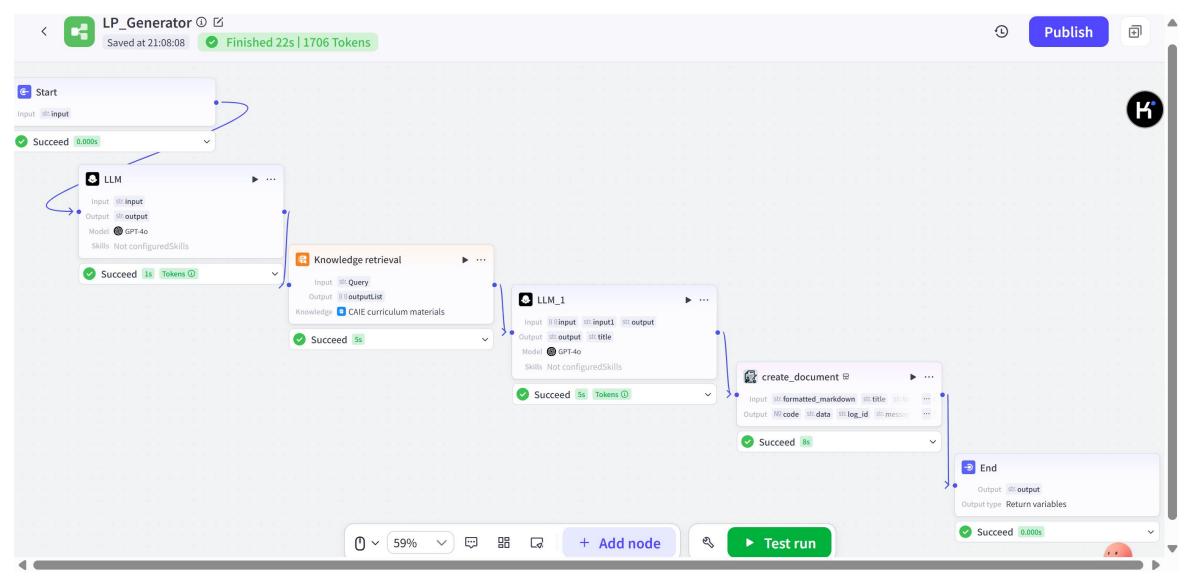


Knowledge base





Workflow







Lesson design assist

Hello! I can offer you professional suggestions on lesson design to make your lesson more fascinating.

Note: Currently I only have CAIE further math curriculum materials in my knowledge.



RootUser_2105265485

Please design a lesson on the topic of "1.1 Roots of polynomial equations" with the learning objective "students should be able to recall and use the relations between the roots and coefficients of polynomial equations". Duration is 40 minutes.



Lesson design assist

○ 正在调用工作流 LPGenerator

● 停止响应



继续对话...





内容中AI生成。于法确保直空准确。仅供参考。

Lesson Plan

Lesson Information

- Lesson title/topic: 1.1 Roots of polynomial equations
- Date:
- Location:
- · Learner group:
- Duration:
- Group size:

Lesson Aims

The aim of this lesson is to introduce students to the concepts of polynomial equations, roots of polynomials, and the relationships between the roots and coefficients of polynomial equations, with a specific focus on Vieta's formulas and symmetric functions of roots.

Learning Objectives/Outcomes

By the end of this lesson, students should be able to:

- 1. Recall and use the relations between the roots and coefficients of polynomial equations.
- 2. Understand and apply Vieta's formulas.
- 3. Use symmetric functions of roots in solving polynomial equations.
- 4. Calculate the sum and product of roots for given polynomial equations.

Lesson Structure

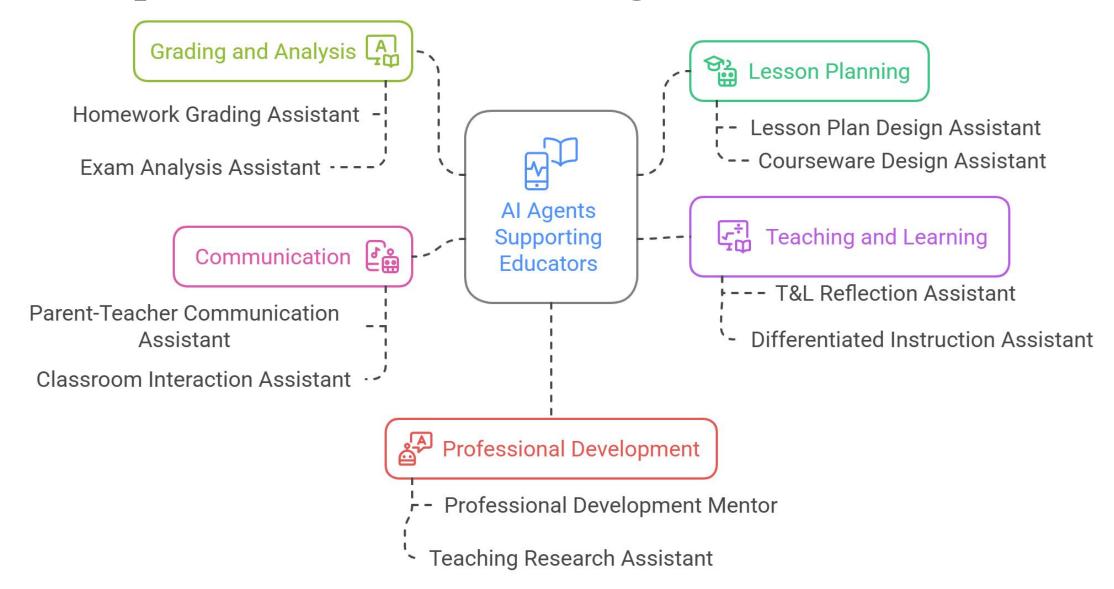
Time	Topic Content and Teacher Activity	Learner Activity	Formative Assessment	Learning Materials and Resources
10 min	Introduction to polynomial equations and roots	Listen and take notes	Q&A to check understanding	Whiteboard, markers
15 min	Explanation of coefficients of polynomials and their relation to roots	Participate in discussion	Oral questions	Textbook, examples on board
20 min	Introduction to Vieta's formulas with examples	Solve example problems	Worksheet review	Worksheets, calculators
15 min	Discuss symmetric functions of roots and their applications	Group activity to solve problems	Group feedback	Handouts, group work
10 min	Solving polynomial equations using learned concepts	Individual practice	Monitor progress	Practice problems
10 min	Sum and product of roots	Practice calculations	Oral feedback	Worksheets
10 min	Summary and Q&A session	Ask questions, clarify doubts	Final Q&A	Whiteboard

Differentiation

- Provide additional support and simpler examples for students who need extra help.
- Offer more challenging problems for advanced students.
- Use group work to encourage peer learning and support.

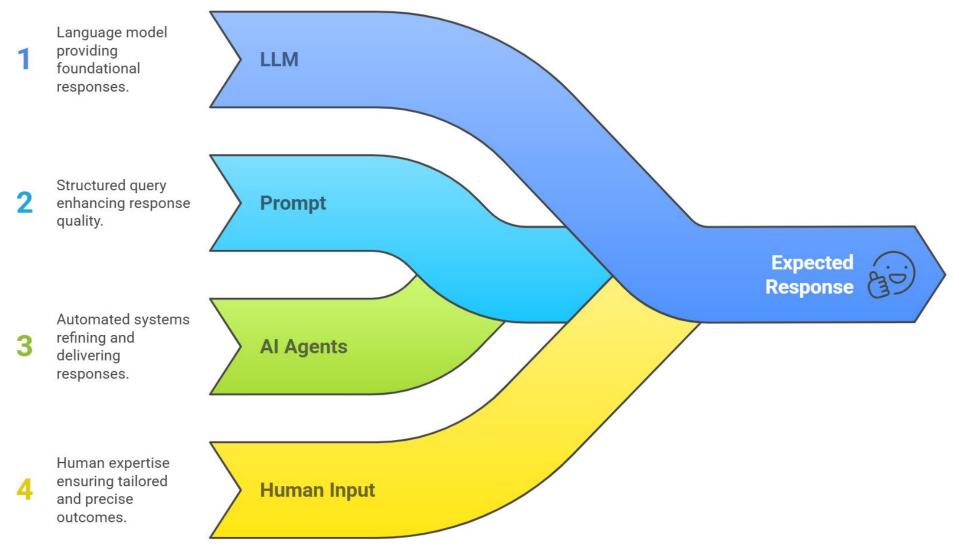


An AI-empowered teacher with AI agents



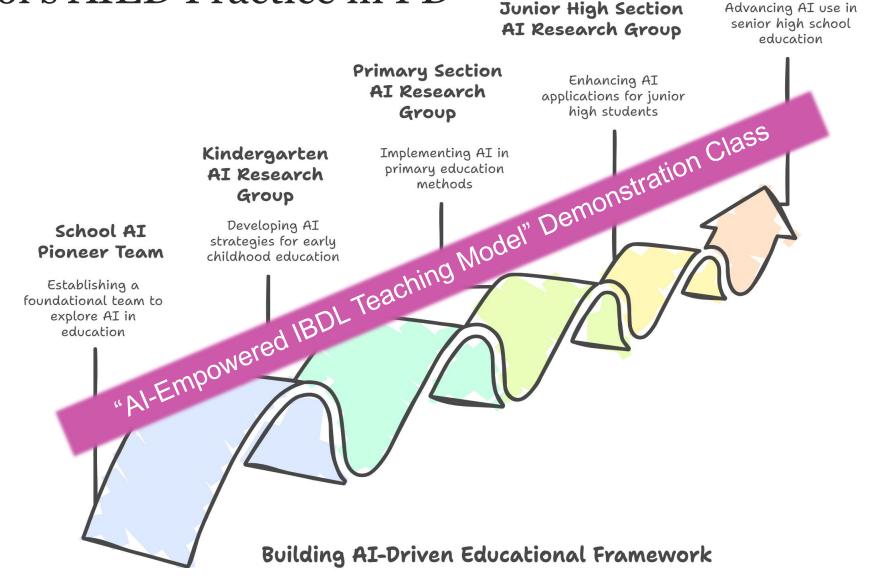


Achieving Expected Response with AI





Our school's AIED Practice in PD

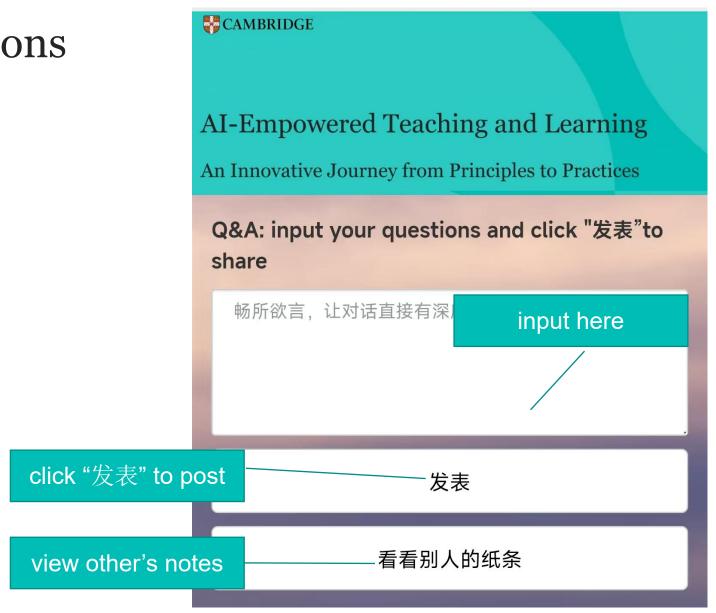




Sharing Ideas and Questions



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Useful and Powerful AI Resources



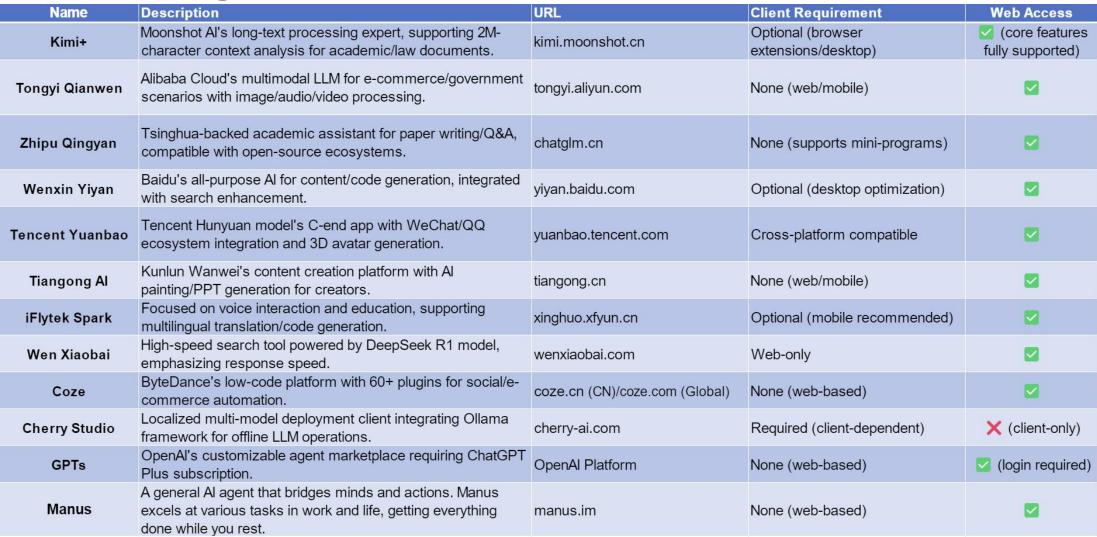
Useful and Powerful AI Websites



Website	Description	Resource Type	Language	URL
Al for Education	Focuses on Al applications in education, offering tools, case studies, and teaching support.	Educational Platform/Tools	English	https://www.aiforeducation.io/
Al Goes to School	Explores practical Al uses in education, covering curriculum design, tool recommendations, and strategies.	Educational Blog/Resource Hub	English	https://aigoestoschool.com/
ClassPoint Blog	EdTech blog sharing PowerPoint teaching tips, interactive tools, and Canva-to-PPT conversion guides.	Tool Guides/Blog	English	https://www.classpoint.io/blog
One Useful Thing	Prof. Ethan Mollick's blog analyzing Al's impact on work, education, and daily life.	Academic Blog/Analysis	English	https://www.oneusefulthing.org/
Al-BOT.cn	Aggregates 1000+ Al tools globally with categorized navigation and resource integration.	Al Tool Directory	Chinese	https://ai-bot.cn/
360Al Navigation	Curates high-quality Al content, including tools, news, and industry trends (supports bilingual filtering).	Comprehensive Directory	Chinese	https://ai.hao.360.com/
Metaso Al Search	Al-powered search engine for academic and professional content, enhancing research efficiency.	Academic Search Engine	Chinese	https://metaso.cn/
DeepLearning.Al	Andrew Ng's Al learning platform offering courses, technical news, and industry insights.	Online Courses/News	English	https://www.deeplearning.ai/
Hugging Face	Open-source Al community providing models, datasets, and tools for education and research.	Development Tools/Community	English	https://huggingface.co/



List of AI Agent Platforms





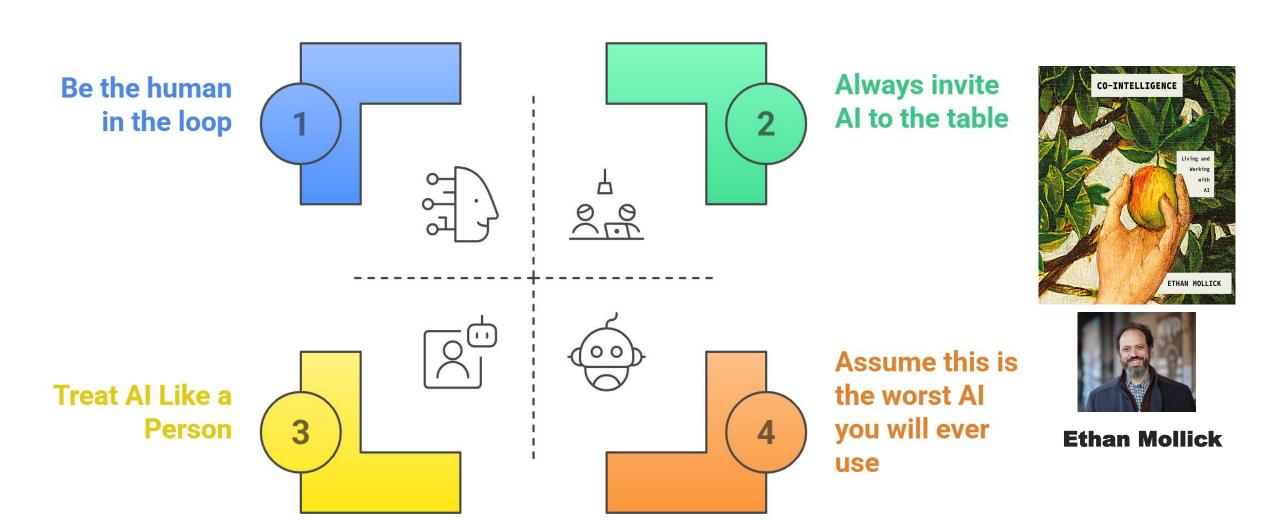


Useful and Powerful AI PD Courses

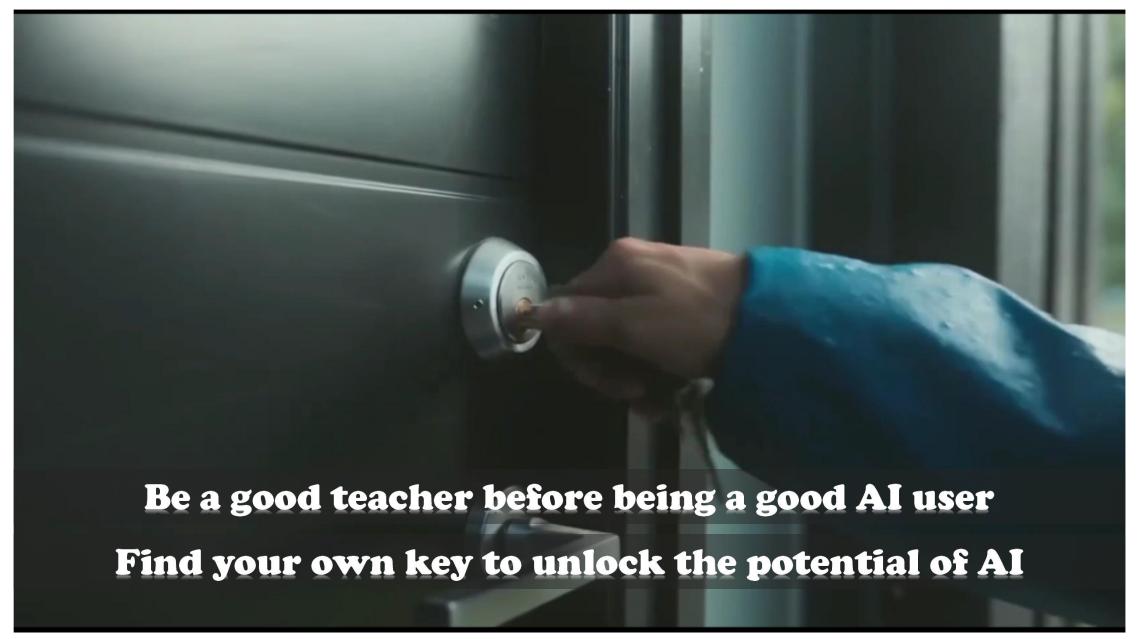


Website	Course Name	Description	Target Audience	Language	URL
Common Sense Education (with OpenAI)	ChatGPT Foundations for K–12 Educators	9 modules (1 hour total), covering AI basics, educational use cases, and privacy protection. Offers a certificate.	Teachers	English	https://www.commonsense.org/edu cation/training/chatgpt-k12- foundations
Common Sense Education (with Khan Academy)	Al Literacy Micro-Courses for Teens	9 short lessons (20 mins total) introducing AI concepts, ethics, and critical thinking for responsible use.	Students (Teachers can use resources)	English	https://www.commonsense.org/edu cation/collections/ai-literacy- lessons-for-grades-6-12
Day of AI (MIT-supported)	Al Literacy Framework & Workshops	Provides training (with certificates), policy guidance, and a 3-tier Al literacy framework (Foundations-Application-Beyond).	Teachers, Administrators	English	https://dayofai.org/professional- development/
Coursera (IBM & Macquarie University)	Artificial Intelligence (AI) Education for Teachers	6-week course on AI history, technology, and classroom integration based on IBM's AI curriculum framework.	Teachers	English	https://www.coursera.org/learn/artificial-intelligence-education-forteachers
National Smart Education Platform (China)	Al Experts Lecture	Government-recommended resources for K-12 AI education, including policies and lesson plans.	Teachers, Students	Chinese	https://www.smartedu.cn/AIEducati on
Al Goes to School	Al Course for Educators	Practical training on integrating AI tools into teaching scenarios with case studies and tool guides.	Teachers	English	https://aigoestoschool.com/en/less ons/
DeepLearning.AI	Generative AI for Everyone	Instructed by AI pioneer Andrew Ng, the course offers hands-on experience with GAI tools, teaching how they work, their practical applications and impact on business and society, aiming to empower everyone for an AI-powered future.	Teachers	English	https://www.deeplearning.ai/courses/generative-ai-for-everyone/
Google for Education	Generative AI for Educators	In this course, you'll learn to use generative AI tools like Gemini and ChatGPT to save time, personalize instruction, and enhance lessons, covering lesson planning, material preparation, and administrative tasks.	Teachers	English	https://skillshop.exceedlms.com/stu dent/path/1176018-generative-ai- for-educators?sid=0c4d0ff4-0c7b- 49f6-be49-1bd122eb91ea&sid_i=0











Thank you!

Get in touch!

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