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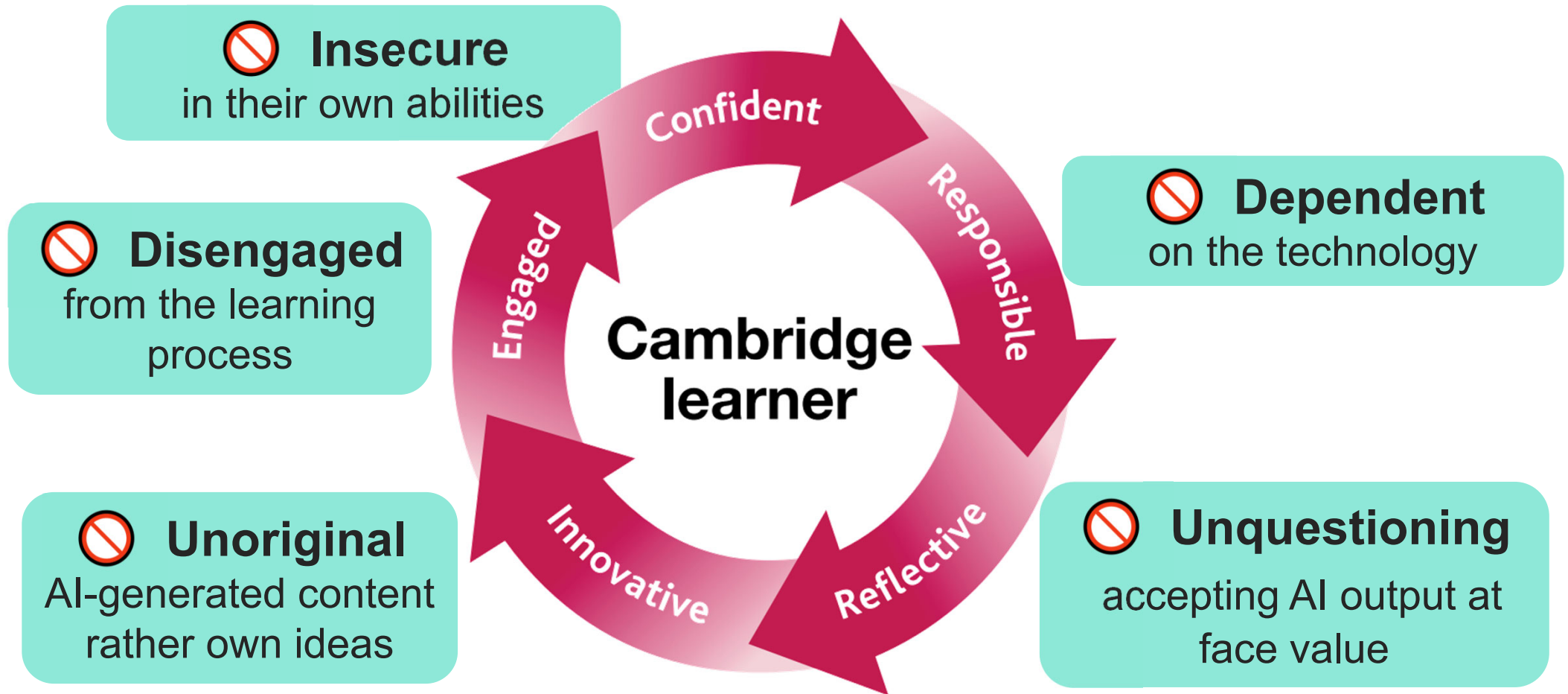
# Integrating AI into the Cambridge curriculum

Strategies for culturally relevant, immersive and intellectually stimulating education


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12 April 2025

# From the Cambridge learner to the ‘AI learner’?

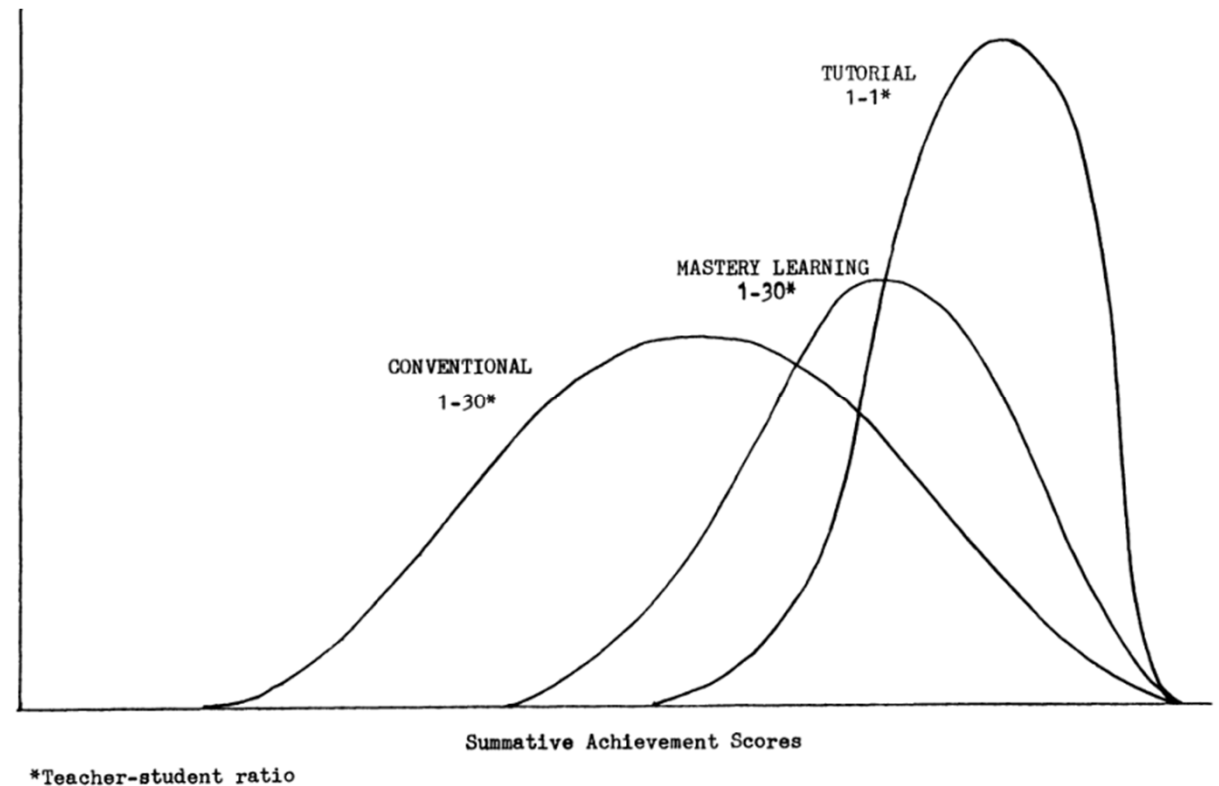


# Integrating AI into the Cambridge curriculum

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1. Why AI? And does it harm learning?
  2. AI scaffolding: How to use AI to support learners
  3. Supporting critical thinking and cognitive challenge
  4. Immersive AI scenarios for culturally responsive pedagogy
  5. The AI-empowered Cambridge learner

# Why AI? Bloom's 2 sigma problem

- Bloom (1984) found that **one-on-one tutored students** performed approximately two standard deviations better than students in conventional settings.
- **Can AI provide the same tailored support and feedback?**



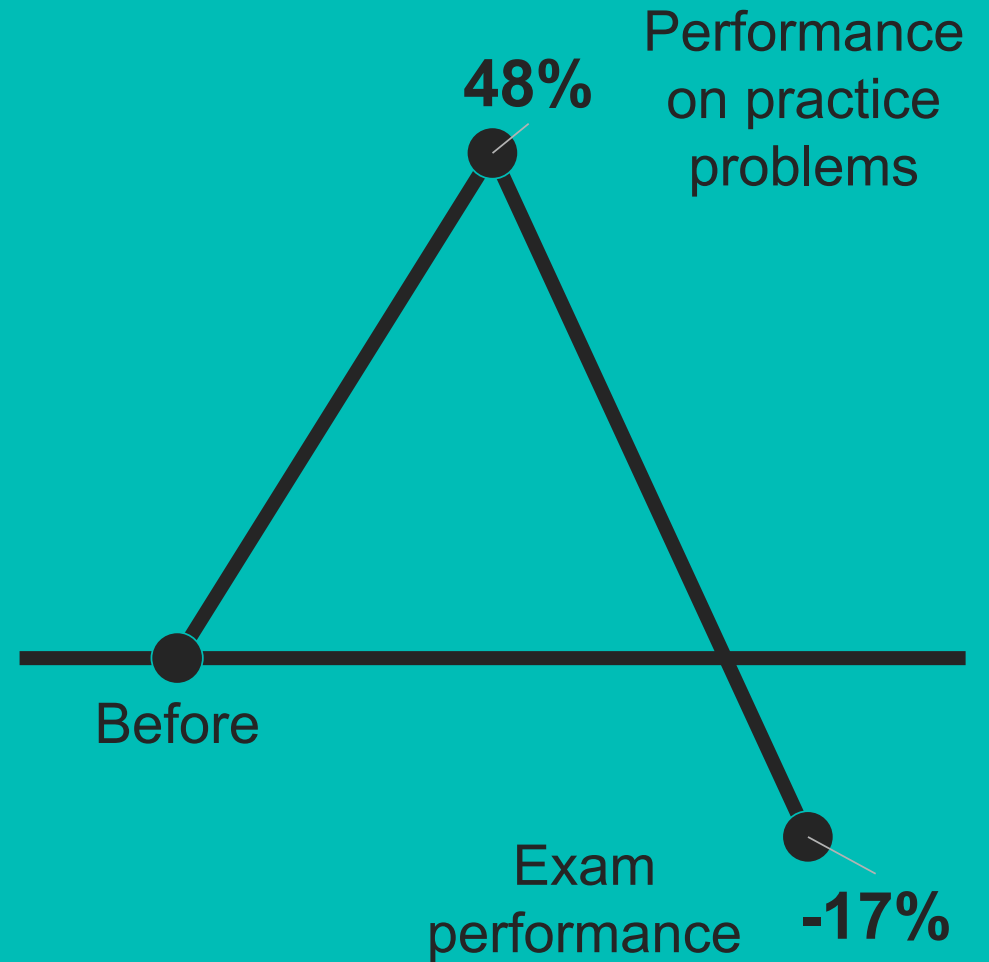
(Bloom, 1984)

## Case 1: “Generative AI can harm learning”

- Experiment with nearly 1,000 high school maths students in Turkey
- When AI assistance was taken away, they performed **17% worse than the control group**.

(Bastani et al., 2024)

### Effect of ChatGPT compared to books and notes

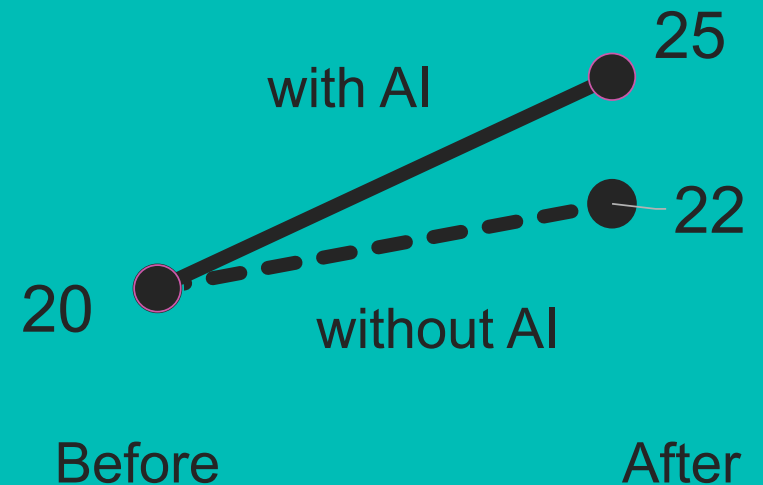


## Case 2: “math growth scores substantially higher”

- Experiment with 500 maths students in Ghana
- **Growth scores were substantially higher for students using AI**
- Equivalent to an extra year of learning

(Henkel et al., 2024)

### Effect of AI tutor on maths performance



## Thinking substitution

AI replaces students' cognitive effort (cognitive offloading)

Students let AI do the thinking and submit full answers.



What is the answer?



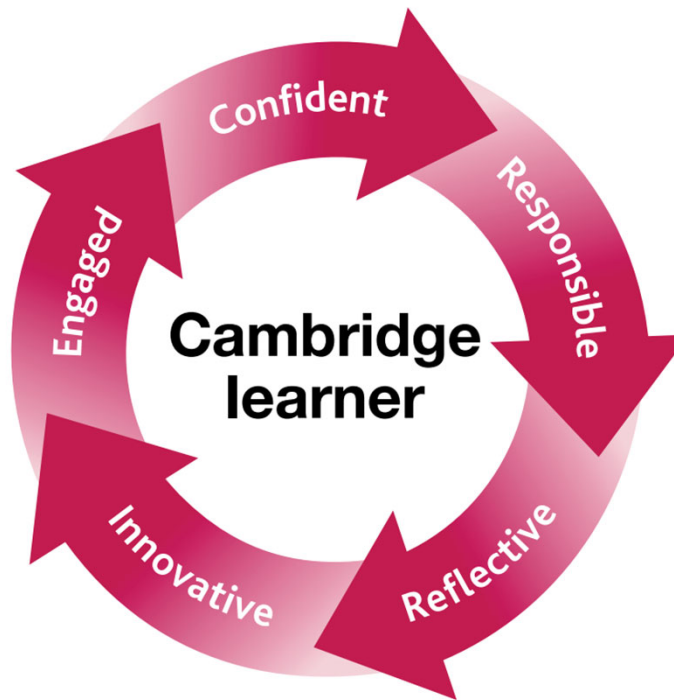
The transformation sequence from  $y = f(x)$  to  $y = -3f(x) + 2$  is as follows:

**Amplitude/Vertical Scaling:** First, multiply the function  $f(x)$  by  $-3$ . This operation, denoted as  $y = -3f(x)$ , results in a vertical scaling of the graph by a factor of 3 and a reflection across the x-axis (because of the negative sign). Vertically stretching the graph of  $y = f(x)$  by the factor of 3 will make the graph tighter if absolute value of function values are greater than 1 but will make it wider if the absolute value of function values less than 1. The negative sign makes the graph flip over the x-axis.

## ✓ **Thinking augmentation**

AI empowers students by enhancing and extending their thinking capabilities

Students actively involved in the thinking process. AI provides support, insights or different perspectives.





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# AI scaffolding extends what learners can achieve.

**Scaffolding**  
temporary support structures  
provided to learners to help them  
master new skills

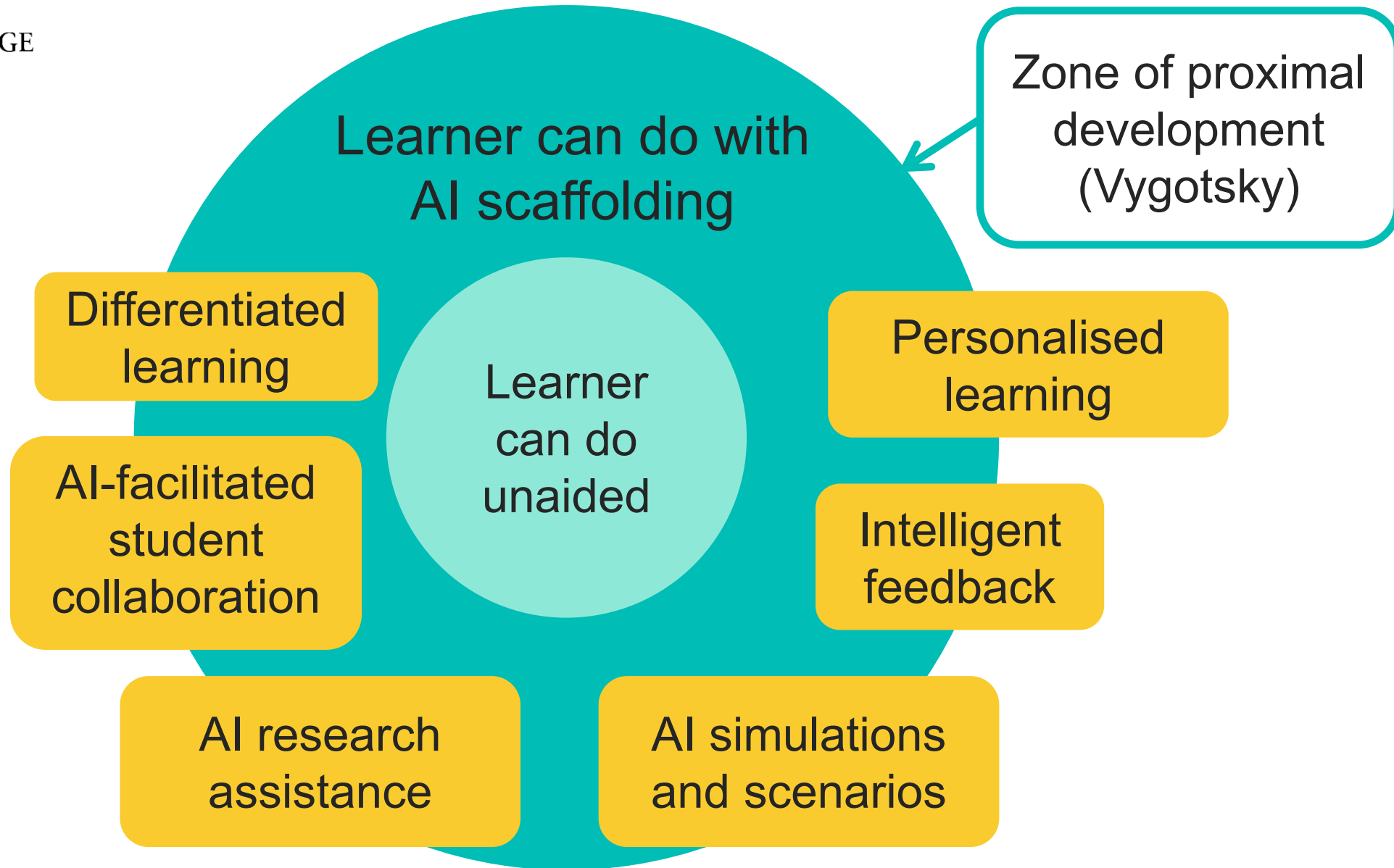
Teacher  
scaffolding

**AI scaffolding**

Peer  
scaffolding

Self-  
scaffolding





# AI scaffolding for differentiated learning

1. The software asks students to use an economic concept.
2. If they struggle, students can access **AI-generated definitions at different levels.**

李宥妍

Demerit good



A\*

A

B

C



A good that is considered harmful to society, often over-consumed.

Show Kindergarten Definition

Show Extended Definition



A thing that might be bad for you, like too much candy.



Demerit goods are products that have negative effects on consumers or society, such as tobacco or alcohol. Governments often regulate or tax these goods to reduce their consumption.

# AI scaffolding for conceptual linking

1. The software randomly selects two economic concepts and a random student who is asked to explain the link between the two concepts.
2. If the student struggles, **AI instantly generates a bilingual explanation of the link** (via API).

## 李宥妍

Factor input costs



Government regulation



Example of how the two concepts are linked

A\*

A

B

C

**This is how Factor input costs and Government regulation are linked:**

Government regulations can increase the cost of production by imposing rules that require businesses to spend more on labor, materials, or technology.

政府规定可能通过要求企业在劳动力、材料或技术上增加支出，从而提高生产成本。

# AI guides students through complex questions

1. Choose essay question outside the students' independent capability.
2. Use AI to **generate a progression of questions** based on the mark scheme.
3. Encourage exploratory talk among students.
4. Remove the scaffold once students have improved their ability to structure an essay.

Discuss the impact on the economy of the introduction of quantitative easing (QE) by the central bank.



- How may QE lead to rising asset prices?
- What might be possible long-term risks of QE on the economy?  
(...)
- Conclude by assessing the overall effectiveness of QE as a monetary policy tool. What does the effectiveness of QE depend on?

# AI tutor guidance for a student competition

- Designed an **interactive AI mentor** for a startup competition among junior high students.
- Students could access the mentor on their own to refine their business ideas through iterative feedback.



## Startup Adviser

作者: SAMUEL OEHLER-HUANG

Guides entrepreneurs in building specific, viable, and defensible AI startups.

## Productivity

类别

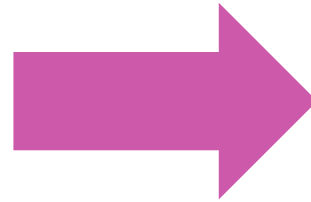
对话开场白

How can I refine my AI startup idea to make it more viable?

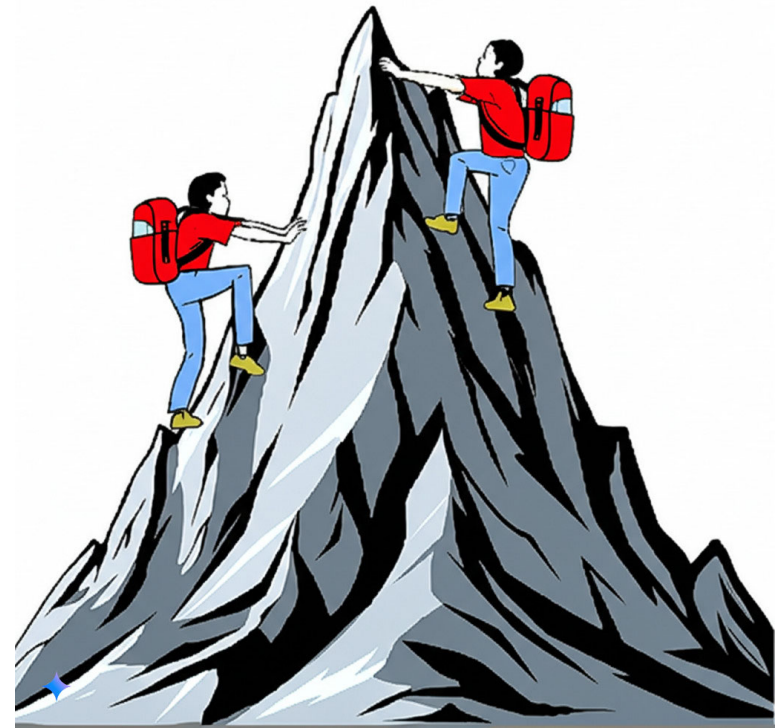


# Strategically reduce AI scaffolding.

Cognitive offloading




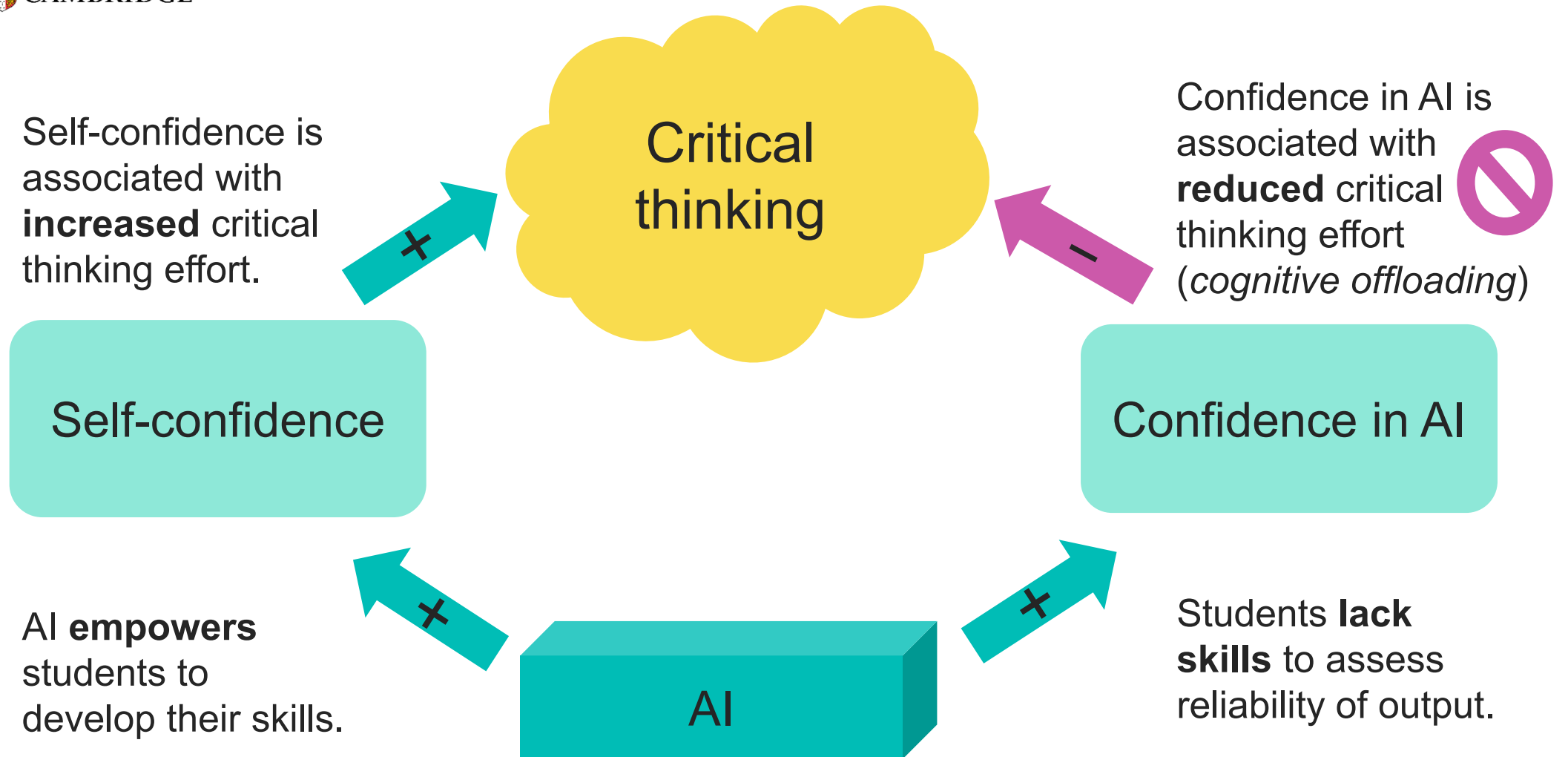
Cognitive challenge





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Based on Lee et al., 2025.

How can I design AI interactions so students reflect on their reasoning instead of just accepting AI outputs?



# Student assignment: Challenge the AI

o

I disagree that subsidy is more effective for promoting socially desirable goods and services because it may be useless for example giving subsidy to education may not increase people's education level and even if it improves it won't reduce inequality because subsidy allows every student to improve education level but different student have different pace of study so it is inefficient



You raise a valid critique, and your skepticism highlights important nuances about the **limits of subsidies** and the complexity of addressing inequality. Let's unpack this with your education example and refine the analysis:

---

## 1. Subsidies and Education: Why They \*Can\* Fall Short

# Ask students to evaluate AI-generated answers.

1. Use AI to **generate model answers** to essay or short-answer questions.
2. Evaluate AI's answer in class.
  - **Examine AI outputs for biases and weaknesses**
3. Ask students to improve the AI's response

A2 Macroeconomics - Essay practice

Please first read the essay thoroughly. Afterwards, answer the questions on the essay worksheet.

10.2 Links between macroeconomic problems and their interrelatedness

### Essay 8: Liquidity

**Explain the Keynesian theory of the assess the impact on the economy of by the central bank.**

The Keynesian theory of the determin rates are determined by the demand for money playing a central speculative.

The transactionary demand relates to where individuals and businesses require increases with income levels.

The precautionary demand is for holding serving as a financial buffer in uncertain economic environment.

The speculative demand for money is interest rates are low, speculative demand the future. This expectation stems from bond prices; a predicted decrease in interest bond prices. Therefore, holding cash and buy bonds at more favorable prices will

The interest rate is set at the intersection money demand curve and the vertical supply curve. The money supply curve because it is determined by the central is independent of the interest rate, representing fixed amount at any given time. If money demand increases (demand curve shift while supply remains constant, the interest rises. An increase in the money supply represented by a shift of the vertical supply lowers the interest rate by increasing liquidity.

A2 Macroeconomics - Essay practice

Please first read the essay thoroughly. Afterwards, answer the questions on the essay worksheet.

10.2 Links between macroeconomic problems and their interrelatedness

### Essay 15: Fixed

**Discuss whether there is likely to exchange rates while at the same inflation.**

In a fixed exchange rate regime, the central bank sets and maintains a specific exchange rate, marked by horizontal "Fixed rate" line in the diagram. To uphold this rate, the central bank takes action in the foreign exchange market. When there is a surplus of domestic currency, as labeled in the diagram, this indicates excess supply over demand at the domestic currency with its foreign pressure and supporting the exchange bank would sell domestic currency.

On the other hand, anti-inflationary demand-side monetary measures (money supply. Increasing interest aggregate demand and slowing economic make domestic assets more appealing that boost the demand for domestic fixed exchange rate because it narrows this appreciation and maintain the increasing the money supply—sell currency. This action, however, contraction to control inflation.

Thus, the conflict arises: maintain can counteract the policies aimed domestic currency to buy foreign which can exacerbate inflation if contradiction presents a significant

To mitigate this conflict, government Supply-side policies, for example

A2 Macroeconomics - Essay practice

Please first read the essay thoroughly. Afterwards, answer the questions on the essay worksheet.

10.2 Links between macroeconomic problems and their interrelatedness

### Essay 14: Phillips curve (inflation and unemployment)

**The Phillips curve suggests that inflation can only be controlled at the expense of higher levels of unemployment. To what extent do you agree with this view?**

The Phillips curve posits a fundamental economic relationship between inflation and unemployment, suggesting that these two key economic indicators are inversely related. This concept was first introduced by economist A.W. Phillips in 1958, who observed that between 1861 and 1957, there was a consistent inverse relationship between the rate of unemployment and the rate of wage inflation in the UK.


One explanation of the Phillips curve relationship is demand-pull inflation. Demand-pull inflation occurs when an expanding economy sees a surge in aggregate demand that outstrips aggregate supply. In such scenarios, businesses respond by increasing production, which often involves hiring more workers, thereby reducing unemployment. However, this growth leads to a tighter labor market where the limited availability of labor allows workers to demand higher wages. As businesses incur higher labor costs, they often raise the prices of their products to maintain profitability, leading to higher inflation. Consequently, if the aim is to control this inflation by slowing down the economy, it might necessitate a reduction in demand which can lead to layoffs or a hiring freeze, thereby increasing unemployment.

A second possible explanation for the Phillips curve relationship is the impact of controlled inflation on real labor costs. When inflation is effectively managed, price increases slow down or stabilize. If nominal wages stay the same or rise during this period, real wages—the purchasing power of wages—will increase. This rise in real wages elevates labor costs for businesses. Particularly in labor-intensive industries, these higher costs can become economically burdensome, compelling firms to reduce their workforce or halt expansion plans. Consequently, this could result in layoffs or a hiring freeze, thereby leading to increased unemployment rates.

However, the applicability of the Phillips curve has been subject to extensive debate and scrutiny, particularly concerning its relevance in different economic contexts and times. During the 1960s, the concept was widely accepted, implying a trade-off that policymakers could exploit: accepting higher inflation could potentially lower



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# AI scenarios: Tailor learning to students' unique profiles

## Cultural background

(draw from global data, respect cultural values)

## Interests and future aspirations

(connect with students' ambitions or hobbies)

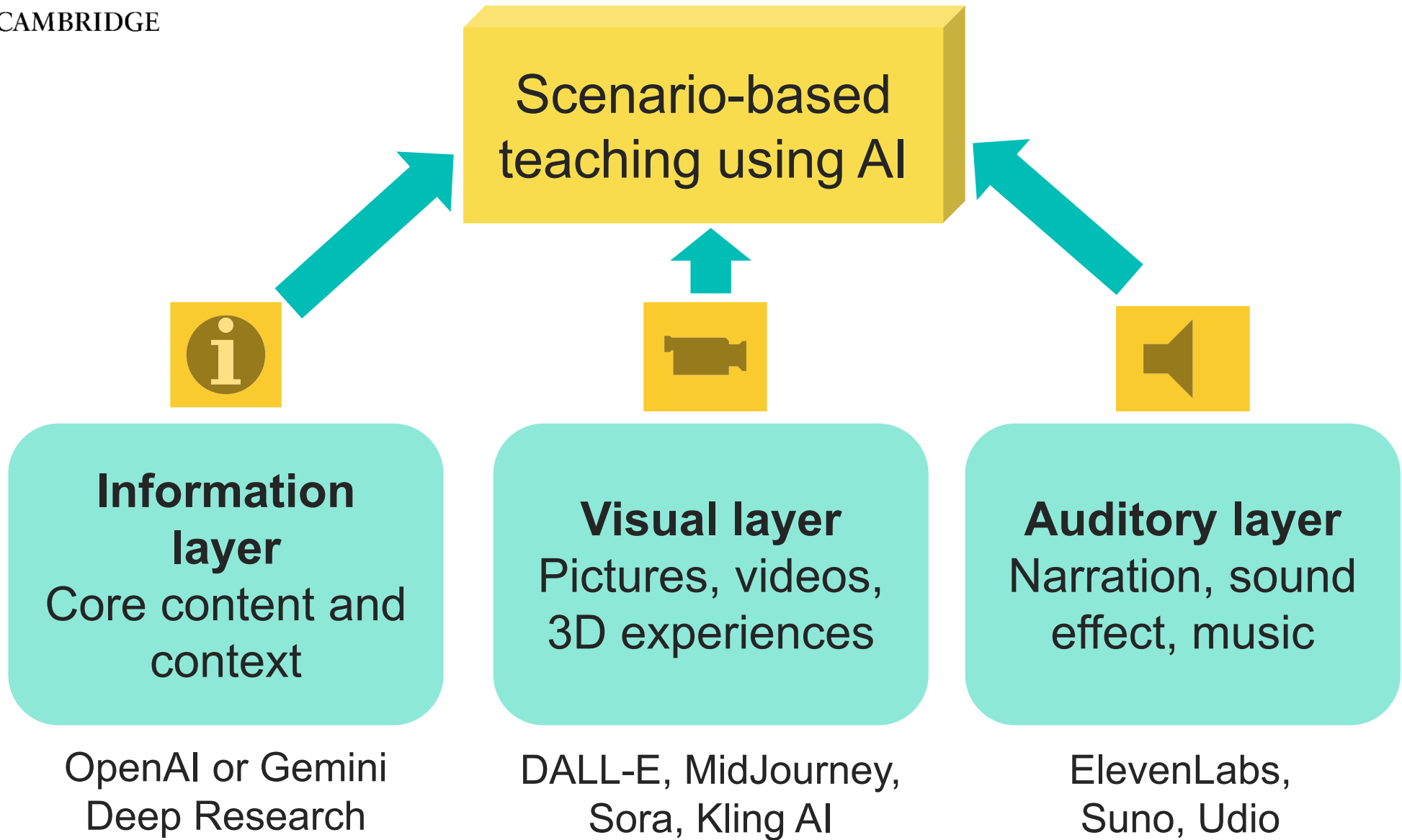
## Preferred learning modalities

(visually, verbally or interactive simulations)

## Learning pace and language proficiency

(adjust scenario complexity)

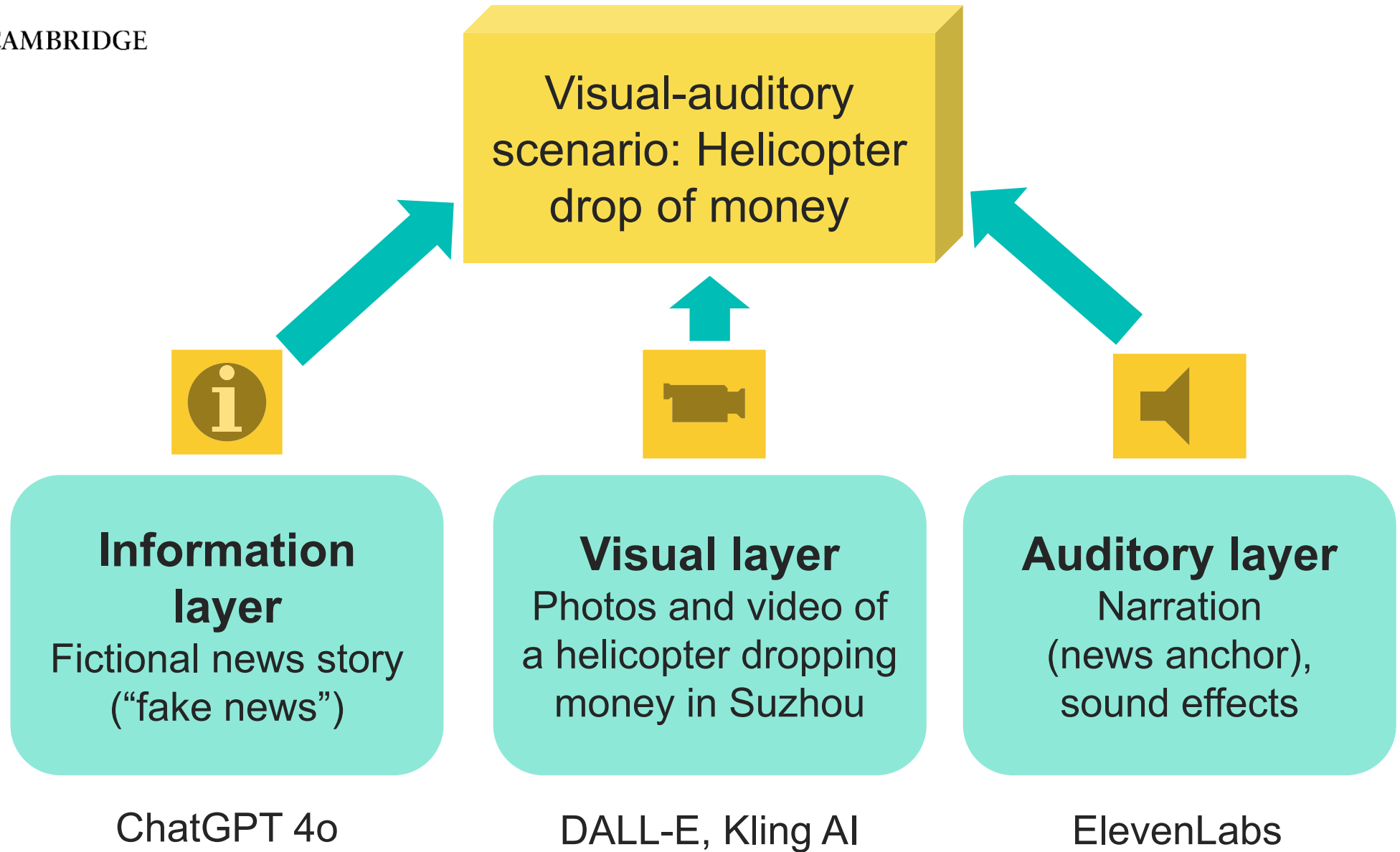






## Visual-auditory scenario: Helicopter drop of money





## Scenario-based teaching

# Real world scenarios: use agentic AI (Deep Research)

Gemini ▾  
Deep Research

### Suzhou International School Pricing Factors



#### Research Websites

Research factors the microeconomics behind pricing at international schools in Suzhou and the surrounding areas. Focus on factors relevant for students of A Level Economics.

(1) Investigate the demand for international school education in Suzhou and surrounding areas, considering factors such as the number of expatriate families, local affluent families seeking international education, and the perceived benefits of an international curriculum.

(2) Analyze the supply of international schools in Suzhou and nearby regions, including the number of existing schools, their capacity, and



OK, starting now. As soon as your report is ready, I'll let you know. In the meantime, feel free to leave this chat.



### Suzhou International School Pricing Factors

Researching 214 websites...



# AI scenario on pricing at international schools in Suzhou

AI-generated research report  
(16 pages)



AI-generated student activity

## Microeconomic Factors Influencing Pricing at International Schools in Suzhou and Surrounding Areas

### 1. Introduction

Suzhou, a significant economic center in China, attracts a considerable number of expatriate families and an increasing population of affluent local families. This economic dynamism has fostered a robust market for international schools in Suzhou and its surrounding areas<sup>1</sup>. The international school sector in China has experienced rapid expansion over the past two decades, and Suzhou has emerged as a key location within this growth<sup>3</sup>. Well-established institutions such as Suzhou Singapore International School (SSIS) and Dulwich College Suzhou are prominent examples of the international educational landscape in the region<sup>4</sup>. The concentration of these schools in economically developed zones like the Suzhou Industrial Park (SIP) indicates a strong relationship between economic activity and the demand for international education. The high GDP and substantial foreign population in SIP<sup>1</sup> suggest a significant base of potential customers who place a high value on and possess the financial capacity for international education. Furthermore, the increasing number of international schools in Suzhou reflects a market response to growing demand from both expatriate and local families. Data indicates a substantial rise in the number of international schools across China in recent years<sup>3</sup>, demonstrating a significant market expansion driven by this escalating demand.

For students of A Level Economics, understanding the pricing mechanisms within this specific market offers valuable insights into the application of core economic concepts. Principles such as supply, demand, cost, and competition are central to determining the price of

## A Level Economics Student Activity: The International School Market in Suzhou Scenario:

You are an economic consultant hired by a firm considering opening a new international school in Suzhou. Your task is to analyze the market and provide insights into the factors that influence the pricing of international school education in this region.

### Questions:

#### 1. Demand Analysis:

- Identify and explain the key drivers of demand for international schools in Suzhou.
- How do changes in the size of the expatriate population and the growth of the affluent class affect the demand curve for international school places? Illustrate your answer using demand and supply diagrams.
- Analyze how the "Double Reduction" policy in China could impact the demand for international schools.

# Interdisciplinary: macroeconomics during Tang dynasty

Deep Research



AI-generated stimulus material

## Tang Dynasty Macroeconomic Research

### Research Websites

Research the macroeconomics of Tang dynasty in China using macroeconomic ideas found in the A Level Economics syllabus.

(1) Investigate the economic growth of the Tang Dynasty, focusing on indicators like agricultural and industrial output, and population

### Excerpt 3: Monetary System and Government Finance

"The Tang Dynasty used a copper-based coinage system, with the 'Kai Yuan Tong Bao' being the standard currency. The government collected taxes in the form of grain and coins, and revenue was used to fund public works, military expenditures, and the imperial bureaucracy. The Granary system was also crucial to control price stability."

(Source: chinaknowledge.de, en.wikipedia.org)

### Excerpt 4: Population Growth and Urbanization

"The Tang Dynasty experienced a significant population boom, with the population estimated to have reached tens of millions. This growth was accompanied by the expansion of major cities like Chang'an, which became a bustling center of trade and culture. The census reports of the time provide valuable insights into population

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# The AI-empowered Cambridge learner

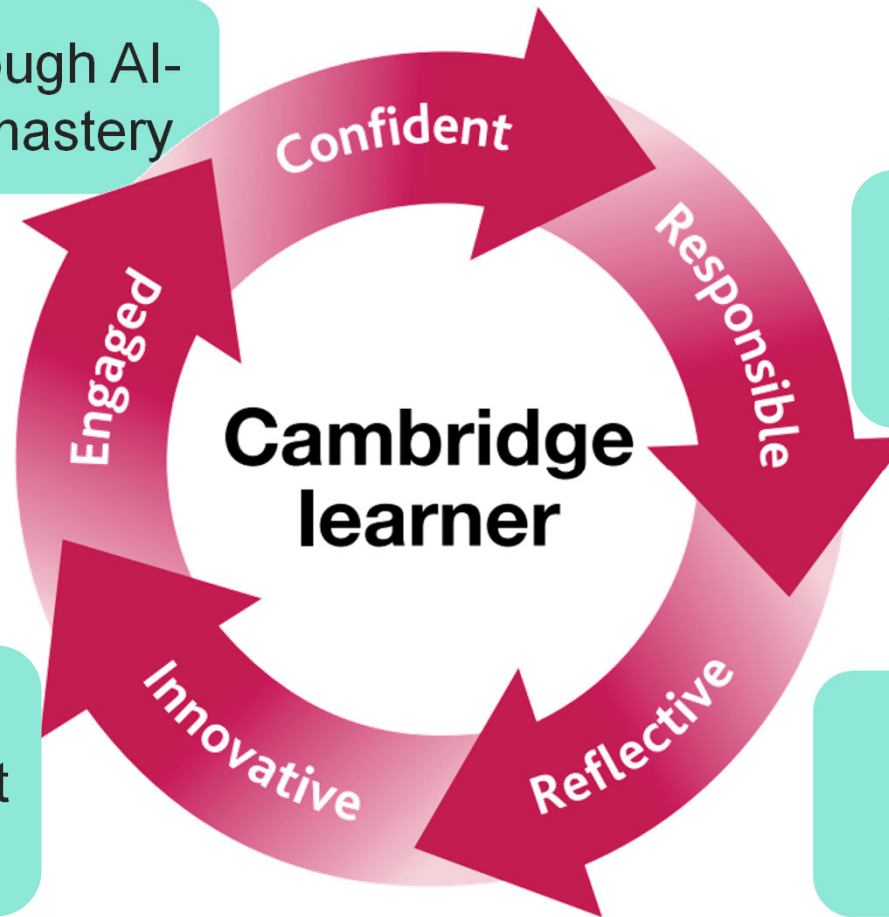
☑ **Confident** through AI-supported skills mastery

☑ **Engaged** by AI that personalises learning to match interests and needs

☑ **Innovative** by using AI to explore, experiment and create.

☑ **Responsible** through AI-assisted self-directed learning

☑ **Reflects** on AI output and own learning





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# Get in touch!

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# Appendix

# Glossary of AI in education (1)

1. **Agentic AI:** AI systems capable of taking actions autonomously, for example an AI that independently conducts research or generates learning materials.
2. **AI stewardship:** Students take on the role of guiding and monitoring AI tools to achieve high-quality outputs, fostering metacognitive skills and a deeper understanding of the task.
3. **AI tutor:** AI designed to provide personalised instruction and feedback to students.
4. **Cognitive offloading:** Students relying on AI tools to perform tasks they feel less confident in handling independently, potentially impacting the development of those underlying skills.
5. **Culturally responsive pedagogy:** Implementation of AI tools that build upon students' diverse cultural backgrounds and experiences to promote engagement.
6. **Differentiated learning:** The use of AI to personalise learning experiences to meet their individual needs, learning styles and levels of understanding.

# Glossary of AI in education (2)

7. **Exploratory talk:** The use of AI tools to facilitate and enhance collaborative learning interactions among students, supporting joint problem-solving.
8. **More Knowledgeable Other (MKO):** An MKO can be an AI tool that provides scaffolding, guidance and feedback to learners, enabling them to progress in their understanding and skills (support their progress within their Zone of Proximal Development).
9. **Personalised learning:** Using AI to tailor educational content, learning activities and pacing to the individual needs, preferences, and learning styles of each high school student.
10. **Scaffolding:** Temporary support structures provided by AI tools to assist students in mastering new skills or complex concepts. This scaffolding should be strategically reduced to promote cognitive challenge and independent learning.
11. **Scenario-based learning:** Using AI to create realistic and engaging scenarios that require students to apply their knowledge and skills, promoting problem-solving, decision-making and critical thinking in relevant contexts.

# Glossary of AI in education (3)

- 12. Thinking augmentation:** Using AI to enhance and extend students' cognitive capabilities, supporting deeper learning, complex problem-solving and the development of innovative ideas.
- 13. Thinking substitution:** The excessive reliance on AI to perform cognitive tasks that students should be developing themselves, potentially leading to a decline in essential skills and critical thinking abilities.
- 14. Two Sigma Problem:** Bloom's observation that one-one-one tutored students perform approximately two standard deviations (two "sigmas") better than students in conventional settings, highlights the potential for personalized AI tutoring systems. Note that the finding is debated. (Bloom, 1984)
- 15. Zone of Proximal Development (ZPD):** The range of tasks or concepts that a learner can achieve with the guidance of a "more knowledgeable other," which in the context of AI can be an AI tool providing scaffolding and support.

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