

GenAI for human skill development and assessment

Dragan Gašević

March 23rd, 2026
OECD Digital Education Outlook 2026
Online conference

Aspiration

Developing human skills
while benefiting from the power of AI

Today's talk

What does existing evidence say?

2 Generative AI for human skill development and assessment: Implications for existing practices and new horizons

Dragan Gašević* and Lixiang Yan**

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**Tsinghua University, China

Generative artificial intelligence (GenAI) is transforming the landscape of education by reshaping how skills are developed, assessed, and supported. This chapter synthesises recent empirical evidence on how GenAI technologies influence instructional practices, feedback, and assessment. It examines both the opportunities and limitations of using GenAI to provide personalised tutoring, enhance feedback quality, and automate assessment practices. The chapter argues for a careful balance between human skill development and AI-augmented performance, emphasising the need for pedagogically grounded integration of GenAI within intelligent tutoring and assessment frameworks. It concludes by outlining directions for research and policy that ensure GenAI strengthens, rather than substitutes, human learning and instructional expertise.

Introduction

The wide adoption of generative artificial intelligence (GenAI) – after the public release of ChatGPT in November 2022 – has triggered profound debates about their implications on education. GenAI can provide technologies that can support skill acquisition through personalised instruction and feedback, and enhance the efficiency and effectiveness of teaching practices (Giannakos et al., 2024^[1]). However, GenAI poses ethical challenges and risks as well (Kofinas, Tsay and Pike, 2025^[2]; Nikolic et al., 2023^[3]). The developments in GenAI triggered educators, education leaders, and policymakers to engage with GenAI extensively, rethink pedagogical, assessment, and governance frameworks to harness GenAI's potential while mitigating its risks. Through these efforts, many education institutions have produced policies and guidelines to support staff and students in using generative AI (Jin et al., 2025^[4]). Similarly, many government, intergovernmental, nongovernmental, and non-for-profit organisations have also produced documents that inform GenAI adoption, responsible practices, and frameworks for professional development of educators (Cardona and Ishmael, 2023^[5]; Miao and Cukurova, 2024^[6]; Miao and Holmes 2023^[7]; OECD, 2023^[8]). Equally so, the rapid developments in GenAI have also mobilised many researchers to study implications on education and human learning (Yan et al., 2023^[9]; Zhang et al., 2024^[10]).

This chapter aims to summarise recent evidence about the implications of GenAI in human skill development and assessment. The focus will be on human skill development and assessment as they are central to education and professional development programs. The analysis of the implications of GenAI on human skill development and assessment is particularly framed around two complementary perspectives. First, GenAI technologies offer some promising prospects for advancing our existing practices related to skill development and assessment. For example, GenAI can be used to provide interactive instructional support, provide personalised feedback at scale,

Key takeaway 1

Much promise but with caveats for
learning and teaching practice

Key takeaway 2

Significant concerns about reliability,
future ready skills, and assessment

Key takeaway 3

Transition to robust research needed
to understand long-term implications

EXISTING PRACTICE – NEW CHALLENGES –
FUTURE NEED – FINAL REMARKS

LLMs in Education

Many ways to use
large language models in education




GenAI for learning support

Tutoring chatbots

Radians & degrees

Google Classroom



Radian & degree conversions

Khan Academy

Sal discusses the general approach to converting between radians and degrees. Created by Sal Khan.

Khanmigo BETA

Khanmigo makes mistakes sometimes. [Here's why](#).

Why should I care about learning this?

Great question! 🚀 If you dream of working at NASA and stargazing, understanding angles is key! Astronomers use degrees and radians to measure angles in the sky and track the paths of stars. So, learning to convert between radians and degrees can help you navigate the night sky like a pro! 🌟

[Leave feedback](#) Rate this response 👍👎

Can you give me an example problem?

Absolutely! Let's dive right in. 🚀

Let's say you're looking at a star that moved 45 degrees across the sky. How many radians did it move? Remember, we can use the conversion 180 degrees equals π radians.


[Leave feedback](#) Rate this response 👍👎

Type message (do NOT share any personal data)

Do NOT share any personal data. This chat is logged and viewable by your teacher.

<https://www.khanacademy.org/khan-labs>

Overfitting



What is it?
Why use it?
How to use it?
Who uses it?
When to use it?

The Socratic method of teaching involves asking a series of questions to stimulate critical thinking and illuminate ideas. It is a form of cooperative argumentative dialogue between individuals, based on asking and answering questions to stimulate critical thinking and to draw out ideas and underlying presumptions. "Imagine a virtual workshop on the principles of supervised learning, focusing on overfitting in machine learning algorithms."

What do you understand by the term "overfitting" in the context of machine learning?

I would like to learn through multiple-choice questions?

Sure! Let's continue with the Socratic method using multiple-choice questions.

Instructor: "What do you think happens when a machine learning model is trained too well on the training data?"

What do you think happens when a machine learning model is trained too well on the training data?

A. The model performs well on new, unseen data.
 B. The model may not perform well on new, unseen data.
 C. The model becomes more generalized.
 D. The model's accuracy increases on the test data.

I think the answer is B

That's correct! When a model is trained too well on the training data, it may not perform well on new, unseen data. This is known as overfitting.

Instructor: "Why do you think overfitting happens?"

Why do you think overfitting happens?

A. The model learns the noise in the training data.
 B. The model is too simple.
 C. The training data is too small.
 D. The model is well-regularized.

Ask a question, or respond to my question.

<https://spl.skoonline.org>

Tutoring chatbots

Radians & degrees
Google Classroom

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Khanmigo makes mistakes sometimes. Here's why [↗](#)

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Underfitting

Overfitting

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2π radians = 360°

Ra

1 radi

Khan

About Transcript

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Created by Sal Khan.

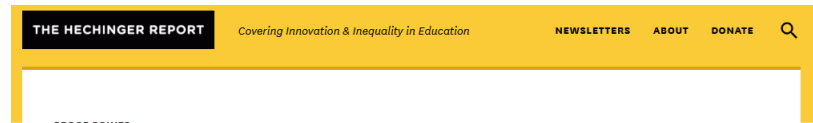
Leave feedback Rate this response 👍 🙌

Type message (do NOT share any personal data)

Clear chat

Do NOT share any personal data.
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GenAI chatbots and learning



PROOF POINTS

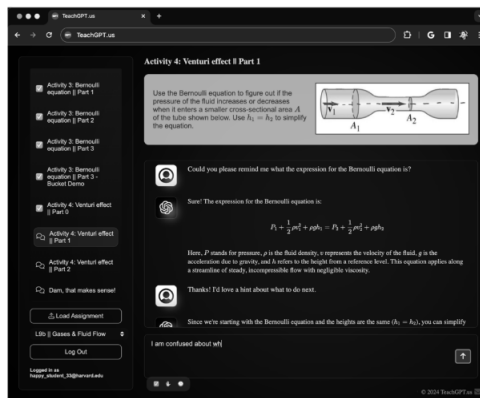
An AI tutor helped Harvard students learn more physics in less time

One intriguing experiment suggests the promise of using the new technology

by JILL BARSHAY
September 16, 2024



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Significant improvements in learning gains, but with limitations

GenAI chatbots and learning

Negative effects of vanilla ChatGPT on math learning

Positive when ChatGPT was prompted to act as a tutor, but not
better than classroom teaching

GenAI chatbots and learning

Research
transparency

Radians & degrees
Google Classroom

2π radians = 360 degrees
1 radian = $\frac{180}{\pi}$ degrees

Radian & degree conversion

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Small effects on math learning gains in K12 classrooms

But, also minimal use by students

GenAI chatbots and learning

LLMs alone are not as adaptive as
intelligent tutoring systems

Promising emerging trend

Hybrid approaches with both
strong human control and AI support

2

GenAI for automated feedback

Evidence

Recent
meta-analysis

Human vs AI feedback have
same learning impact

Feedback effectiveness

Effectiveness of GenAI feedback is mixed

GenAI vs human feedback

GenAI feedback preferred*, but
worse outcomes than with teachers'

*seen as more fair, easier to accept, and more willing to make revisions

Trust in AI-generated feedback

Students don't trust AI-generated feedback

Even though they can't recognize the difference with human feedback

GenAI to promote life-long learning skills

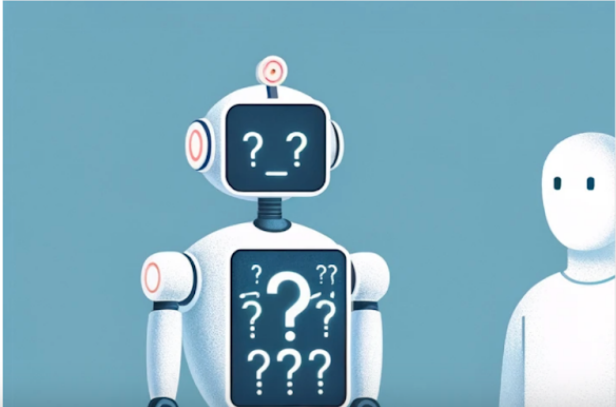
Turning real-time analytics into process feedback

FLORA My courses Site administration

3: AI in Medicine

2.4 Patient's perspectives

Researchers at a US university found that many patients do not trust AI systems for several reasons. For example, an AI doctor (robot) may sometimes ask the patient to do things that make her or him uncomfortable. Also, some patients may feel that AI systems are not yet ready to take over the role of a human doctor.



LLMs generate based on real-time learning analytics

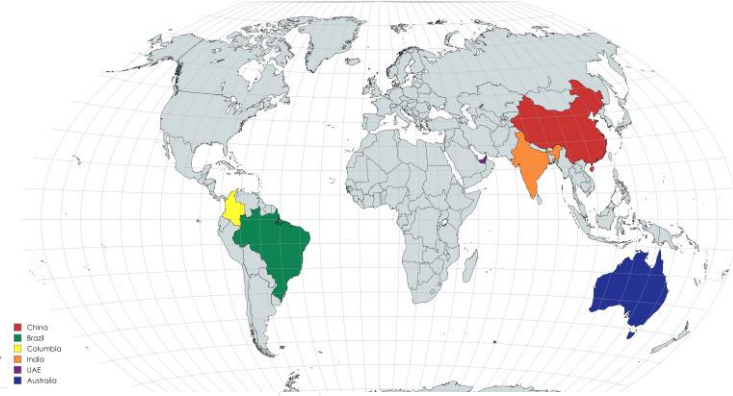
Instruction Panel

This will help you structure your essay effectively and cover all necessary points. Remember, planning your approach and being mindful of the time can enhance your performance. You're in control of your learning, and these strategies will empower you to produce a high-quality essay. Keep up the good work!
10:49:46

I see that you're aware of the time and tools available, which is great! However, it's important to also understand the task instructions and rubric. Your essay should discuss AI's concept, current use, and future integration in daily life and medicine. Use the reading material to gather information and examples. Start by defining AI, then discuss its current and potential future applications in medicine. Remember to write in your own words and include your own thoughts. You're doing well, just focus on incorporating the reading material into your essay. You've got this!
10:56:51

<https://www.floraengine.org/moodle/my/courses.php>

Evidence



FLORA My courses Site administration

x

[1.1 What is artificial intellig...](#)

[1.2 How does AI work?](#)

[1.3 AI in practice](#)

3: AI in Medicine C / 2.4 Patient's perspectives



PAGE
2.4 Patient's perspectives

Instruction Panel

This will help you structure your essay effectively and cover all necessary points. Remember, planning your approach and being mindful of the time can enhance your

Significant improvements of learning strategy

[2.5 Doctor's perspectives](#)

[2.6 AI accuracy in medicine](#)

[2.7 AI and data security in...](#)

[2.8 How does hospitals in ...](#)

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10:56:51

Beyond text and digital spaces

CLINICAL SCENARIO

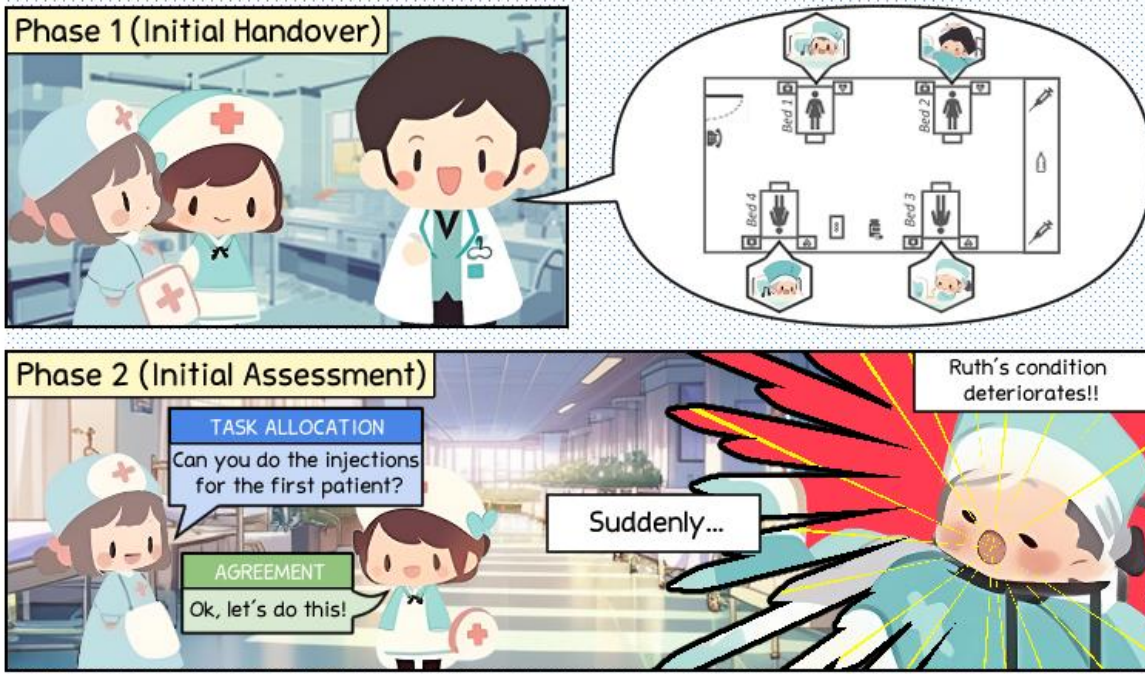


Multimodal feedback in complex environments

Multimodal feedback with GenAI

THE LEARNING SCENARIO

METS: Multimodal Learning Analytics of Embodied Teamwork Learning



VizChat: Chatting with analytics dashboards

A Session 287

1. Tagging | **2. Debriefing** | 3. Team Assessment

PN 1: Name | PN 2: Name | SN 1: Name | SN 2: Name

Timeline | Video

0:25 Scenario started | 6:17 Handover ends | 15:30 Secondary nurse enters | 22:57 Doctor enters | 29:23

Select: All | Scenario started | Handover ends | **Secondary nurse enters** | Doctor enters | Undo | Redo

- 15:30 - Secondary nurse enters
- 15:51 - Handover to secondary nurse
- 17:01 - Shares information
- 18:07 - Delegates care
- 19:10 - Verbalises concern
- 20:02 - Care for patient/s (Bed 1-3)
- 20:19 - Calls MET
- 22:57 - Doctor enters

Prioritisation Bar

Add to projector

Behaviours

Working together on tasks for Ruth	10%
Working individually on tasks for Ruth	30%
Working together on other tasks	10%
Working individually on other tasks	30%
Moving around the beds	20%

Percentage (%)

Ward Map

Add to projector

PN1 ✓ | PN2 ✓ | SN1 ✓ | SN2 ✓

Communication Network

Add to projector

Communication Behaviour

Add to projector

B Seeking Clarification

Who did I communicate with?

To determine who you communicated with, please provide the **name or role** you had during the simulation.

Contextualising Response

primary nurse 2

As Primary Nurse 2, you communicated with the doctor, Primary Nurse 1, both Secondary Nurses, and the patients. This is indicated by the **lines connecting** to your icon in the **Communication Network**.

Personalised Response

Where did I spend most time?

Primary Nurse 2 spent most time around Bed 4, indicated by the **high concentration of blue hexagons** in that area of the **Ward Map**.

C Integrating Multiple Visualisations

Did we show the **expected behaviours** for this stage?

Based on the **timeline**, this appears to be **Stage 3: Secondary nurse enters**. The expected behaviors include two students working collaboratively on the medical emergency at Bed 4 and at least one student continuing with tasks at Beds 1 or 2. The **bar chart** shows significant time spent on tasks for Ruth (Bed 4), both collaboratively and individually, **indicating adherence to the expected behaviors for this stage**.

D Explaining Data Collection and Analysis

What **data** was used for the bar chart?

The bar chart, labeled as "Prioritisation Bar," **used data from the team's spatial behaviors to illustrate their prioritization strategy**. It shows the percentage of time spent on various behaviors such as working together on tasks for Ruth (Bed 4), working individually on tasks for Ruth, working together on other tasks, working individually on other tasks, and moving around the beds. This data was likely derived from the **positioning data** collected during the simulation, as outlined in my knowledge source.

EXISTING PRACTICE – **NEW CHALLENGES** –
FUTURE NEED – FINAL REMARKS

1

Concern

GenAI isn't flawless

Bias in GenAI

THE LEARNING SCENARIO

METS: Multimodal Learning Analytics of Embodied Teamwork Learning

Phase 1 (Initial Handover)

Phase 2 (Initial Assessment)

TASK ALLOCATION
Can you do the injections for the first patient?

AGREEMENT
Ok, let's do this!

Suddenly...

Ruth's condition deteriorates!!

Phase 3 (Resolving Emergency)

MET CALL

Two nurses enter...

INFORMATION SHARING
Ruth's oxygen level is 87

SITUATION ASSESSMENT
So she is having respiratory troubles

Primary Task

Phase 4 (Emergent Diagnosis)

Secondary Tasks

The doctor asked the nurses for critical medical information & guided them to determine the cause of deterioration

The nurses were able to resolve the situation.

Bias

Effectiveness across language is uneven

English and Chinese languages small positive effects,
but for others negative

Hallucinations

GenAI hallucinates, but people easily let such errors slip through



My News  

AI 'hallucinations' in court papers spell trouble for lawyers

By Sara Merken

February 19, 2025 7:55 AM GMT+11 · Updated February 19, 2025

<https://bit.ly/4h61rZZ>



Deloitte Refunds AU\$440K Report Over GPT-4o AI Hallucinations

<https://bit.ly/4gZzMtv>

Human skills and GenAI

GenAI literacy
is necessary but insufficient

2

Reimagining skills and knowledge

Hybrid Intelligence

Synergy

Human + AI > (Human or AI)

Hybrid Intelligence

Augmentation

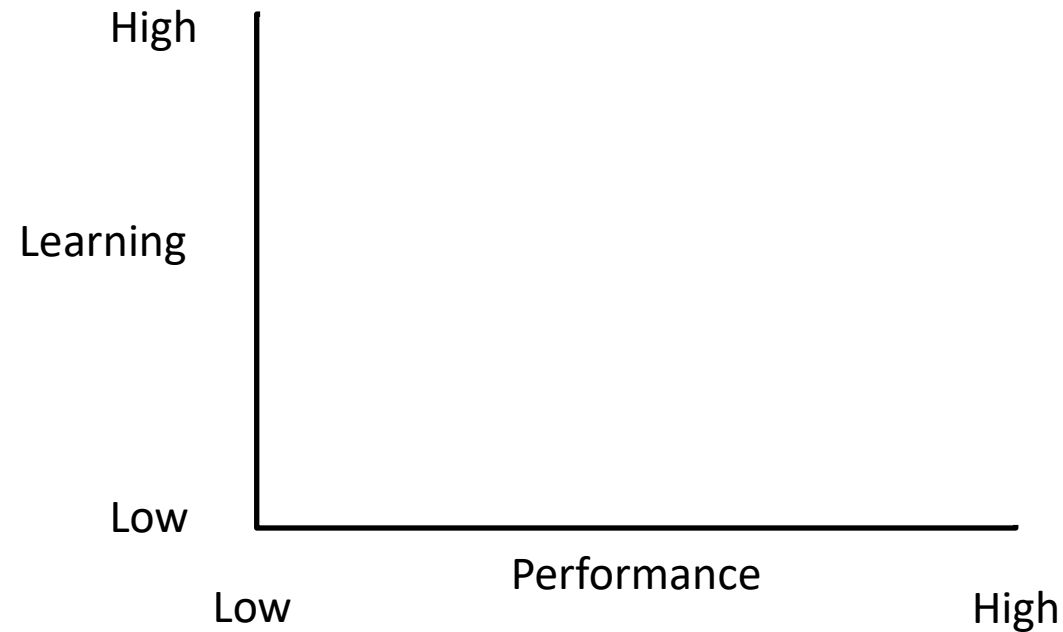
Human + AI > Human

Decoupling of learning and performance

Learners can perform better
when using GenAI

But that does not mean they learn

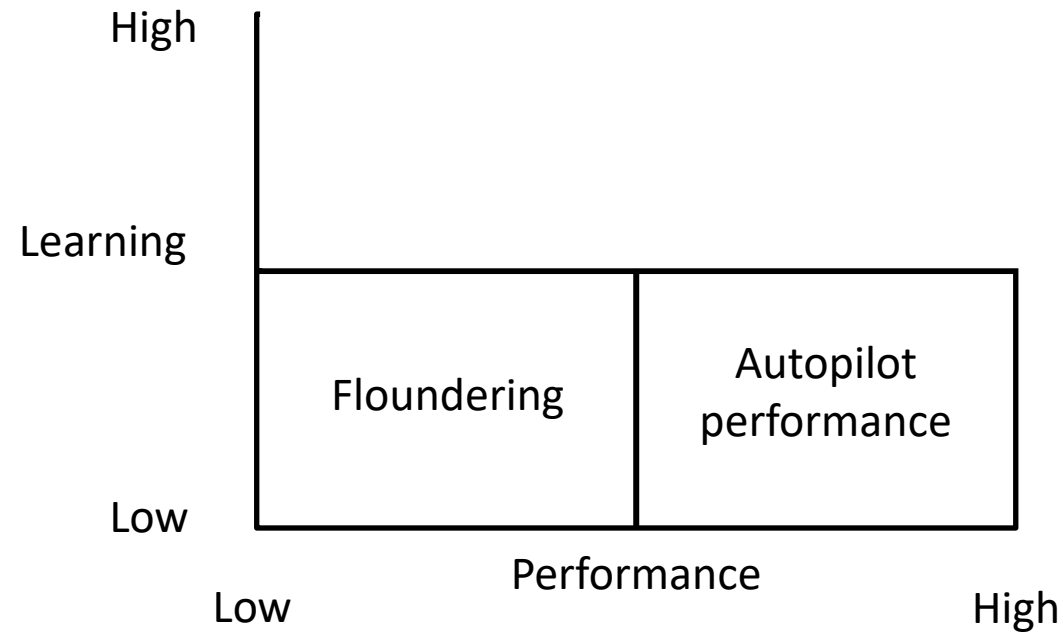
Towards hybrid intelligence



AI support:

- aims to *improve performance*
- has a good fit for the task
- requires knowledge of AI tool

Towards hybrid intelligence

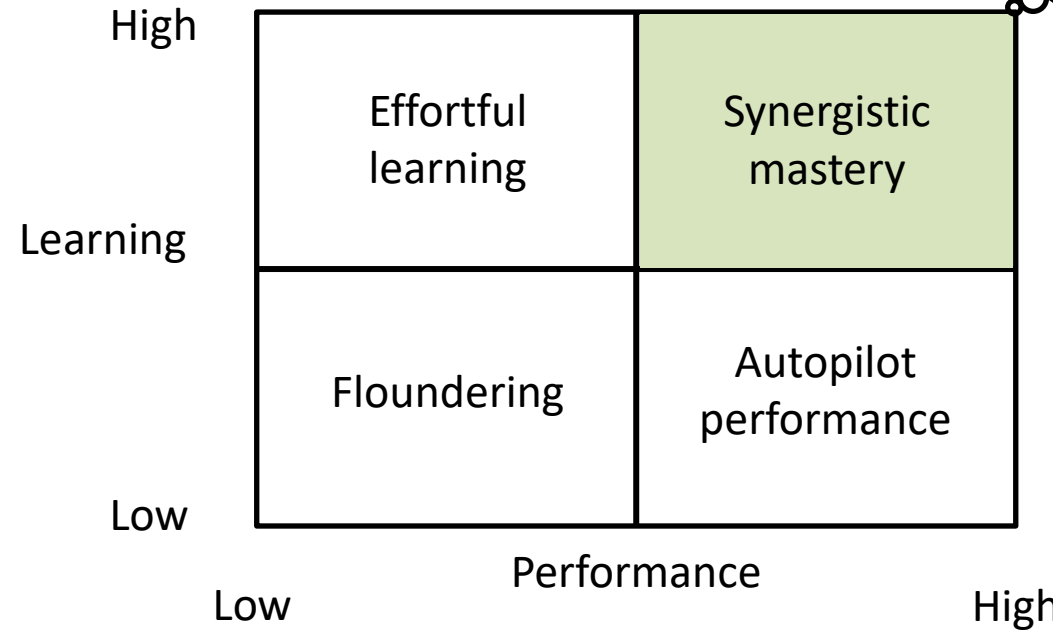


AI support:

- aims to *improve performance*
- has a good fit for the task
- requires knowledge of AI tool

Towards hybrid intelligence

Ultimate goal:
Synergy and
Augmentation



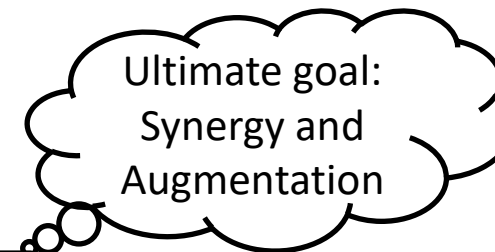
Scaffolds:

- promote *human learning*
- can be implemented with AI

AI support:

- aims to *improve performance*
- has a good fit for the task
- requires knowledge of AI tool

Towards hybrid intelligence



Core assumption

Synergy of high human and AI-empowered skills
can only happen with ***high human skills***

Low

Performance

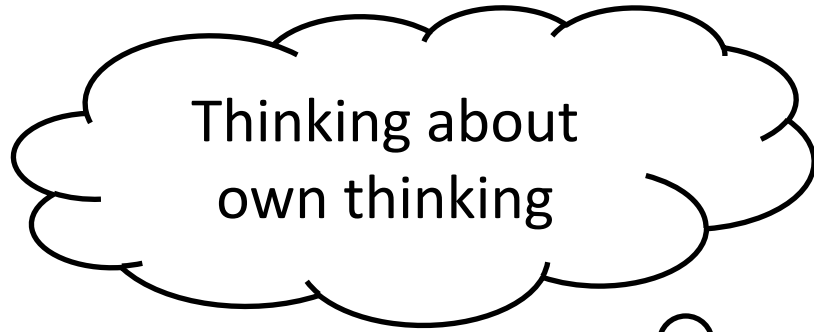
High

Challenge



Warning

Metacognitive laziness



Thinking about
own thinking

Metacognitive laziness

GenAI can reduce the productive friction needed for learning

Hybrid intelligence in practice

Learners mostly do not change
GenAI produced content

Hybrid intelligence in practice

Believing we are AI literate can make us
worse at metacognition

3

Future-ready assessment

Whodunit?

Do we have an illusion of human skills
if products are only assessed?

Automation ≠ Synergy/Automation

Human alone and Human + AI

Expanding dimensions of assessment



Process

Learning

Product

Performance

Metacognition

Future-ready assessment

The screenshot displays a learning management system interface with a navigation sidebar on the left and a main content area. The sidebar includes sections for 'Navigation', 'Course introduction', 'Task requirements', 'Task I. History collection and clinical reasoning', 'Task II. Physical examination and clinical reasoning', 'Task III. Auxiliary examination and clinical reasoning', 'Reading Materials I: Basic knowledge', and 'Reading Materials II: Diagnostic reasoning'. The main content area is titled 'Learning content' and features a 'Dialogue with patient' section. A 'Patient consultation' window is open, showing a conversation between a patient and a doctor (Li Ke). The patient's messages are in grey bubbles, and the doctor's responses are in blue bubbles. The patient's messages include: 'I came to the hospital', 'If you walk a little or use force, it will be heavier, and if you stop, it will get better.', 'It doesn't affect. You won't be woken up in the middle of the night.', and 'I also felt my heart beating faster, and there was a burst.'. The doctor's responses include: 'Does dyspnea affect sleep?', 'Is there anything else uncomfortable?', and 'Do you have chest tightness and chest pain?'. The interface also shows a 'History collection and clinical reasoning' section with a 'Mark completed' button and a 'Diagnose along with justification' section with a rich text editor and a '保存作文' (Save essay) button.

Navigation

- Course introduction
 - Task requirements
- Task I. History collection and clinical reasoning
 - History collection and clinical reasoning
- Task II. Physical examination and clinical reasoning
 - Reading and clinical reasoning
- Task III. Auxiliary examination and clinical reasoning
 - Reading of auxiliary examination
- Reading Materials I: Basic knowledge
 - [Pathology] Cholelithiasis
- Reading Materials II: Diagnostic reasoning
 - [Diagnosis] Heat
 - [Diagnosis] Joint pain
 - [Diagnosis] Cough and sputum
 - [Diagnosis] Hydroposema
 - [Diagnosis] Lose weight

Learning content

History collection and clinical reasoning

Web page Set up More

Mark completed

Dialogue with patient

I came to the hospital

Patient consultation

Li Ke: If you walk a little or use force, it will be heavier, and if you stop, it will get better. 18:06:44 round: 7

Does dyspnea affect sleep? 18:07:34

Li Ke: It doesn't affect. You won't be woken up in the middle of the night. 18:07:36 round: 8

Is there anything else uncomfortable? 18:07:54

Li Ke: I also felt my heart beating faster, and there was a burst. 18:07:58 round: 9

Do you have chest tightness and chest pain? 18:08:29

输入文字开始对话 Ctrl+Enter

Diagnose along with justification

Normal

2. Acute Myocardial Infarction:
Sudden onset of left-sided chest pain at night without obvious triggers, radiating to the shoulder, persistent without relief, gradually worsening, but presenting as a stabbing pain.

3. Acute Pericarditis:
Sudden onset of pain in the left precordial area, stabbing in nature, radiating to the left shoulder, gradually worsening, persistent without relief, worsened by deep breathing, by leaning forward, aggravated by lying flat.

Initial Diagnosis:
Acute pericarditis.

Diagnostic Basis:
Sudden onset of pain in the left precordial region, stabbing in nature, gradually worsening, persistent without relief, pain aggravated by deep breathing, relieved by sitting and leaning forward, worsened by lying flat; accompanied by fever, persistent low-grade fever; no history of similar diseases, no smoking history, no palpitations, no dyspnea, no history of hypertension or diabetes.

保存作文

Future-ready assessment

The screenshot displays a learning management system interface. On the left is a 'Navigation' sidebar with a tree view of course content, including 'Course introduction', 'Task I. History collection...', 'Task II. Physical examination...', and 'Task III. Auxiliary examination...'. The main content area is titled 'Learning content' and features a 'History collection and clinical reasoning' section with a 'WEB PAGE' icon and a 'Mark completed' button. Below this is a 'Diagnose along with justification' section with a rich text editor and a '保存作文' (Save Essay) button. A 'Dialogue with patient' chat window is overlaid on the right, titled 'Physical examination'. The chat shows a sequence of messages: a blue bubble 'Cardiac acultation' (14:11:56), a grey bubble from the 'Reporter' describing a 2/6-level systolic murmur (14:12:01 round: 1), another blue bubble 'Cardiac palpation' (14:12:05), and a final grey bubble from the 'Reporter' stating 'There is no abnormality.' (14:12:09 round: 2). The chat window includes a search icon, a close button, and a 'Ctrl+Enter' button for sending messages.

Future-ready assessment

The screenshot displays a learning management system interface. On the left is a navigation menu with sections for 'Course introduction', 'Task I. History collection and clinical reasoning', 'Task II. Physical examination', 'Task III. Auxiliary examination', and 'Reading Materials I: Basic', 'Reading Materials II: Deep'. The main content area is titled 'Learning content' and features a 'History collection and clinical reasoning' section with a 'Web page' tab and a 'Mark completed' button. Below this is a 'Diagnose along with justification' section with a rich text editor and a list of clinical conditions: '2. Acute Myocardial Infarction', '3. Acute Pericarditis', and '4. Acute Cholecystitis'. An 'AI assistant' chat window is overlaid on the right, showing a user query 'How to assess the disease status of AIDS' and a detailed response from the AI assistant regarding HIV infection assessment, including viral load detection and CD4+ T lymphocyte count.

Navigation

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 - [Diagnosis] Lose weight

Learning content

History collection and clinical reasoning / History collection and clinical reasoning 1

WEB PAGE

History collection and clinical reasoning

Web page Set up More

Mark completed

Dialogue with patient

I came to the hospital

Diagnose along with justification

Normal

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保存作文

AI assistant

How to assess the disease status of AIDS
18:16:48

AI assistant

The assessment of the disease status of AIDS (HIV infection) mainly includes the following aspects:

- Virus load detection**
Viral load refers to the amount of HIV RNA in the blood, which is an important indicator for evaluating the effect of antiviral treatment and the progress of the disease. The lower the viral load, the better the virus replication is controlled and the better the treatment effect. The ideal state is that the viral load cannot be detected (below the lower detection limit).
- CD4+ T lymphocyte count**
CD4 cells are an important part of the human immune system. HIV mainly attacks and destroys CD4 cells. The higher the CD4 count, the better the immune function. The CD4 count of normal people is generally 500-1500/ μL . CD4 below 200/ μL indicates that the immune function is seriously impaired and prone to opportunistic infection.

Ask a question... Ctrl+Enter

Learning analytics for future-ready assessment

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A 'Medical evaluation' window is open, showing the following text:

medical terms were used.
- Score: 5 points

****Education and brief summary of medical history information (5 points)**:**
- No explanation of the condition or health science popularization was given, and no summary of the condition was made.
- Score: 0 points

Total score:

- ****Consultation content score**:** 27 / 85
- ****Consultation skills score**:** 8 / 15
- ****Total score**:** 35 / 100

Summary:
The intern was more detailed in dealing with the characteristics of chest pain, but did not perform significantly in collecting other related symptoms, the diagnosis and treatment of chest pain, past history, personal history, etc. It is acceptable in building doctor-patient trust, but the skills in education and summarizing the condition need to be improved.

23:27:08

Possible diagnoses: Angina, Pulmonary Embolism, Pericarditis, Aortic Dissection
Preliminary diagnosis: Aortic Dissection

End of consultation

Implications for Hybrid Intelligence

Learn first, work with AI later for
synergetic mastery and performance

EXISTING PRACTICE – NEW CHALLENGES –
FUTURE NEED – FINAL REMARKS

1

Need

Understanding long-term implications

Solid evidence is needed to scrutinize the value

Processing fluency



Generated with ChatGPT 4o with some edits

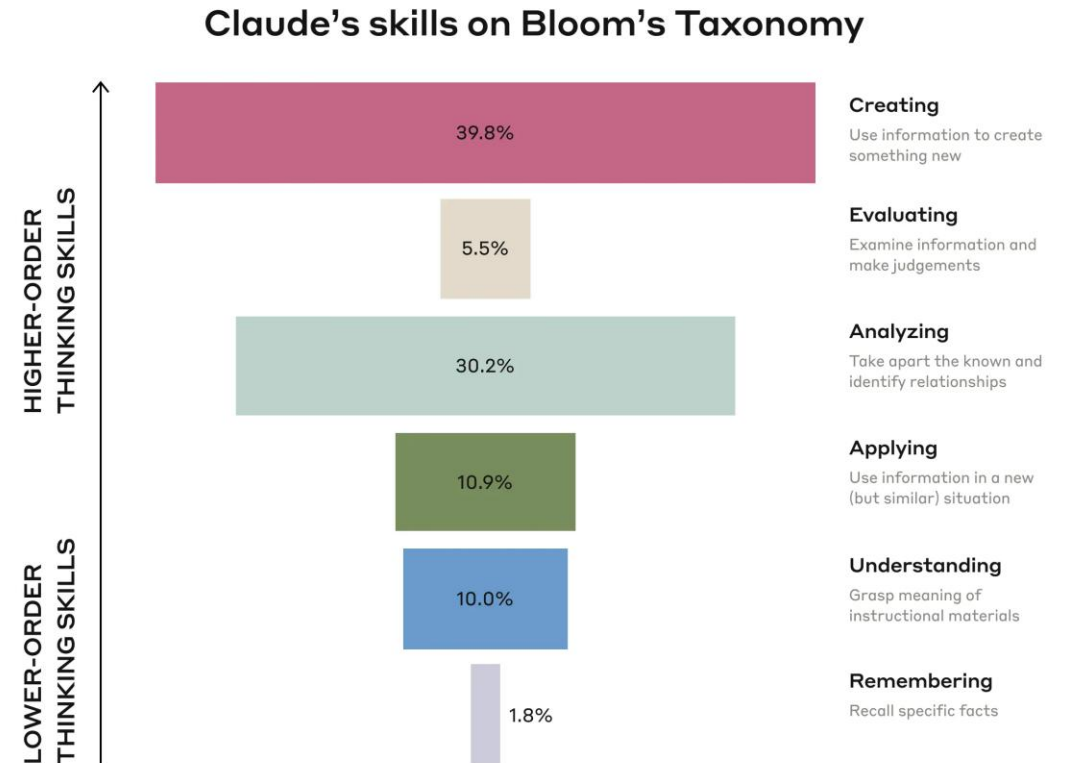
Easy to read
doesn't mean
easy to understand

Hallucinations

Teachers can't detect errors in
GenAI produced content

Overreliance

How to assure
development of
higher-order skills?



Critical thinking

Writing is an important learning tool

What happens when much of that tool is offloaded to GenAI?

Beyond prompting

Learners have limited ability
to ask quality questions

How does that impact their ability to prompt GenAI effectively?

Communication

Ethical concerns may discourage
helpful GenAI uses

2

Need

Methodological rigor matters

Sins of fast science

Robust
evidence

Technology use
≠
effective pedagogy



Computers & Education
Volume 227, April 2025, 105224



Does ChatGPT enhance student learning? A systematic review and meta-analysis of experimental studies

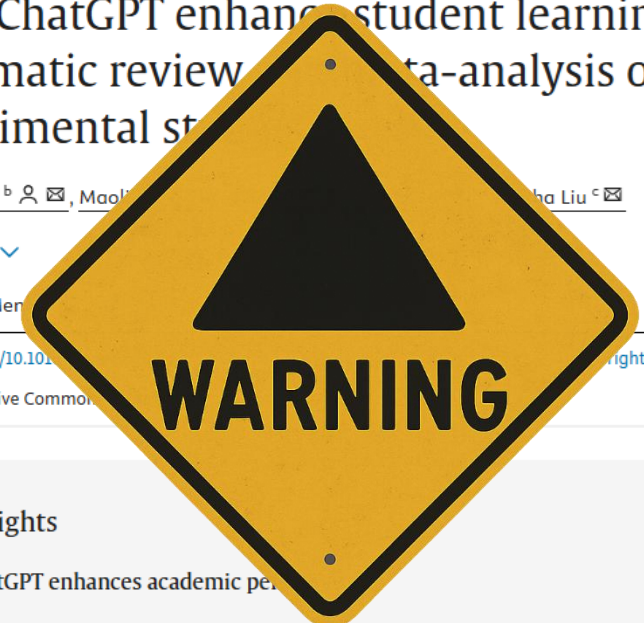
Ruiqi Deng ^{a, b}, Maoliang Li ^a, Liha Liu ^c

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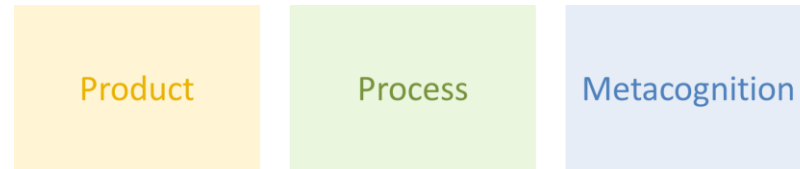


Highlights

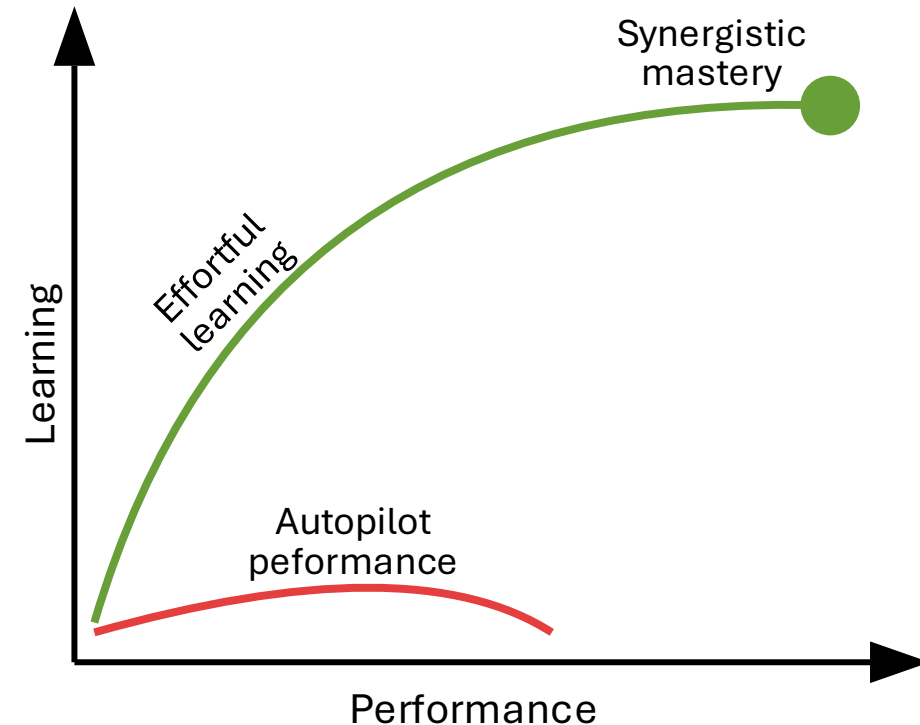
- ChatGPT enhances academic performance.
- ChatGPT boosts affective-motivational states.
- ChatGPT improves higher-order thinking propensities.
- ChatGPT reduces mental effort.
- ChatGPT does not influence self-efficacy.

Avoiding conflation

Robust
measurement

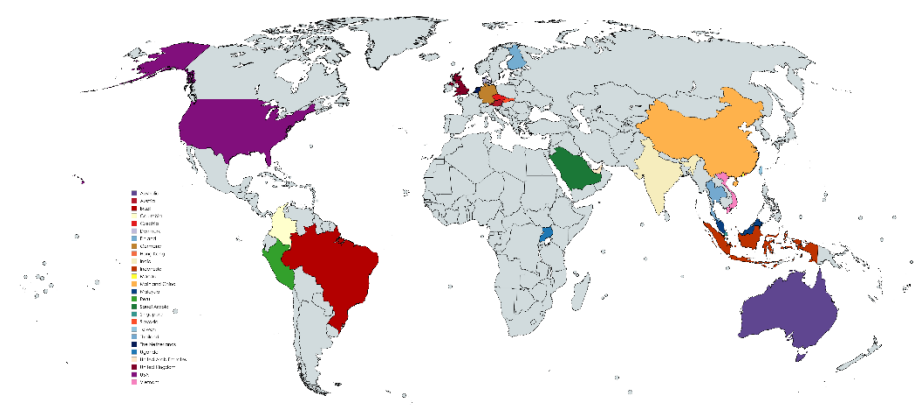


Distinguishing learning from performance



Replication
challenge

Open science



Cross-context replication studies of human-AI synergy

Open call for participation

Meta-analyze effects rather than to compare education systems

FINAL REMARKS



Nuance needed

Need to broaden understanding of learning *with, about, and despite* GenAI

Metacognition

Don't confuse copilots with autopilot!

Know *when* and *how* to onload and offload cognition to AI

Future-ready assessment

Assessment to center human learning and productive interaction with AI

Human alone and Human + AI (synergy and augmentation)

Using process and product data

GenAI for human skill development and assessment

Dragan Gašević

March 23rd, 2026
OECD Digital Education Outlook 2026
Online conference