

AI & Medical Education

How AI is changing how we learn –
And how we can use it to teach

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Landing Page
tinyurl.com/4kbj74hy

Disclosures

I have no relevant financial relationships to disclose

GenAI tools used in preparation of this session

Gemini, Gemini Notebook (formerly NotebookLM), Claude (including Code & Cowork) were used to generate teaching materials — outlines, slides, web activities, apps, and graphics.

Don't worry — I'll show you how.

I have reviewed, edited, and confirmed all information being presented

Institutional guidelines are changing rapidly. My read reflects BIDMC and broader trends; policies vary by institution and will change over time.

Two Questions Anchor Today

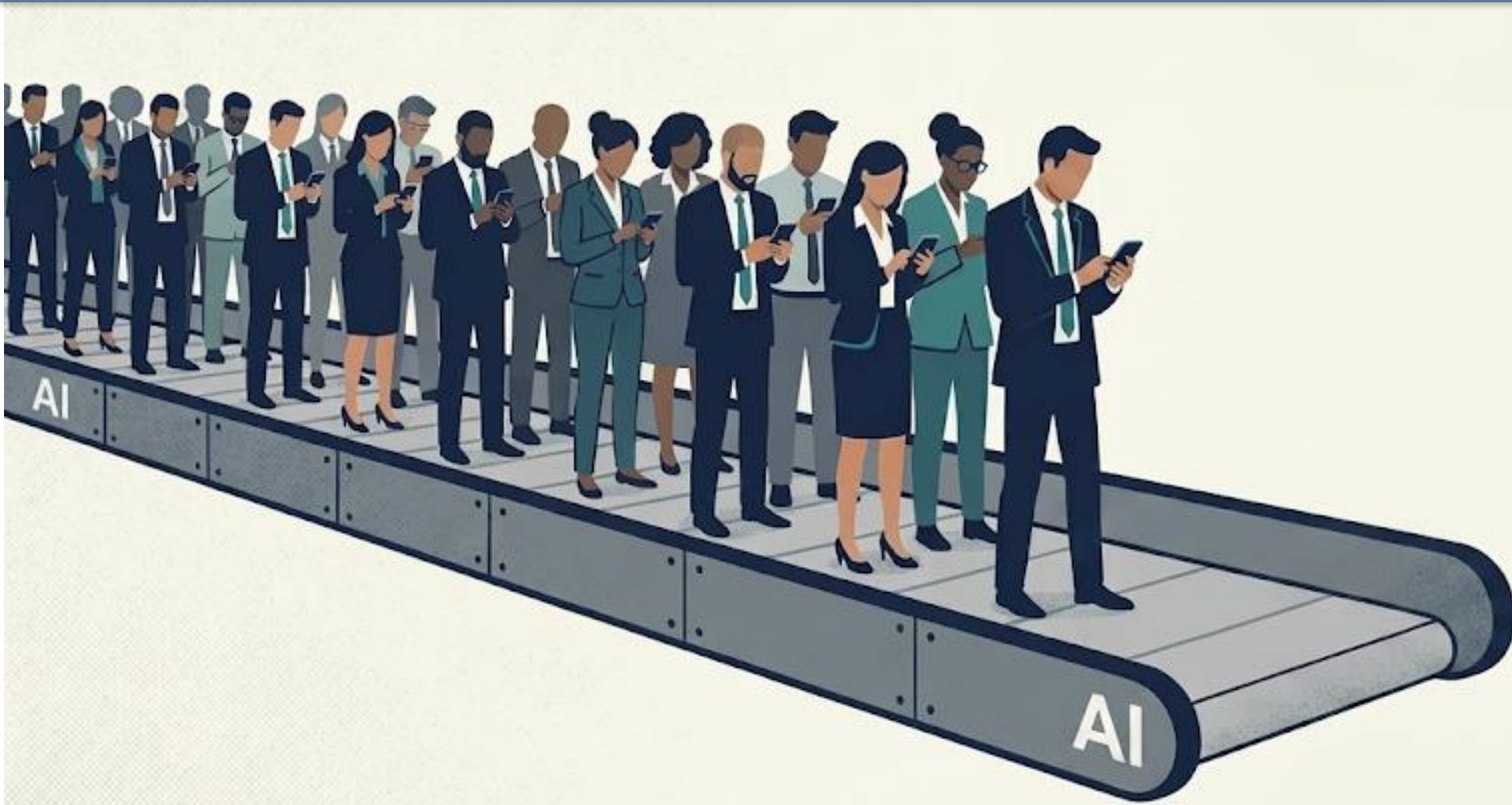


How is AI changing how we learn — and subsequently how we teach?



How can we use AI to augment our capacities as educators?

Manufactured Inevitability



Manufactured Inevitability



1. Vast Training Data Ingestion



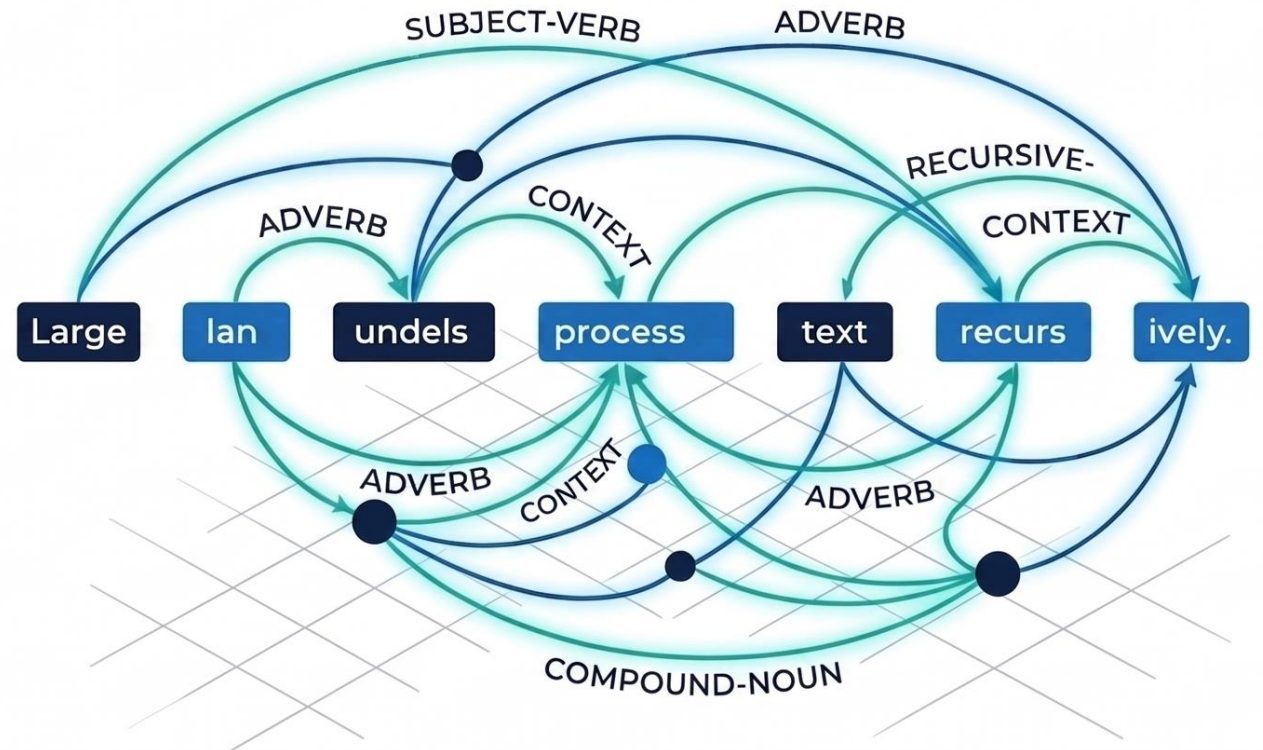
1. Vast Training Data Ingestion



2. Tokenization and Relationship Mapping

Large language models process text recursively.

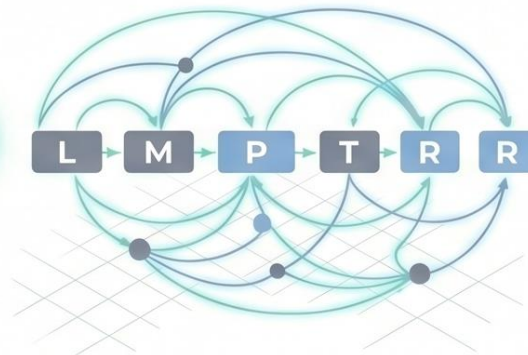
Large language models process text recursively.



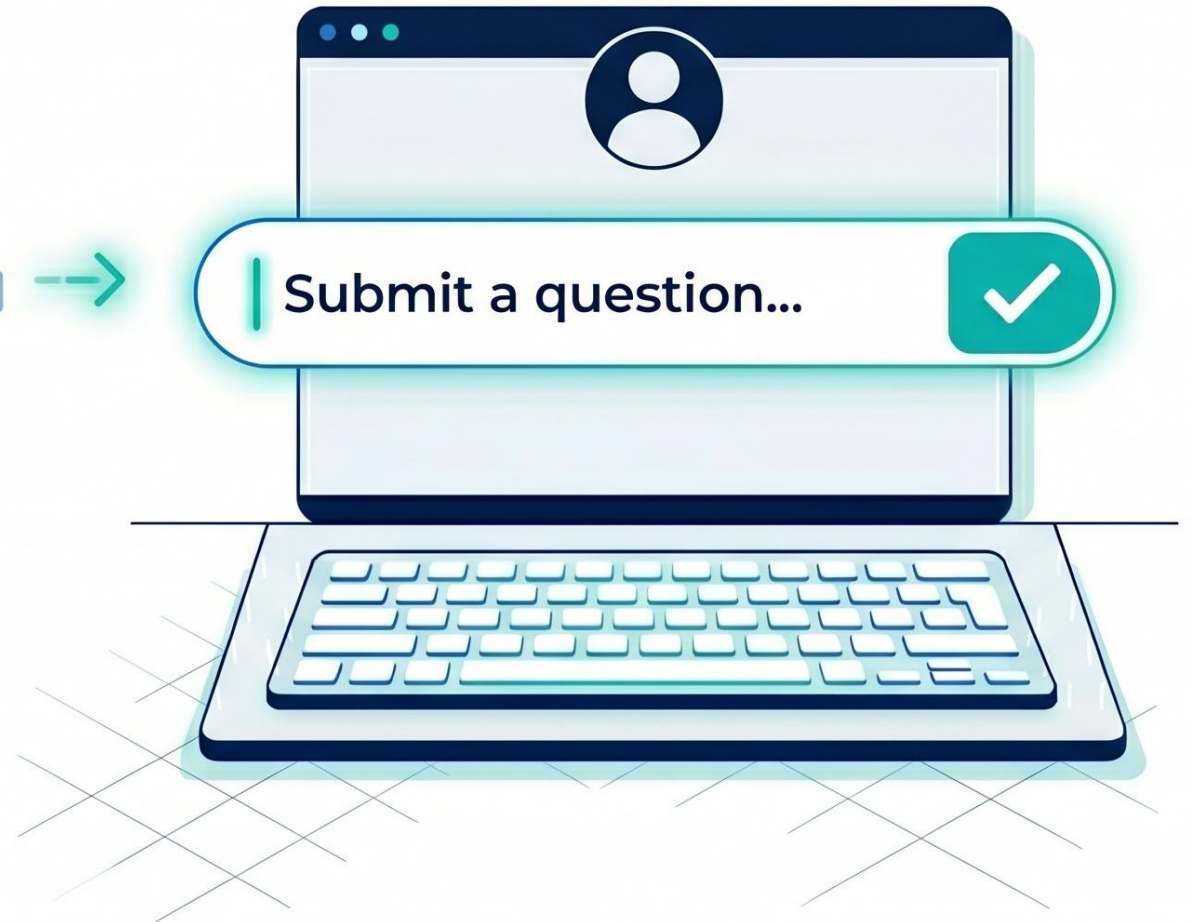
1. Vast Training Data Ingestion



2. Tokenization & Mapping



3. User Query Input



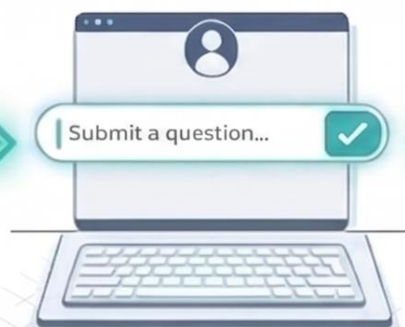
1.



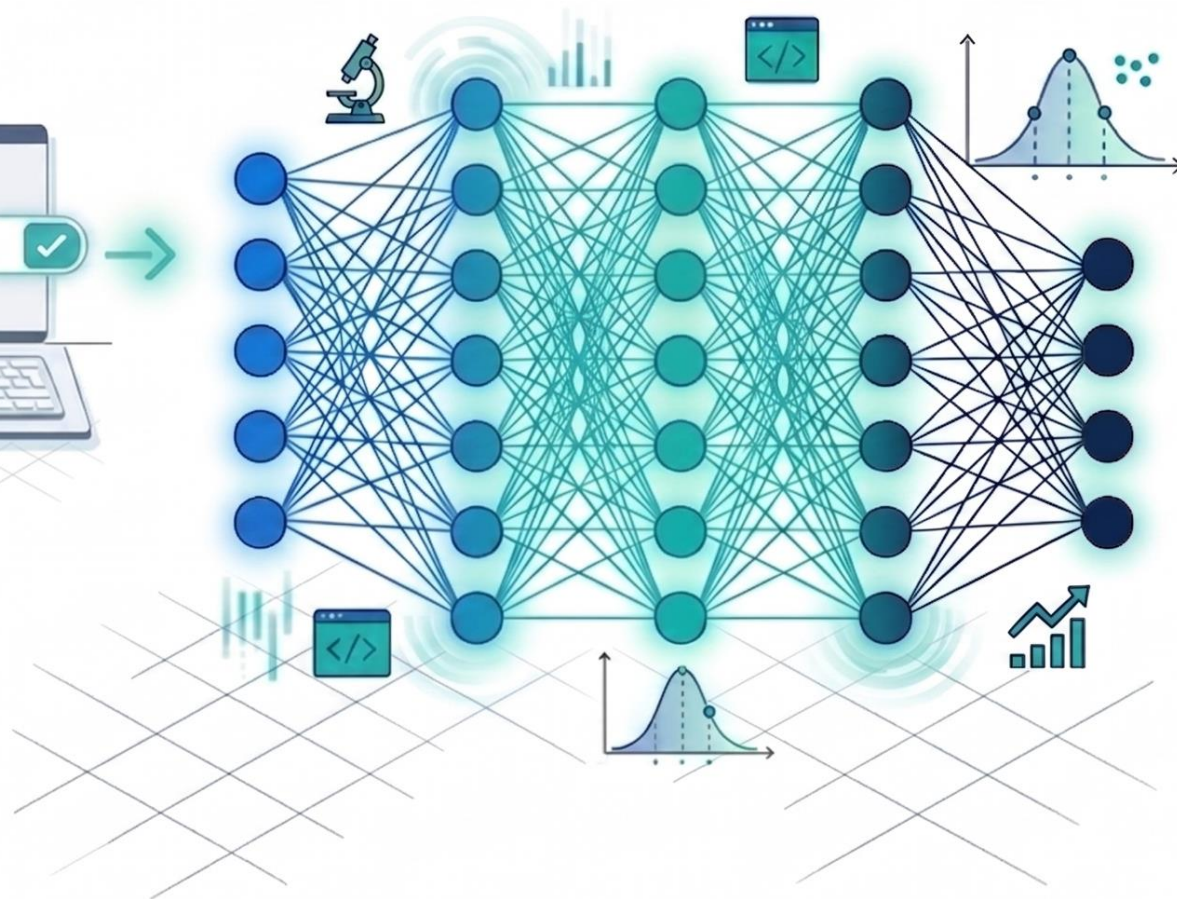
2.



3.



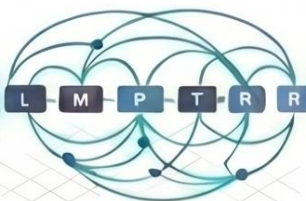
4. Deep Neural Network Processing and Prediction



1.



2.



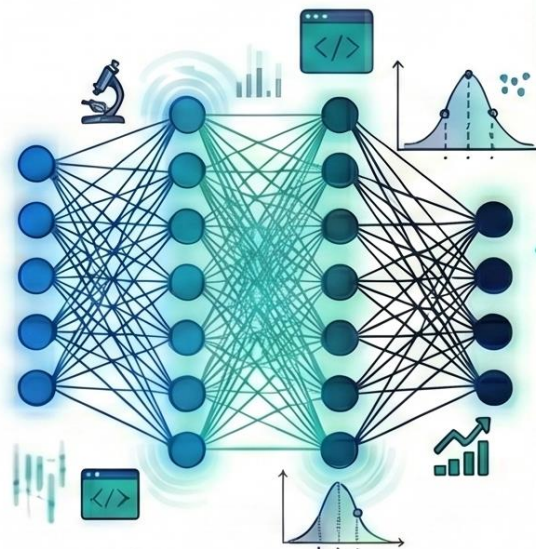
3.



Fine-Tuning
Data



4.



5.

**Evaluation
and Use of
Output**



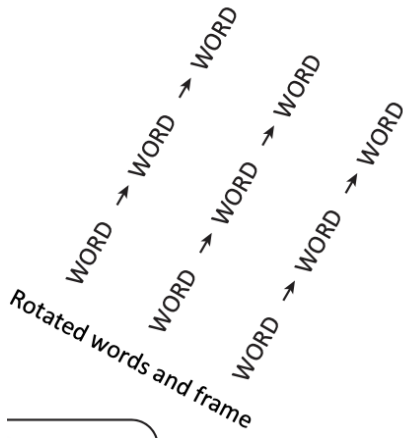
AI for the Learner



Cognitive Offloading

Risko & Gilbert, Trends in Cognitive Sciences, 2016

Any external action that reduces internal cognitive demand



Internal normalization



External normalization



Cognitive Offloading

Risko & Gilbert, Trends in Cognitive Sciences, 2016

Any external action that reduces internal cognitive demand

— writing things down, using a calculator, setting an alarm, even rotating your head to read sideways text

Natural, automatic, metacognitive

Depending on what's being offloaded,
can be adaptive or maladaptive

Cognitive Load Theory

Working Memory

Intrinsic Load

Extraneous Load

Germane Load

Cognitive Load Theory



Intrinsic Load

The diagram illustrates the components of Cognitive Load Theory. On the left, a blue rectangular box contains the text 'Intrinsic Load'. To the right of this box, the text 'Inherent Complexity' is positioned above a V-shaped line. The two arms of the V point downwards to the words 'Task' and 'Expertise', which are placed side-by-side. At the bottom center of the diagram, the text 'Goal: Manage' is displayed in a large, bold, black font.

Inherent Complexity

Task

Expertise

Goal: Manage

Cognitive Load Theory



Extraneous Load

Distraction

Goal: Minimize

Cognitive Load Theory



Germane Load

Learning

Goal: Maximize

Cognitive Load Theory

Intrinsic Load

Extraneous Load

Germane Load

Manage

Minimize

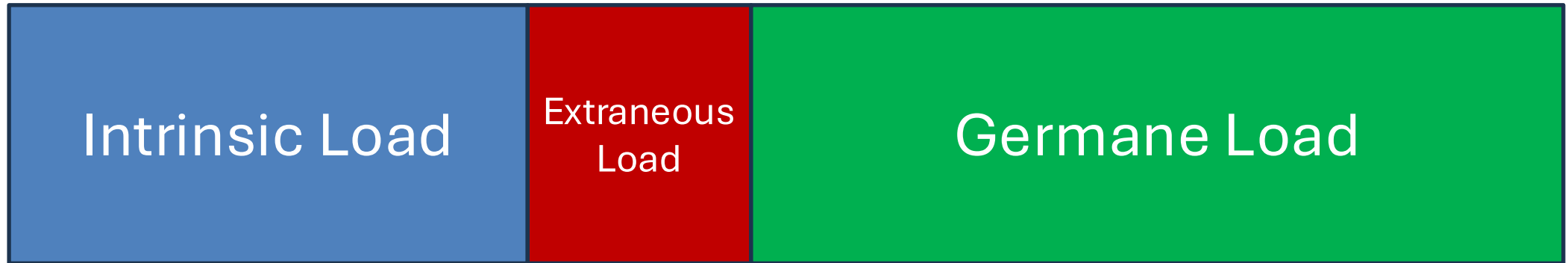
Maximize

Guide
attention

Eliminate
distractions

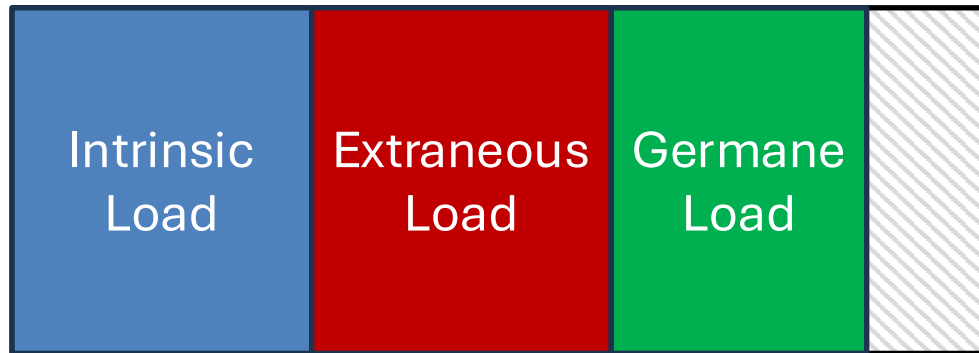
Encourage
effort

Cognitive Load Theory



Ideal goal with AI

Cognitive Load Theory



Potential concern

Alignment

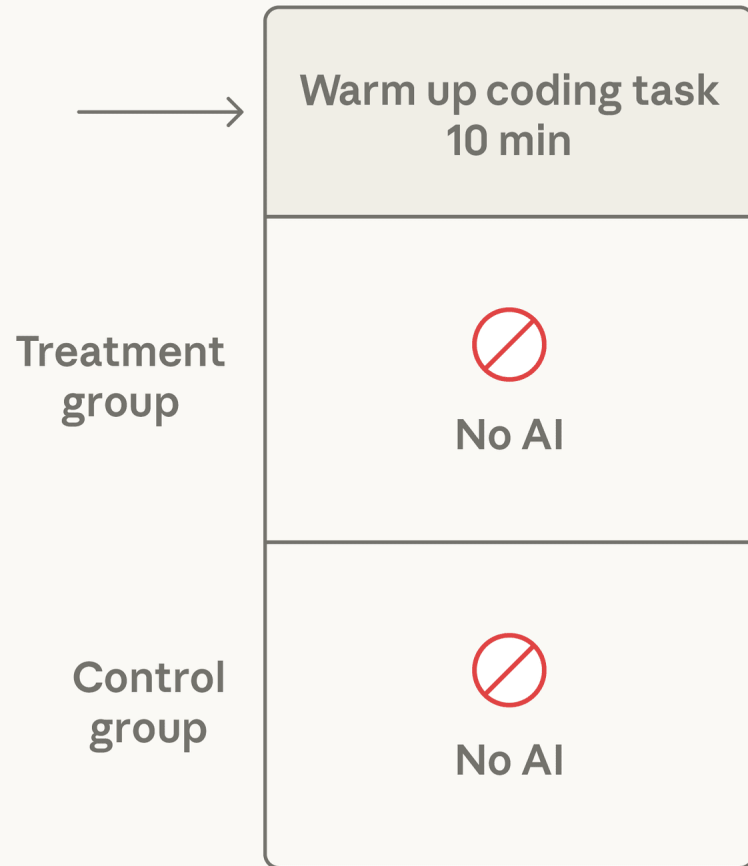
How AI assistance impacts the formation of coding skills

Jan 29, 2026

Read the paper

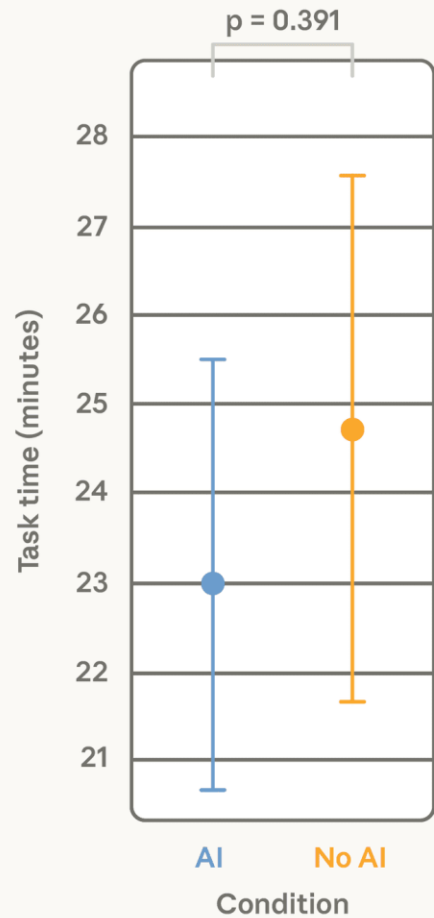
<https://www.anthropic.com/research/AI-assistance-coding-skills>

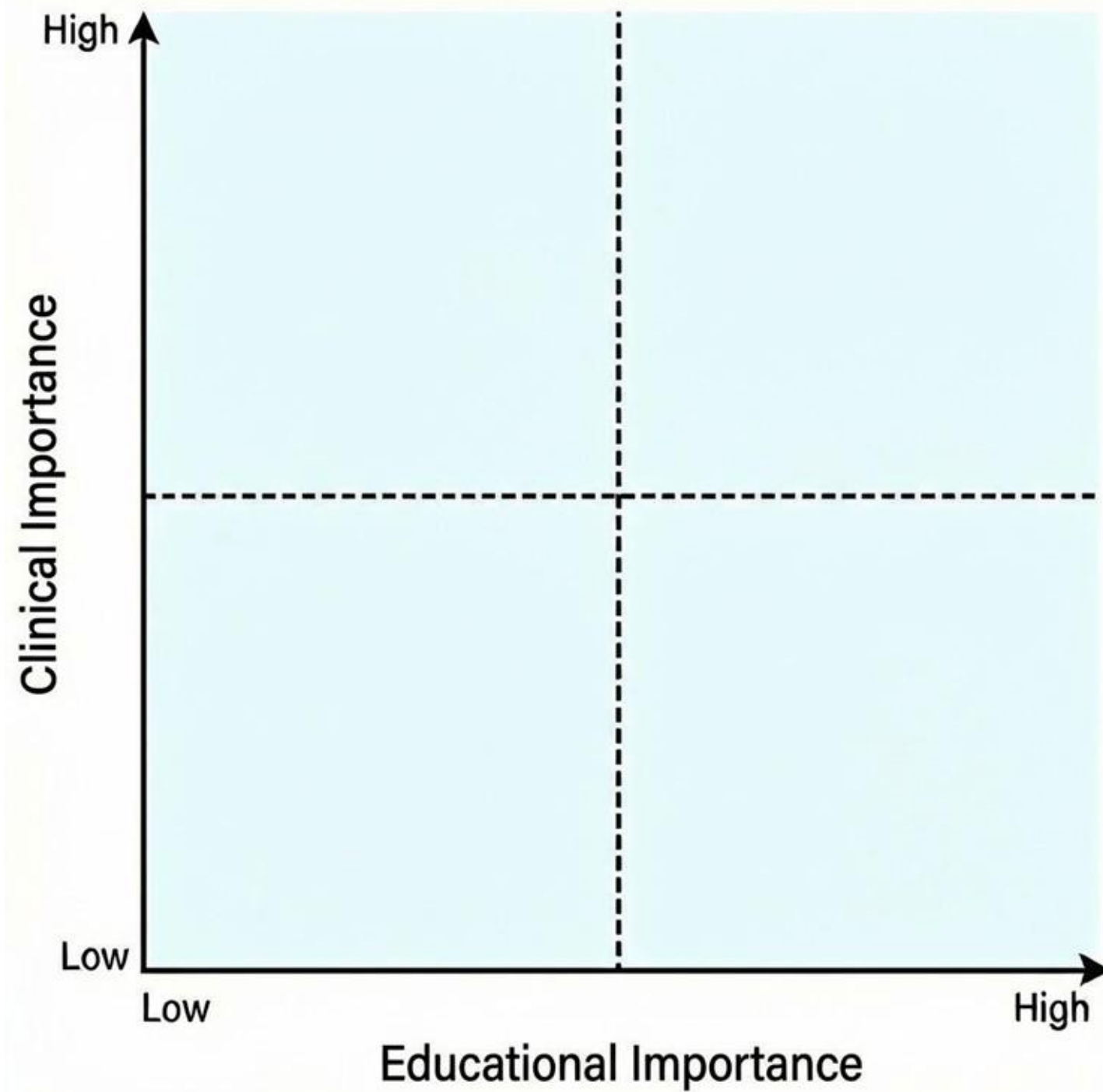
Study design

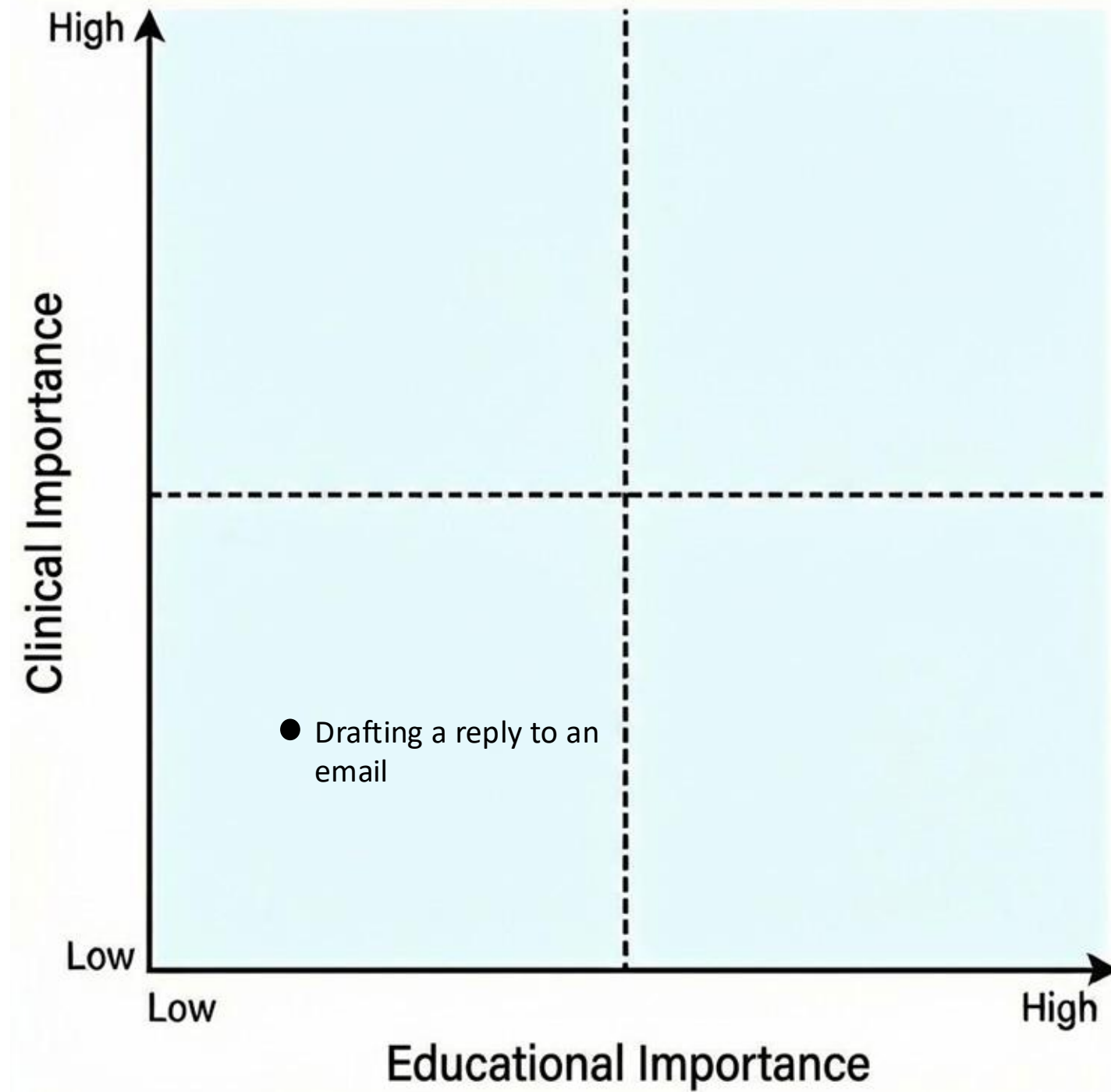


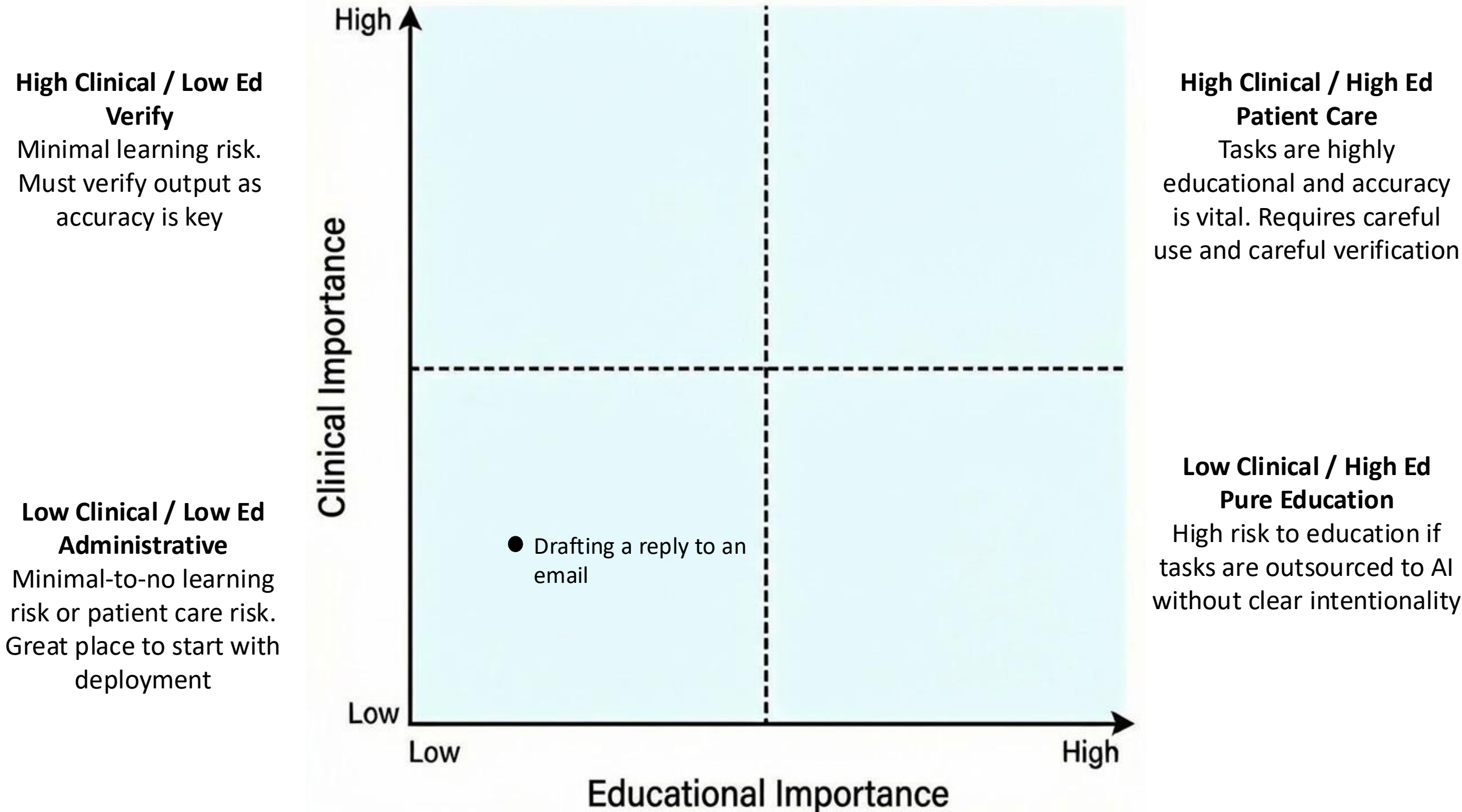
How AI assistance impacts coding speed and skill formation

AI assistance: treatment effect on coding speed and knowledge score









**High Clinical / Low Ed
Verify**

Minimal learning risk.
Must verify output as
accuracy is key

**Low Clinical / Low Ed
Administrative**

Minimal-to-no learning
risk or patient care risk.
Great place to start with
deployment

Clinical Importance

High

Low

Low

High



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● Dr
email

**High Clinical / High Ed
Patient Care**

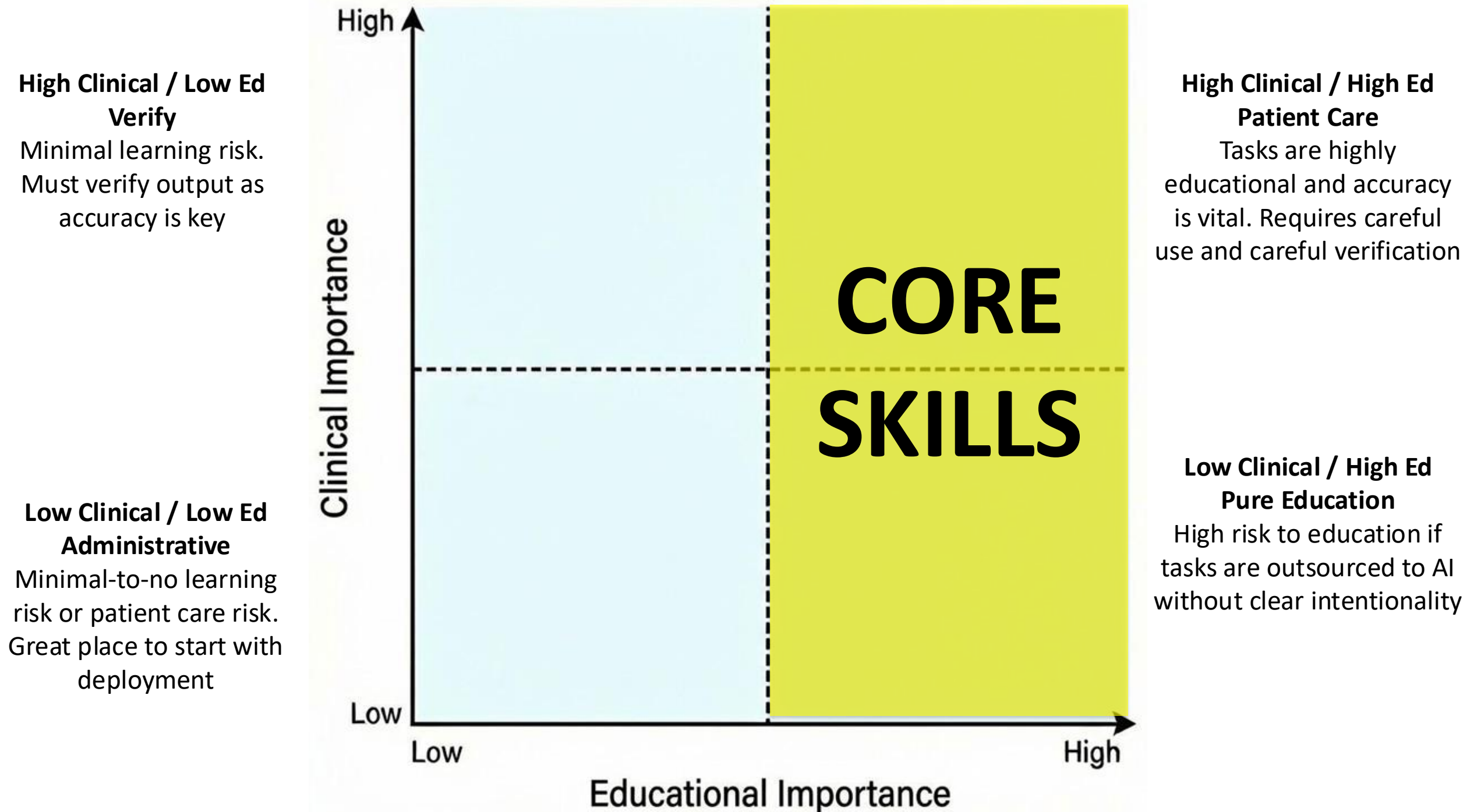
Tasks are highly
educational and accuracy
is vital. Requires careful
use and careful verification

**Low Clinical / High Ed
Pure Education**

High risk to education if
tasks are outsourced to AI
without clear intentionality

Educational Importance





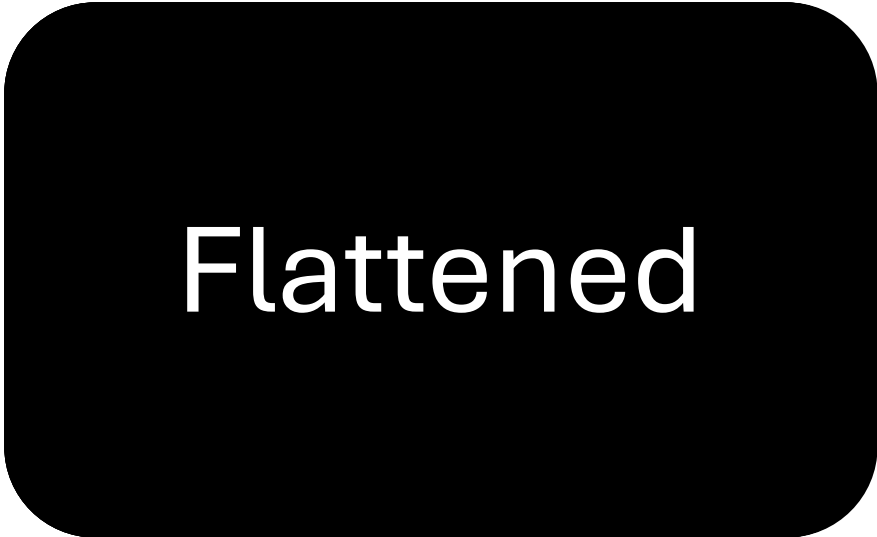
Classifying Questions

Empirical
Facts

Phronetic
Judgment

Unknowable

Classifying Questions



Flattened

A

New Admission — Fatigue & Back Pain

CASE SUMMARY

69F with HTN and T2DM with months of fatigue and low back pain. Recently completed 14-day linezolid for MDR-MRSA cellulitis.

Labs: Normocytic anemia (Hb 9.1), AKI (Cr 1.8 from 1.1), total protein 8.5, albumin 3.2. Ferritin 60, TSAT 30% (normal).

PROMPT 1

The intern asks: "How long do you need to be on linezolid for it to cause cytopenias?"

The resident responds: "AI says bone marrow suppression typically occurs after >2 weeks, with thrombocytopenia being the most commonly affected cell line."

PROMPT 2

After presenting a very thorough differential, you ask the intern about their framework for anemia. They admit that they don't have a great one and plugged the patient data into Open Evidence to get their differential.



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B

Rounding — Ms. R, Day 8

CASE SUMMARY

59F with Parkinson's and IgA vasculitis (skin-limited) on high-dose steroids. Admitted for worsening purpura; improving and de-escalated from IV to PO steroids. On Bactrim SS prophylaxis ×4 days.

Today: new chest purpura, improving CRP (18 from 50), but new transaminase elevation (AST 84, ALT 70; normal Alk phos, T.bili).

PROMPT 1

While presenting the elevated transaminases, the intern states confidently:

"We should stop the Bactrim. I ran it through AI and it says this is DILI."

PROMPT 2

The senior resident reviews the plan and says:

"I looked up on Open Evidence the likelihood of Bactrim causing DILI four days after beginning prophylaxis dose — the timing makes this less likely."



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Best Practices – Precepting in an Age of AI

AI for the Educator

Your Prework: What Did You Build?

Teaching summary prompt

A reusable prompt that generates a structured teaching summary from a clinical case or topic.

Cases → Slides

Converting clinical cases to PowerPoint slides using multimedia design principles.

Pharmacology game

An interactive educational pharmacology game.

Three Use Cases for Me (This Week)

Paring down an overly long lecture for timing

Claude Cowork: I provided a PowerPoint file and some context

Claude created a Word document highlighting recommendations for slides to hide/cut

Designing survey phrasing for an educational project

Claude: I explained the concept I wanted to measure and asked for several different ways to phrase it.

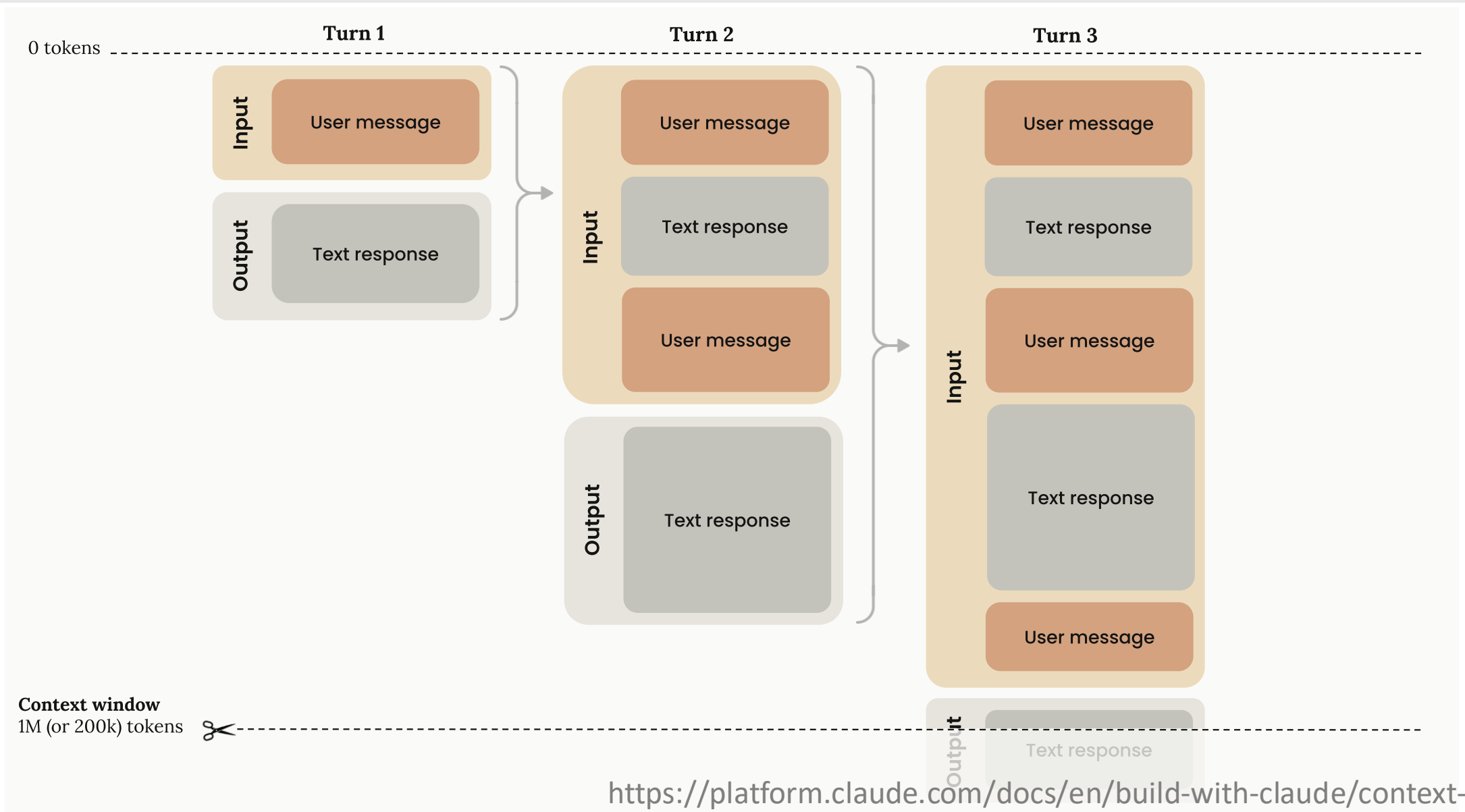
Claude provided a handful of different approaches and pros and cons of each

Converting your survey answers to slides

Codex: I provided the excel file, a template of slides, and asked for it to create/update the slides with your information

Codex duplicated the powerpoint, read the excel, updated the information, and did several QA checks to assess readability

Context



Context Rot and Drift

Models re-read the entire conversation with every prompt

Conversation length →



Practical tip: Start new chats often — especially when topics shift. You lose some context but gain better attention.

Context Windows

1 million

Free: 16k
Plus: 32-256k

1 million

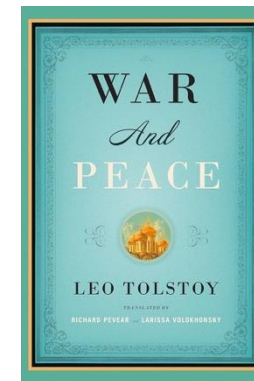
 Claude

 ChatGPT

 Gemini

1 million tokens = 750k words = 1500 pages

Roughly 1.3x Tolstoy's War and Peace



Training Data Cutoffs

Your AI doesn't know what it hasn't read

General chatbots:

ChatGPT / Claude / Gemini all have optional web search — but you might need to ask it to do so

Enterprise Copilot Chat:

No web search (intentional — keeps PHI contained within the enterprise environment)

If your AI can't look for the latest information, all it knows is what is in its training data!

Hallucinations: Confidently Wrong

Definition: Model generates plausible-sounding but fabricated content

Good news: Much better than 2022 — "thinking" and reasoning models significantly reduce hallucination rates

⚠️ Bad news: Hallucination rate is not (and likely never will be) 0

Mitigation: You must read output before using in any capacity. If you're using AI for information, ask for citations — then actually follow the links.

AI Biases Mimic Human Biases

Training Data

Underrepresentation of certain populations in the medical literature and trial data can lead to incorrect or less accurate results in certain subgroups



Annotation Bias

Human-provided labels for supervised learning are subjective; human bias can be propagated to machines



Evaluation Bias

Metrics used to judge model performance may not identify failures in certain subgroups



Generic Responses



Intentional Model Choice

🌸 Jonathan returns!

How can I help you today?

+

Write

Learn

From D

Sonnet 4.6 Medium

🎤 🔊

Fable 5 Included until June 22
For your toughest challenges

Opus 4.8
For complex tasks

Sonnet 4.6
Most efficient for everyday tasks ✓

Haiku 4.5
Fastest for quick answers

Effort Medium >

More models >

Higher effort means more thorough responses, but takes longer and uses your limits faster.

Low Default

Medium ✓

High

Max ⓘ

Thinking

Can think for more complex tasks ☐

Where should we start?

+ Ask Gemini

Flash ▾

🎤

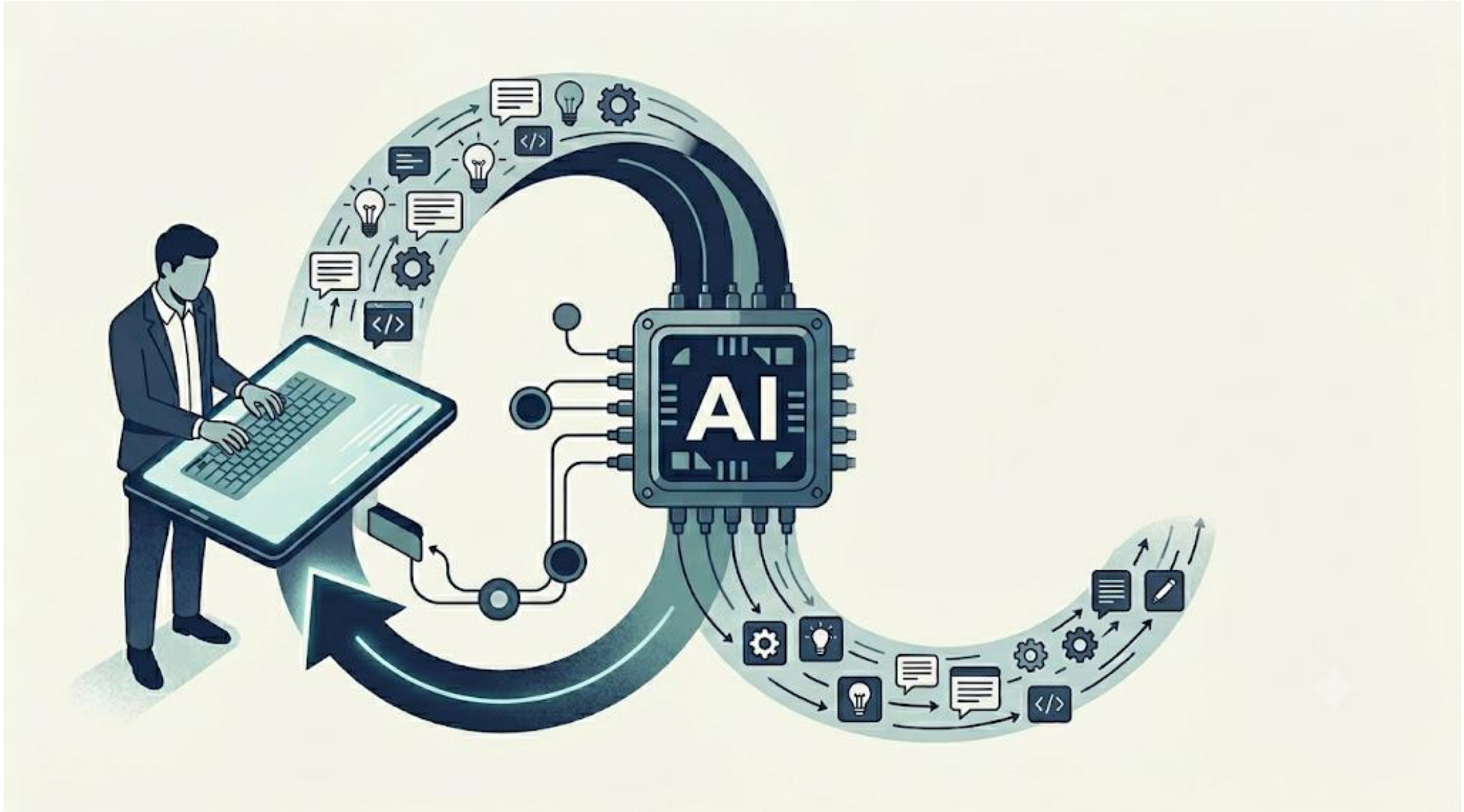
3.1 Flash-Lite
Fastest answers New

✓ **3.5 Flash**
All-around help

3.1 Pro
Advanced math and code

Thinking level
Standard ▶

Iteration



The “Jagged Frontier”



Quality Output Requires Anticipating and Articulating What Success Looks Like

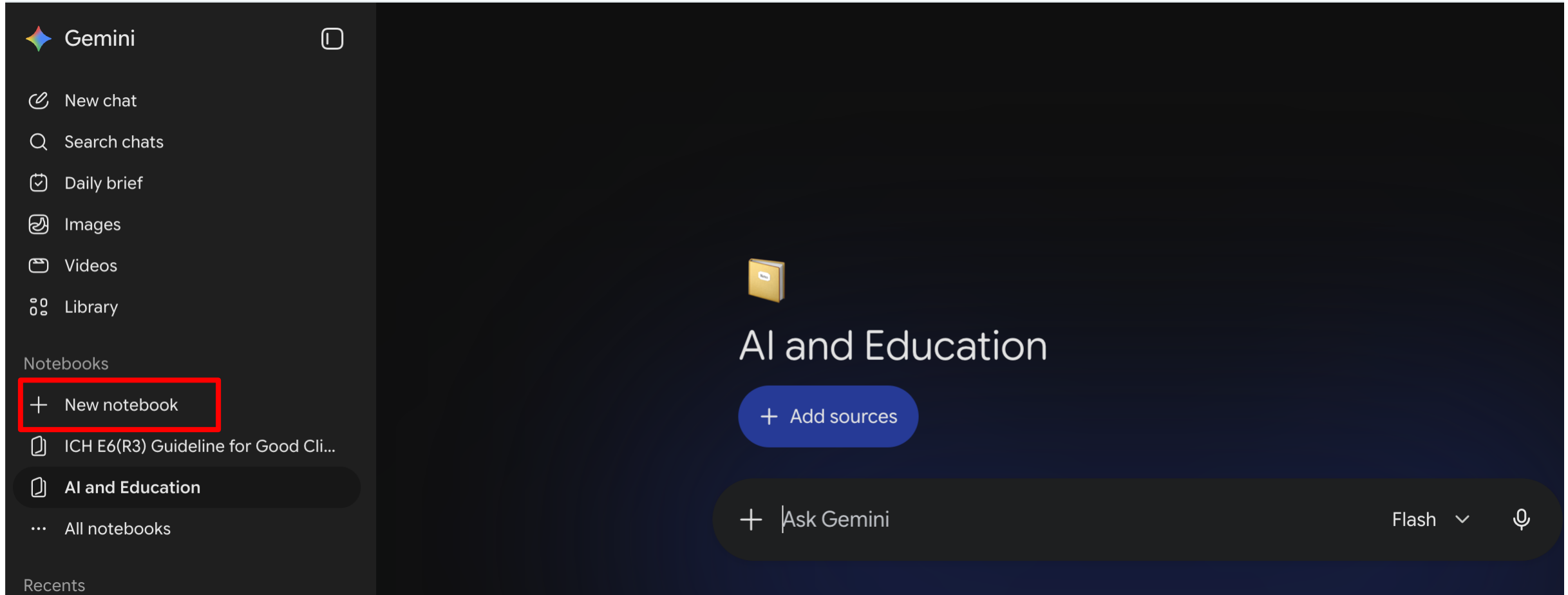
Create an image that shows the concept of the "Jagged frontier"



Editorial-style conceptual illustration, muted navy-and-teal palette on off-white. The "jagged frontier", an austere cliff face with angular jagged areas - some jutting out much further than others. Clean flat vector shapes, subtle grain texture, no text in the image. 16:9.



Projects/Notebooks/Folders



The screenshot displays the Gemini application interface. On the left is a dark sidebar with a list of navigation options. The 'New notebook' option, located under the 'Notebooks' section, is highlighted with a red rectangular border. The main area on the right is dark blue and features a yellow folder icon with a white 'S' on it. Below the icon, the text 'AI and Education' is displayed. Underneath this text is a blue button with a white plus sign and the text 'Add sources'. At the bottom of the main area is a dark input bar with a white plus sign, the text 'Ask Gemini', and on the right side, the text 'Flash' followed by a downward arrow and a microphone icon.

Gemini

- New chat
- Search chats
- Daily brief
- Images
- Videos
- Library

Notebooks

- + New notebook**
- ICH E6(R3) Guideline for Good Cli...
- AI and Education
- ... All notebooks

Recents

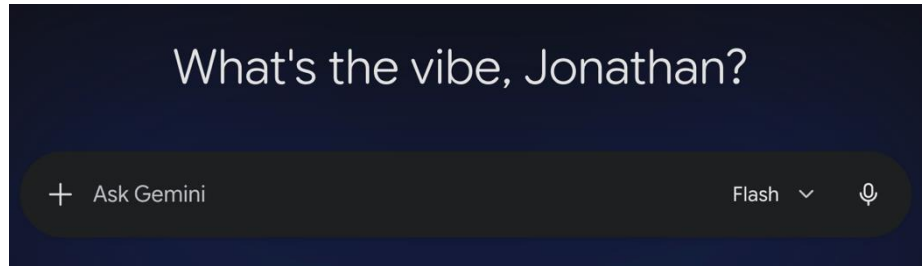
AI and Education

+ Add sources

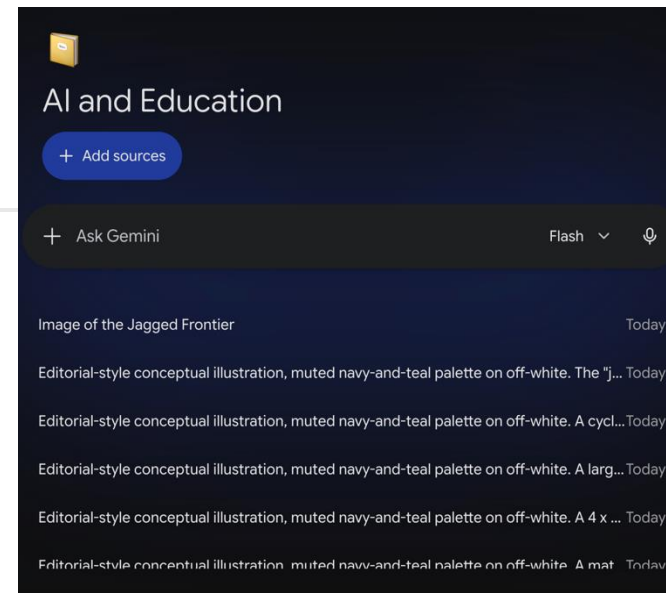
+ Ask Gemini

Flash ▾

Projects/Notebooks/Folders



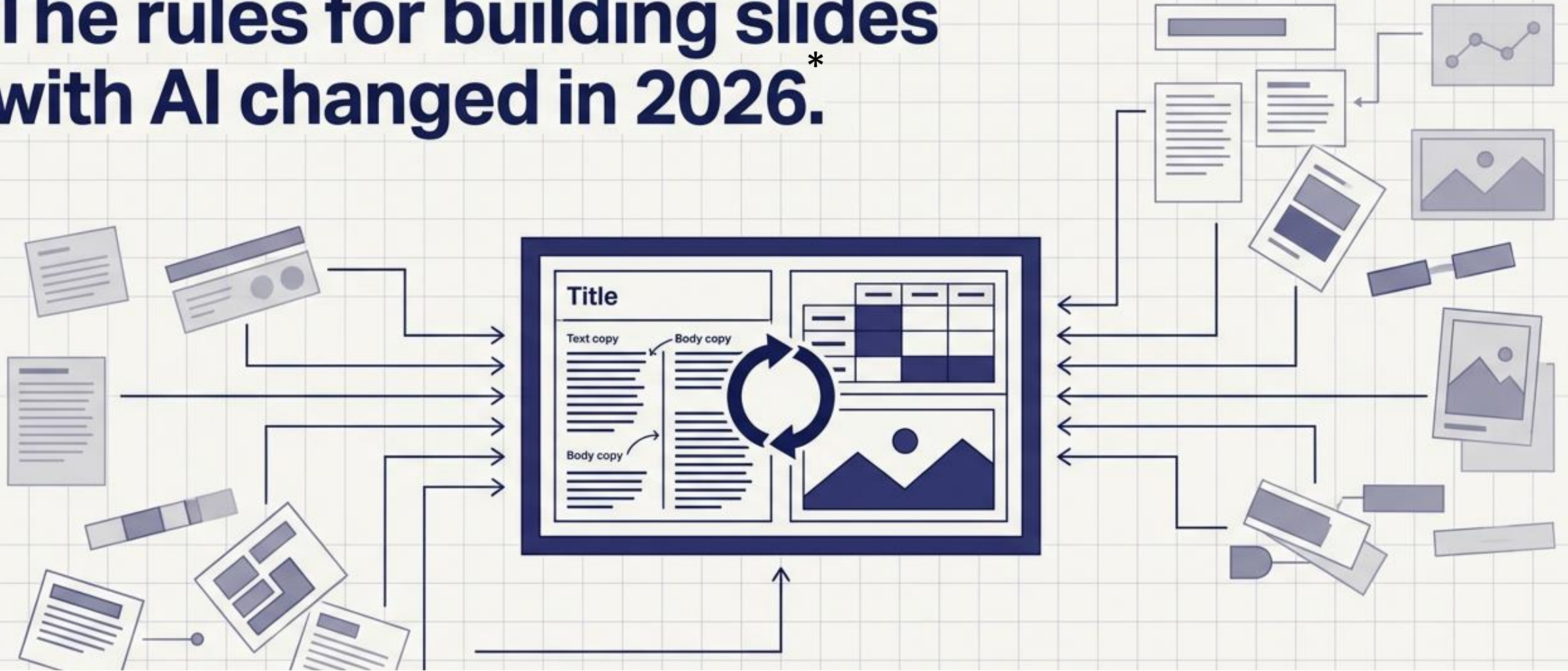
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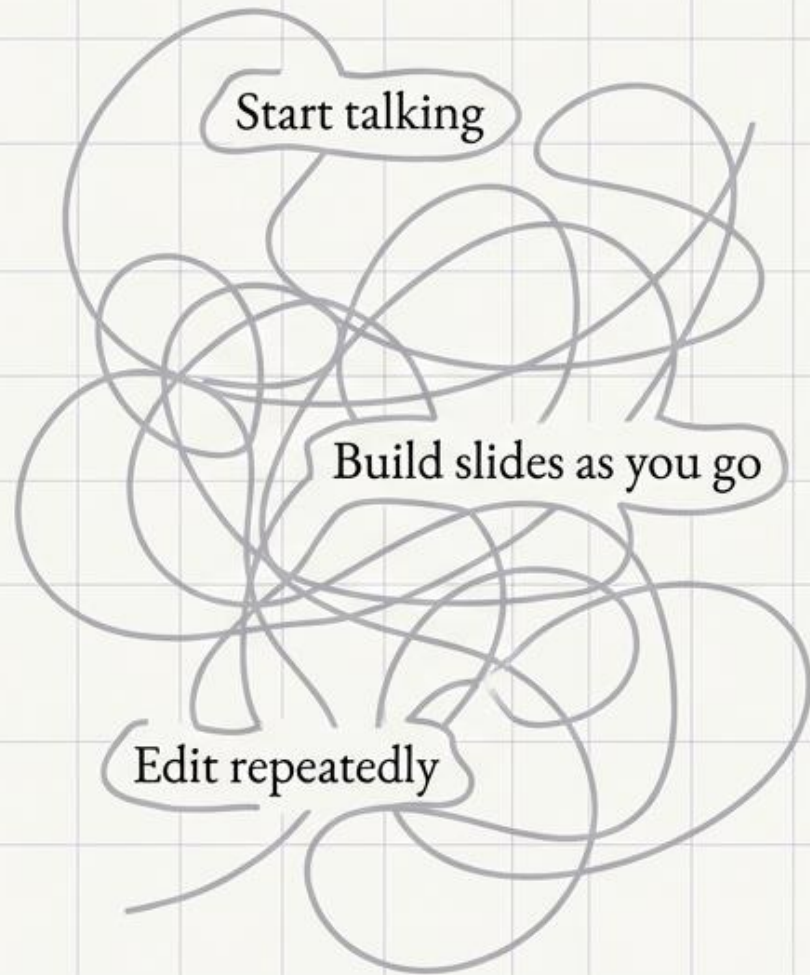


The rules for building slides with AI changed in 2026.*



***But all the rules of slide design and cognitive load that we discussed still apply!**

Structured output requires structured input.



Prompting

Consider describing/encoding the principles that you want your AI tools to follow in making slides. You can do this one-off or you can build a skill (Claude), gem (Gemini) customGPT (ChatGPT)

`## Personal Slide Preferences (always apply)`

- **Font**: Aptos only. Do not pair with Georgia/Calibri unless explicitly requested.
- **Minimum font size**: 20pt for any body text. Titles/headers larger.
- **Text density**: Max **7 words per line**, **7 lines per slide** when text-heavy.
- **Icons over bullets**: Where an icon fits, use it instead of a bullet. Prefer `'react-icons/fa'`.
- **No bullets by default**: If content stands alone as plain text, skip bullets and icons entirely.
- **Ask first**: Before starting any deck, ask Jonathan if he has a specific color palette or theme in mind.

The Tool Selection Diagnostic

TOOL	BEST FOR	IDEAL INPUT	OUTPUT FORMAT	THE “AHA” USE CASE
 Claude	Structure	Human Outline	Editable PPTX	First-drafting a full talk.
 NotebookLM	Synthesis	Existing Corpus/Notes	Grounded Slide Draft	Synthesizing heavy literature into a presentation.
 Gemini	Visuals	Concept Description	Custom Image File	Creating specific, one-off slide art.

Going to the Balcony



How This Talk Was Built

Claude — scaffolded an outline from our prior planning conversation

Jonathan — wrote framing questions, learning objectives, and the talk's arc; dropped in bibliography sources and pre-survey input along the way

Claude — organized everything into blocks, structure, and proposed slides for each block

Jonathan — reviewed and edited the outline

Claude — drafted a first-draft PowerPoint from the outline

Jonathan — generated images, pulled in slides from other decks, and fleshed out / edited slides

Claude — built this slide

Two Questions Anchor Today

How is AI changing how we learn — and subsequently how we teach?

How can we use AI to augment our capacities as educators?

Learning Objectives

Explain the concepts of **cognitive load**, **cognitive offloading**, and **deskilling**, and how they relate to GenAI use in the context of medical training.

Sort various tasks performed by a medical trainee into **core** v. **secondary** skills, and use this framework to guide **when, where and how** to deploy AI.

Demonstrate GenAI use patterns that **support** learning rather than hinder it.

Identify where GenAI tools can **accelerate** educational session development v. where they are currently not helpful due to **error rate, amount of manual correction required, or misleading results**.

Identify **prompting strategies** and **tool choices** that improve AI output for clinical and educational tasks.

Choosing the Right Tool

Task	Best tool(s)	Note
Clinical reasoning / differential	Claude, Gemini, ChatGPT	Avoid framing, ensure using extended thinking/pro models for complex cases
Evidence-based clinical questions	Open Evidence	Pulls data from sources and cites them; more reliable when the answer exists out there
Patient messages, letters, education	Claude, Gemini, ChatGPT	Claude often thought to have the most natural prose. OE can do simple tasks now
MCQ / teaching case generation	Claude, ChatGPT, Gemini *OE improving here	Better able to leverage multiple inputs, use tools, reason through hard questions
Slide generation (image-heavy)	Gemini, NotebookLM	Gemini makes great visuals. NotebookLM turns sources into great slides
Slide generation (content-heavy)	Claude	Very good at helping make outlines or turning outlines into draft slides. Can't do images
Data cleaning, file conversion, website/app design	OpenAI Codex, Claude Code/Cowork	Agents shine at processing and manipulating files

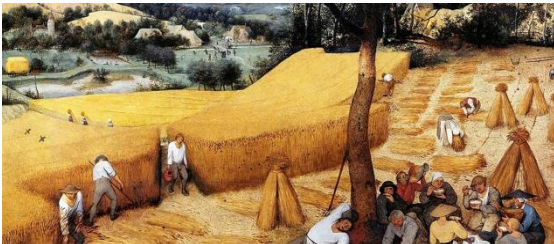
With Whom Am I In Conversation?



One Useful Thing



Claude Code for Everything



The Convivial Society



Teaching in the Age of AI



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