

## Goal

In this piece I go over thoughts and techniques for applying AI tools to learning, studying and academic research workflows.

## Fuzzy Principles for Applying AI Tools to Learn Stuff

My view on the topic of using AI to learn and study is:

- You can **only learn effectively by applying focused and intentional effort** into something
- The amount you trully learn is correlated with how much intentional effort you put into it, **that HAS NOT CHANGED WITH AI**
- What has changed is that **now we have tools to boost the efficiency of the time we spend on something** intentionally
- The problem, when it comes to AI usage, is that **it's use invites bad habits** and incentivizes too much cognitive offloading, which can inherently lead to less learning.
- So if you use AI in such a way where you become less intentional and put in less mental effort, you learn less, but if you use it right, and you can self-regulate the impulse to offload too much to AI, you can learn a whole lot.
- Intelligent offloading to AI is a critical meta skill in the new age



*Image generated with GPT-4o*

??? note "Example Bad and Good Prompts" | Bad Prompt | Good Prompt | |-----|-----| | Write me an essay about:{X} | I'm working on this essay about {X} I got stuck on this part regarding {Y} because I can't seem to find a perspective/angle on it, can you suggest 3 ways to get me unstuck? | | | I want to write an essay about {X} but I don't have any background knowledge on the topic, which questions should I be asking to get started? | | | Can you take a look at this essay I wrote: {ESSAY INPUT} and give me feedback on it based on these materials I'm working through: {MATERIALS}? Write the feedback as instructive and actionable bullet points. | | I have this coding problem: {PROBLEM INPUT} write the code to fix it: | I'm trying to figure out this coding problem: {PROBLEM INPUT}, can you identify what am I doing wrong and explain it without code? | | | I got stuck in this coding problem: {PROBLEM INPUT} can you break down the solution into questions and ask them 1 by one so I can figure out the solution by myself? Write each as an individual bullet point. | | Summarize this article in simple terms: {FULL ARTICLE} | I read this article: {FULL ARTICLE} and this is what I understood: {YOUR OWN SUMMARY OF THE ARTICLE}, can you identify things I missed? | | I'm studying this: {YOUR STUDY TOPIC}. Extract the main insights from this article: {FULL ARTICLE} that relate to my research and provide quotes that validate each insight. |

The examples outlined below showcase this idea of striving for learning through active engagement and critical dialogue where rather than accept blindly whatever the AI gives you, you stop to reflect, ask for follow ups, question it , and so on.

The idea is that **by understanding the dangers, we can strive to mitigate its negative effects** and learn a healthy path towards trully better learning with AI.

An amazing piece on this topic if you're interested is in [this piece by "The Guardian"](#).

I also like this piece from the "[The Stanford Daily](#)" by Divya Ganesan discussing how one can avoid the "AI temptation zones" and use AI as a tool for critical thinking.

Funny thing is that after listening to this article while walking on the park I did a little AI session on it which I think exemplifies perfectly the type of AI usage I want to advocate for, you can check that out [here](#).

## Some Fake Math To Back It Up

If before you spent an hour to learn X amount of information and knowledge, now you can spend that same hour with same intentional effort to learn  $p * X$  where p is a multiplier associated with proper usage of technological tools.

However there is a catch, if poorly used, AI tools can undermine learning by creating these dangerous incentives towards things like guess and check approaches or copy pasting essays and so on.

To put it in some fake math terms:

$$\text{Learning Output} = p \times X$$

X is the baseline amount of information/knowledge learned in one hour

p = f(proper tool usage) is the efficiency multiplier from using AI tools effectively

p > 1 when AI tools are used properly

$p = 1$  represents traditional learning without AI tools

$p \rightarrow ?$  represents the degradation of learning when AI tools are misused, creating perverse incentives that can undermine knowledge acquisition

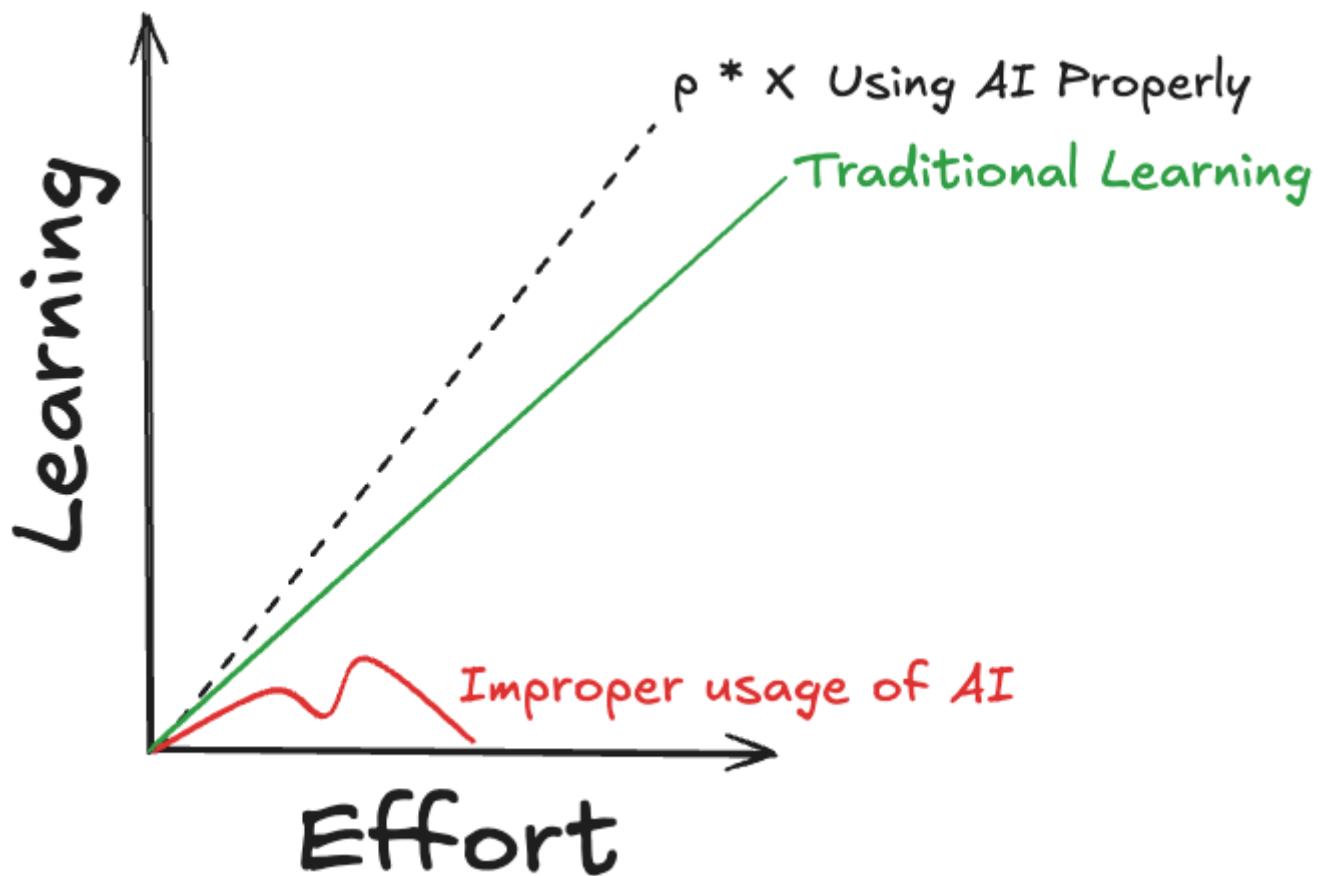


Image generated by me! 😊

Note on this graph is that I don't mean learning is linear, I'm just arguing for the potential of efficient usage of AI.

Think about the fact that if you have time X to do task Y you can either waste it on watching say a full YouTube video from beginning to end, or you can take the video transcript, feed into AI and then extract exactly what you need with timestamp references to the relevant parts, so that you can directly tackle your problem rather than waste time with information you don't need. Why would you not do it? There is a qualitative difference between that and asking AI to do your homework.

In my view, the goal is to:

Boost efficiency of the intentional effort we put in to learning anything by systematically addressing the pragmatic challenges and obstacles of each of proper strategic use of AI for learning, studying and research

## Practical Definitions & Tooling Landscape

??? note "AI & LLM Terminology" ??? note "Core Concepts" - AI Tool: Software that exposes one or more AI models via UI or API to perform tasks (e.g., text generation, summarization, image creation). - Model: A

trained neural network that maps inputs to outputs (e.g., text → text, image → caption). - LLM (Large Language Model): A transformer-based model (often billions of parameters) that predicts and generates text token by token. - Transformer: Neural architecture using self-attention to capture dependencies across a sequence; backbone of modern LLMs. - Token: Discrete unit of text (word piece, character) that the model processes; vocabulary element. - Context Window: Maximum number of tokens the model can "see" in one call; sets the input+output limit. - Prompt: User-provided text (and instructions) that conditions the model's output. - Prompt Engineering: Crafting prompts (templates, examples) to steer model behavior and improve output quality.

??? note "Advanced Concepts"

- Zero-/Few-Shot: Prompting without (zero-) or with a small set of examples (few-shot) to teach the model a task.
- Embedding: Fixed-length vector representing text (or images) in continuous space, used for similarity and retrieval. <span style="color: red">?</span>
- Retrieval-Augmented Generation (RAG): Technique that retrieves relevant documents via embeddings and feeds them into the LLM to ground its answers. <span style="color: red">?</span>
- Agent: Script or workflow that chains multiple prompts, API calls, or tools (search, calculator) to perform complex tasks. <span style="color: red">?</span>
- Structured Output: Constraining model responses into predefined formats (JSON, tables) for reliable parsing and downstream use.
- Hallucination: Model's confident but incorrect or fabricated information; mitigated by grounding, citations, or checks. <span style="color: red">?</span>
- Inference: The act of running the model on new inputs to produce outputs. <span style="color: red">?</span>
- API Call: Programmatic request to an AI service, submitting prompt and receiving model output. <span style="color: red">?</span>

??? note "AI Tooling Landscape" - ChatGPT - Custom GPT (or Custom Assistant): User-configured agent built via templates or fine-tuning to automate repeatable workflows. ? - Projects - Canvas - Claude - Artifacts - Projects - Gemini - Llama - Perplexity - Elicit - DeepSeek - Ollama - NotebookLM

## Foundational Tool Skills

Hopefully at this point you're convinced there is a good way to use AI, so the question is now how? To address this let's start by the tools we need and the skills we aim to develop:

- Prompting (ChatGPT, Claude, Gemini, Llama, Deep Seek)
  - CRE Framework for ChatGPT prompting
  - Practical Approach to Prompting
  - Prompt Templating
  - Prompt Improvers like anthropic console's prompt improver
- Image Generation

- Deep Research
- Prompt management tools

After finishing come back and see which were the tools used in fact

## Foundational 'Meta-Skills'

- Meta-usage
  - Clarifying
  - Learning to ask for questions
  - Planning with reasoning LLMs

After finishing come back and see which were the meta stuff addressed

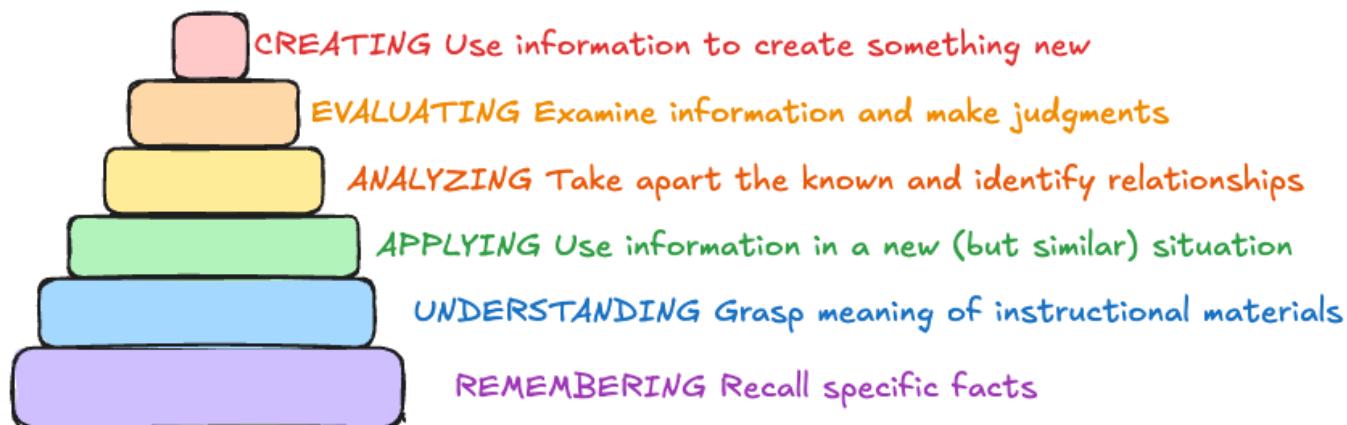
## Learning

To serve a practical end we'll discuss learning as this navigation through the layers of [the Bloom Taxonomy](#).

??? note "Bloom Taxonomy" Bloom's Taxonomy was first articulated in the mid-20th century as a systematic classification of educational objectives, laying the foundation for decades of instructional design and assessment practices. The original concept emerged from a committee of educators chaired by Benjamin S. Bloom and was codified in a handbook focused on the cognitive domain. This seminal work not only defined six hierarchical levels of cognitive processes but also established parallel frameworks for affective and psychomotor domains, profoundly shaping how learning outcomes are written and evaluated.

### Sources:

– 'Bloom, B. S., Engelhart, M. D., Furst, E. J., Hill, W. H., & Krathwohl, D. R. (1956). *Taxonomy of Educational Objectives: The Classification of Educational Goals – Handbook I: Cognitive Domain*. London: Longmans.'



*Image Generated by the author inspired by Bloom 1956*

The Bloom Taxonomy is a systematic classification of educational objectives that outlines 6 hierarchical levels of cognitive processes:

- Remembering

- Understanding
- Applying
- Analysing
- Evaluating
- Creating

Essentially, I want to discuss how we can effectively leverage AI to improve, accelerate and boost the efficiency of each of these learning stages. I also want to emphasize that the bridge I am making here is not scientific, it's merely practical, giving us a useful theoretical foundation with which we can work.

For each of these I want to provide some workable definition of what we're trying to achieve, and then go on to techniques, tips and effective strategies for using AI to navigate each of these stages.

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## Remembering

**For this stage what we want is to have a system to ensure we remember whatever we want.**

My favorite article on this topic is from the legendary Michael Nielsen: '[Augmenting Long Term Memory](#)' where he outlines his preference and interest for [anki flashcards](#).

??? note "Summary of Augmented Long Term Memory" - **Memory is leverage** – Spaced-repetition cuts the lifetime review cost of a fact from ~2 h (paper flashcards) to **4-7 min**, making recall a *choice* instead of luck.

- **Anki's core mechanic** – After every correct answer, the interval before the next review grows ( $\approx \times 2.4$ ). A failure resets the card, enforcing "desirable difficulty". - **Create cards while creating things** – Extract questions from papers, code, conversations or experiments you're *actively* working on; skip "just-in-case" trivia to avoid orphan cards. - **Atomic questions > fuzzy prompts** – One idea per card, no yes/no framing; split big facts into multiple Cloze/Q-A cards for sharper recall. - **One deck, mixed domains** – Tags are fine, but reviewing everything together keeps sessions short (10-20 min/day) and sparks cross-domain associations. - **Retrieval first, re-reading last** – Regular testing at the edge of forgetting strengthens memory far more than rereading notes; convert frequent ChatGPT errors into new cards. - **Declarative  $\leftrightarrow$  procedural bridge** – SRS primes commands, formulas and language; cement them by performing a real micro-task right after review. - **Cognitive backdrop** – Builds on the Ebbinghaus forgetting curve and distributed-practice research: spaced tests flatten the decay curve and enlarge working-memory "chunks", accelerating higher-order thinking. - **Keep the setup simple** – Vanilla Anki (Q-A + Cloze) delivers 95 % of the value; chase plugins and automation *after* the habit sticks.

Source: [Augmenting Long-term Memory]  
(<https://augmentingcognition.com/ltm.html>)

To follow along you should have some flashcard software that you can use, I recommend [Anki Flashcards](#), but similar approaches can be achieved with any other.

I love anki flashcards so here we go. Let's talk about some techniques I use on a weekly basis to help memorize all sorts of information.

### 1. From ChatGPT Chat to Anki

**Prompt:**

'Create {{PUT AMOUNT OF CARDS}} anki flashcards for the content below in the format:

''''''<front content>;<back content>'''''.

Try to capture all the main information and craft cards that can encode that effectively.

{{PASTE CONTENT TO ANKIFY}}

**Expected Output**

```
# For any conversation when there are more than just a few facts I want to memorize I use this prompt
# to just generate a simple .txt file with the structure you see below
back question1 ;front answer 1
back question2 ;front answer 2
....
```

Which allows me to upload them directly to anki in bulk instead of having to create individual cards, imagine having to study for a biology exam and having to write all the cards yourself.

My pro tip is to not go crazy trying to ankify everything because that can lead to a lot of inefficient studying down the line, but to **cultivate a skill of learning what you should memorize**, and then using AI to facilitate the process when you have to memorize a lot of stuff from the same source.

## 2. Quiz From {Source}

Beyond just creating flashcards, you need to actually practice retrieval, given that at this stage is pretty much established that retrieval works quite well if done right.

??? note "Effectiveness of Retrieval Practice on Knowledge Retention" Retrieval practice, or self-testing, has been shown to be an effective strategy for enhancing learning and retention across various academic disciplines (Richmond et al., 2022; Maddox & Balota, 2015). Both overt and covert retrieval practice can benefit retention equally (Smith et al., 2013). The effectiveness of retrieval practice may be influenced by factors such as spacing (Maddox & Balota, 2015), timing (Matayoshi et al., 2020), and the difficulty of retrieval (Greving et al., 2020). However, some studies have found mixed results, with one study in a MOOC environment showing no significant effect of retrieval practice (Davis et al., 2018). Importantly, when given control over their learning, students often fail to utilize retrieval practice effectively, leading to poor retention (Karpicke, 2009). Retrieval practice can improve both higher- and lower-level thinking (Richmond et al., 2022) and enhance subsequent encoding during study (Karpicke, 2009). Additionally, retrieval practice can benefit the accuracy of self-assessment and overall test performance (Pilotti et al., 2009).

Source: [Elicit quick research report]  
(<https://elicit.com/notebook/c2a4cb6f-7c9e-45f8-8ea5-9fb08998d030>)

For quizzes what I like to do is literally ask ChatGPT/Claude/Gemini to quiz me on topic X, usually quizzing yourself directly on the chat can be useful as a kind of screening stage for the stuff you tend to forget, and for which you could potentially create anki cards for.

Prompt:

I am studying for {DESCRIBE THE CONTEXT OF YOUR QUIZ} and I want you to quiz me on this content:  
{PASTE THE CONTENT YOU WANT TO BE QUIZZED ON LIKE A PDF}

Ask me 3 questions at a time and wait for my reply before providing feedback.

The pro tip here is to be very customizable regarding how your quizzed and the nature and format of the questions and the feedback you expect to get.

??? note "Custom Specialized Prompts for the Remembering Stage" 1 — Rapid-Fire Recall Quiz Prompt template "Ask me 10 single-sentence questions that simply check whether I can name, define or list key points about . After each answer I give, tell me immediately if I'm right, supply the correct answer if needed, then move to the next question. End with a scoreboard."

Why it works – immediate feedback plus spacing; uses “name/define/list” verbs tied to the remembering tier.  
[Whatfix] ([https://whatfix.com/blog/blooms-taxonomy/?utm\\_source=chatgpt.com](https://whatfix.com/blog/blooms-taxonomy/?utm_source=chatgpt.com))  
[Tips at UARK] ([https://tips.uark.edu/blooms-taxonomy-verb-chart/?utm\\_source=chatgpt.com](https://tips.uark.edu/blooms-taxonomy-verb-chart/?utm_source=chatgpt.com))

2 – Cloze-Deletion Flashcards  
Prompt template  
“Create 20 cloze-deletion cards (Anki-style ‘fill-in-the-blank’) for the most testable facts about <topic>. Return them as a two-column table: Front (sentence with [...] blank) | Back (missing word).”

Cloze cards force lexical recall, not mere recognition, while tables paste straight into flashcard apps.  
[TeachThought] ([https://www.teachthought.com/critical-thinking/question-stems/?utm\\_source=chatgpt.com](https://www.teachthought.com/critical-thinking/question-stems/?utm_source=chatgpt.com))  
[Salisbury University]  
([https://www.salisbury.edu/administration/academic-affairs/instructional-design-delivery/articles/blooms-taxonomy-action-verbs.aspx?utm\\_source=chatgpt.com](https://www.salisbury.edu/administration/academic-affairs/instructional-design-delivery/articles/blooms-taxonomy-action-verbs.aspx?utm_source=chatgpt.com))

### 3 – Definition-Matching Grid

Prompt template

“Give me a shuffled list of 15 terms and 15 concise definitions for <topic> in two separate numbered columns so I can draw lines or use drag-and-drop tools to match them.”

Matching is a classic remember-level activity and the two-column format plugs into digital worksheet generators.

[ThoughtCo]([https://www.thoughtco.com/blooms-taxonomy-questions-7598?utm\\_source=chatgpt.com](https://www.thoughtco.com/blooms-taxonomy-questions-7598?utm_source=chatgpt.com))  
 [Utica University]  
[https://www.utica.edu/academic/Assessment/new/Blooms%20Taxonomy%20-Best.pdf?utm\\_source=chatgpt.com](https://www.utica.edu/academic/Assessment/new/Blooms%20Taxonomy%20-Best.pdf?utm_source=chatgpt.com))

### 4 – Memory-Palace Hooks

Prompt template

“For each core fact I must memorize about <topic>, produce: 1) the fact in one sentence; 2) a vivid, quirky image I can visualize in a memory-palace room; 3) a one-word cue. Limit to 12 items.”

Adds imagery to raw recall, strengthening encoding while staying inside the “remember” objective.

[worldofinsights.co](https://worldofinsights.co)  
 [Whatfix]([https://whatfix.com/blog/blooms-taxonomy/?utm\\_source=chatgpt.com](https://whatfix.com/blog/blooms-taxonomy/?utm_source=chatgpt.com))

### 5 – 1-Minute “Dump” Drill Generator

Prompt template

“Give me a prompt that tells me to write down (from memory, no peeking) everything I know about <topic> for exactly 60 seconds, then supply the authoritative list so I can compare gaps.”

The timed free-recall (“brain dump”) pushes retrieval fluency; comparing to the model answer highlights omissions.

## 3. Quizzing with Quotes

When quizzing yourself with a PDF for example the #1 tip is for any statement given ask for a 'quote that validates it', for example

??? note "Prompt for Quizzing with Quotes" ` ` ` Prompt: You are an expert instructional-designer.

I will paste text from a PDF (any length, possibly in chunks). Create \*\*higher-order multiple-choice questions\*\* that check genuine comprehension (analysis, causation, implications, synthesis).

\*\*Format your reply exactly like this (no JSON, no extra commentary):\*\*

1. \*\*[Question]\*\*

- A) ...
- B) ...
- C) ...
- D) ...

THE OUTPUTS LIKE BELOW SHOULD BE PROVIDED AFTER GETTING THE USER's answer FIRST:

\*\*Answer:\*\* C

\*\*Supporting quote (page #, paragraph #):\*\* "Exact ≤ 40-word excerpt that proves the correct answer."

## 2. \*\*[Question]\*\*

...

...and so on until the user says STOP, or asks for modifications on the quiz.

### \*\*Rules\*\*

- Choices must be plausible, mutually exclusive, and cover common misconceptions.
- Do \*\*not\*\* repeat wording from the stem in the correct choice.
- Draw questions from across the whole document so every main section is tested.
- Quotes: copy verbatim—including punctuation—from the PDF; shorten with ellipses only if necessary for brevity.
- Do \*\*not\*\* provide quotes for wrong choices or add explanations besides the single supporting quote.
- Keep the presentation clean—just the numbered list above, nothing else.
- Ask ONE QUESTION at a time, wait for answer, then give rich FEEDBACK and move to the next question

```

### Example output:

```
! [](..../assets/quiz-with-quote-answer.png)
*Screenshot take from https://chatgpt.com/*
```

## 4. Summarize with References to Sources

You can also ask for summaries that refer to the original source for quick reference and validation:

Prompt:

Summarize the following content in a format that presents a bullet point followed by a related key quote to illustrate each summarized bullet point:

```
{{ SOURCE CONTENT LIKE A PDF }}
```

You can do the same even with Youtube videos:

Prompt:

Summarize this Youtube video the transcript is below:

{INPUT YOUTUBE TRANSCRIPT}

Now the summary should be about the main topics discussed regarding algebraic topology and the structure of the summary should follow:

...

1. {Core idea explanation}

- youtube link refering to the timestamp that validates the idea

2. {Core idea explanation}

- youtube link refering to the timestamp that validates the idea

etc...

...

to create the youtube links with the right timestamps consider this is the link for the original video:

{INPUT YOUTUBE LINK}

## 5. AI-Powered Search for Validation of Summarized Information Access

When you're quizzing yourself or creating flashcards, obviously you need to make sure that the information holds, to guarantee that you can use AI-powered search to validate sources for questions and information that you think might not be as widely available online.

You can leverage search + smart prompting to [create flashcards that accompany sources](#).

Search should also serve as validation specially for topics you think might be less available online and therefore the model's training might not be able to properly prepare the model to respond.

Prompt:

'Create {NUMBER OF CARDS} anki flashcards for the content below in the format:

''''''<front content>;<back content>;source as link if available or reference to doc title or origin''''.

Try to capture all the main information and craft cards that can encode that effectively.

content:

{INPUT RAW CONTENT}

Make sure to:

{INPUT ANY CUSTOM INSTRUCTIONS}

## 6. Leverage Image Generation for Memorizing Procedures

Now, beyond just prompting we can leverage other generative capabilities of AI models to complement memorization of specific types of information or processes. For example, one thing I like to do is to leverage GPT-4o image generation for memorizing procedures.

Prompt:

{INPUT RECIPE/PROCEDURE WITH CONCRETE STEPS}

Can you Create a helpful visual to help me remember this ?

Make sure to include

1. All the ingredients
2. All the instruction steps through relevant imagery
3. Make it a like in a graphic novel like style

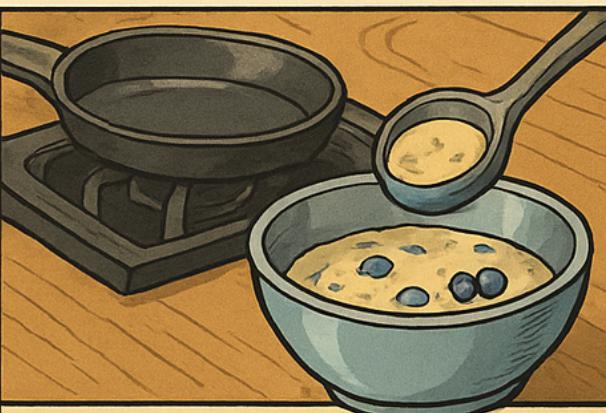
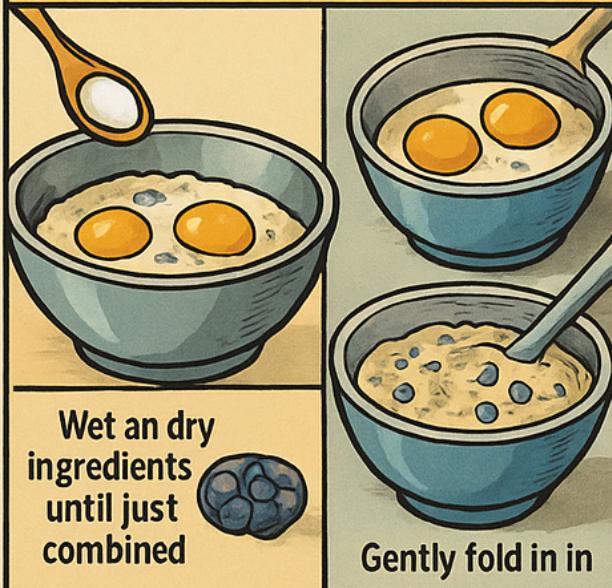
# FLUFFY GREEK YOGURT BLUEBERRY PANCAKES WITH STRAWBERRY MAPLE SYRUP

## INGREDIENTS

For the Pancakes:



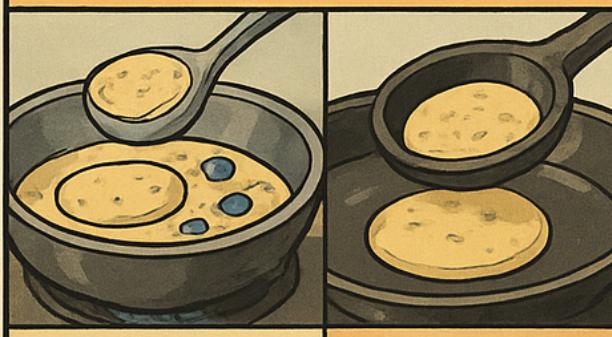
## PREPARE THE BATTER



In separate bowl,  
baking powder,  
a baking soda

1 cup pure maple  
syrup por vanilia  
extfakt, mik

## COOK THE PANCAKES



Batter being scoop  
onto sckliot ac  
butter on koldi



## MAKE THE STRAWBERRY MAPLE SYRUP



1 assapoon me-  
dium heat~e

Simmer over  
strawberries,  
vanilia extrat

## SERVE



*Image generated with GPT-4o*

You can check out the full conversation with ChatGPT [here](#).

## Tips for Better Remembering with AI

- Never generate cards blindly, if you don't have agency over the process you might recall some facts but won't be able to integrate that into anything
- Don't try to memorize too much at first, get an overview first by chatting with the model about the topic of interest
- Leverage [Programmable Attention](#)

??? note "Programmable attention and priming" Programmable attention, a concept explored by Andy Matuschak, refers to systems that dynamically guide your focus over time, automating the scheduling of small tasks—like flashcard reviews or creative exercises—to optimize learning and productivity. Tools such as spaced repetition systems (e.g., Anki, Orbit) exemplify this by managing when and what you review, reducing cognitive load and enhancing retention. This approach extends beyond memorization to support creative work and habit formation, integrating with practices like evergreen notes to foster sustained intellectual development.

Source: [https://notes.andymatuschak.org/Programmable\\_attention](https://notes.andymatuschak.org/Programmable_attention)

## Understanding

- Start off with basic brainstorming - [example chat](#)
- Explain it back

### Informal (spoken) version Example from chat:

*"I'm trying to work out the main points of this paper. I'm going to talk to you about it. Give me very quick feedback about it, about whatever I say, and refer to the original article every time to validate."*

⌚ 00:17



Sure, let's do it! Share your main points and I'll validate them with the article.

*"From what I understood, this article discusses the danger the AI poses in terms of diminishing people's intelligence by making them over-reliable to this technology in the way that they began to outsource things that they would need to develop themselves in order to develop their intelligence. That poses a lot of dangers, and they outline the dangers and what we can do to mitigate"*

⌚ 00:25

Yes, that captures the core argument. The article emphasizes concerns about AI leading to over-reliance, which could weaken cognitive skills like critical thinking and memory. It also discusses potential dangers, like reduced creativity and the risk of disinformation. And it suggests focusing on critical thinking and independent problem-solving to mitigate these effects.

### Formal version

#### Prompt

I am analyzing a specific article and want to extract and understand its main points. I will share my thoughts with you one at a time. For each thought I share:

Give me immediate and concise feedback.

Refer explicitly to the original article to validate or correct what I've said.

Keep your responses focused and factual, pointing out where my interpretation aligns with or diverges from the text.

- Compare & Contrast

#### Prompt

I'm studying {X} Prompt me to write a 100-word paragraph comparing and contrasting {CONCEPT A} and {CONCEPT B}, focusing on purpose, process and

outcome. After I answer, supply your own comparison with a three-bullet improvement checklist.

??? note "More Prompts for Understanding" Differentiate between A and B **Prompt:** Task 1 (60 s, no notes): List at least three key ways that <concept A> and <concept B> differ in purpose, structure and outcome. Task 2: When I'm done, show a concise comparison table (rows = dimensions; cols = A vs B) and highlight any distinctions I missed or got wrong. Quick example Replace the placeholders with mitosis vs meiosis (biology) or traditional budgeting vs zero-based budgeting (finance). Identify the main idea of X **Prompt:** Give me a 120-word, expert-level paragraph on <topic>. Instruct me to rewrite the single, clear main idea in ≤20 words without looking back. After my answer, display the authoritative main-idea sentence and emphasise any concepts I omitted. Quick example Topic could be the Doppler effect (physics) or Maslow's hierarchy of needs (psychology). Explain "Why did ...?" **Prompt:** Ask me: 'Why did <event/process> happen, and what were its two most significant consequences?' After I answer (max 150 words), provide a model explanation organised as Cause → Mechanism → Effect 1 & 2, and underline any causal links I missed. Quick example Fill with Why did the Berlin Wall fall in 1989? or Why does increasing enzyme temperature accelerate then inhibit reactions?

### Paraphrasing short chunks of large materials

```

#### **Prompt**

"Give me a short authoritative paragraph (≈120 words) about {TOPIC}. Tell me to paraphrase it in my own words without looking back. Then display both texts side-by-side and flag any ideas I dropped or distorted."

```

#### **Quick Example**

```"Give me a short authoritative paragraph (≈120 words) about the process of photosynthesis. Tell me to paraphrase it in my own words without looking back. Then display both texts side-by-side and flag any ideas I dropped or distorted."```

## Applying

The Applying stage focuses on using knowledge in practical contexts, requiring students to demonstrate understanding through concrete examples, exercises, and real-world applications.

### 1. Rich context informed feedback

??? note "Applying Stage Prompts" ### Examples & Application

#### ### Experimentation

```

**Prompt:** Give me an idea for an experiment I could do to test

my knowledge of {X}.

```

```

Prompt: "Generate 3 concrete examples of how <concept> applies in real-world scenarios."

For each example, explain how it demonstrates the core principles of {INPUT YOUR TOPIC OF FOCUS}

```

### ### Exercises

```

Prompt: "Create 5 exercises I can use to practice skill {X}."

```

### ### Study Guide Creation

```

Prompt: "Create a comprehensive study guide for {TOPIC} that includes:

- Key concepts and definitions
- Practical examples
- Common misconceptions
- Practice questions
- Real-world applications"

```

### ### Contextual Feedback

```

Prompt: "Review my understanding of {CONCEPT} and provide feedback that:

1. Acknowledges my current level of understanding
2. Points out specific areas for improvement
3. Suggests practical ways to apply this knowledge"

```

### ### Analysis of Mechanisms

```

Prompt: "Explain why {PROCESS/CONCEPT} works the way it does, breaking down:

4. The underlying principles
5. The cause-and-effect relationships
6. The practical implications"

```

### ### Modification & Adaptation

```

Prompt: "How would you modify {PROCESS/SYSTEM} to achieve {SPECIFIC GOAL}?

Consider:

7. Current limitations
8. Required changes
9. Potential impacts"

```

### ### Instruction Development

```  
Prompt: "Create a step-by-step guide for {PROCESS/TASK} that:  
10. Is clear and actionable  
11. Includes important precautions  
12. Provides examples for each step"  
```

## Analysing & Synthesizing

??? note "Prompts for Analysis and Synthesis" Summary ``` Prompt You are an expert content summarizer. You take content in and output a Markdown formatted summary using the format below.

### OUTPUT SECTIONS

Combine all of your understanding of the content into a single, 20-word sentence in a section called ONE SENTENCE SUMMARY:.

Output the 10 most important points of the content as a list with no more than 16 words per point into a section called MAIN POINTS:.

Output a list of the 5 best takeaways from the content in a section called TAKEAWAYS:.

### OUTPUT INSTRUCTIONS

Create the output using the formatting above.

You only output human readable Markdown.

Output numbered lists, not bullets.

Do not output warnings or notes—just the requested sections.

Do not repeat items in the output sections.

Do not start items with the same opening words.

```

This example was adapted from [here]

(<https://github.com/danielmiessler/fabric/blob/main/patterns/summarize/system.md>)

## Weighing Factors

```

### Prompt

I read this: {CONTENT} and for this context: {CONTEXT DESCRIPTION}  
these are the factors I consider to be relevant along with a 1–5 score  
for their importance {INPUT YOUR OWN FACTOR RANKING},  
give me feedback on this by contrasting with your own and organizing  
everything into a table.

```

## Contrasting Perspectives

```

### Prompt

Given context {CONTEXT} I think {YOUR PERSPECTIVE} take an opposing view  
and argue with me helping me flush out arguments and ideas.

Let's work through small debating sessions focused on one topic at a time.

```

### Re-framing (Contrasting & Reflecting)

#### Prompt

```

I'll paste a {TEXT\_TYPE} on {TOPIC}.

- First, \*\*I\*\* will rewrite {NUM\_PARAGRAPHS} paragraphs from the perspective of a {LENS\_A}; you \*only\* respond with probing questions that test my framing.
  - After my revision, \*\*you\*\* produce your own {LENS\_A} version \*\*and\*\* a {LENS\_B} version, noting three framing shifts between them.
  - End with one question that forces me to choose which lens better serves my purpose.
- ```

#### \*\*Placeholder guide\*\*

| Placeholder  | What to insert | Example |
|--|----------------|---------|
| `{TEXT_TYPE}`  Kind of source you'll paste   *policy brief*, *lab report*, *news article*    |                |         |
| `{TOPIC}`  Subject matter   *urban housing*, *quantum computing*                             |                |         |
| `{NUM_PARAGRAPHS}`  How much you'll rewrite first   *two*, *one*                             |                |         |
| `{LENS_A}`  First analytic lens or stakeholder view   *behavioural economist*, *UX designer* |                |         |
| `{LENS_B}`  Second contrasting lens   *environmental activist*, *CF0*                        |                |         |

Much fancier example [here]

([https://github.com/danielmiessler/fabric/blob/main/patterns/analyze\\_paper/system.md](https://github.com/danielmiessler/fabric/blob/main/patterns/analyze_paper/system.md))

## Evaluating

??? note "Examples of Prompts for Evaluating Stage"

#### \*\*Agree / Disagree\*\*

```

#### Prompt

I'm going to share a {STATEMENT} about {TOPIC}.

- First, \*\*I\*\* decide whether I \*agree\* or \*disagree\* and give a brief rationale ( $\leq 100$  words).
- You reply with
  1. one probing question that tests my reasoning and
  2. a concise counter-position backed by one piece of {EVIDENCE\_TYPE}.

Finish by asking me to revise or stand firm—and explain why.

...

**Placeholder guide\***

Placeholder	Insert...	Example
`{STATEMENT}`	Claim / assertion	Social media worsens teenage mental health.
`{TOPIC}`	Subject area	adolescent psychology
`{EVIDENCE_TYPE}`	Evidence style	peer-reviewed study

---

**Choosing the Best Option\***

...

**Prompt**

I'll paste {NUM\_OPTIONS} candidate {OPTIONS\_TYPE} for solving {PROBLEM}.

- \*\*I\*\* will rank them best → worst and add a one-sentence reason for each.
- You then
  3. share your own ranking (mark any swaps with ),
  4. point out one criterion I overlooked and
  5. ask how including that criterion might change my decision.

...

**Placeholder guide\***

Placeholder	Insert...	Example
`{NUM_OPTIONS}`	Number	3
`{OPTIONS_TYPE}`	Plans / tools / policies   marketing strategies	

``{PROBLEM}``	Challenge	boosting newsletter engagement
---------------	-----------	--------------------------------

---

### \*\*Determining the Most Effective Approach\*\*

```

#### Prompt

I'll provide three approaches ({APPROACH\_A}, {APPROACH\_B}, {APPROACH\_C}) to achieve {GOAL}.

- Build a comparison grid whose rows = evaluation criteria I list below.
- Leave the grid blank for me to score 1-5.
- After I post my scores:
  - add your own,
  - highlight in \*\*red\*\* any criterion where we differ by  $\geq 2$  points and justify briefly,
  - conclude with an evidence-based verdict on the most effective approach.

```

### \*\*Placeholder guide\*\*

Placeholder	Insert...	Example
----- ----- -----		
``{APPROACH_A/B/C}``	Method names	in-house build
/ outsourced SaaS / open-source stack	Desired outcome	deploying a
``{GOAL}``		
data dashboard		

---

### \*\*Opinion-with-Evidence\*\*

```

#### Prompt

I'll paste a question: {OPINION\_QUESTION}.

- \*\*I\*\* share my opinion plus at least two supporting reasons or pieces of evidence.
- You evaluate my support by
  6. rating each reason for credibility (1-5),
  7. suggesting one stronger piece of {EVIDENCE\_TYPE} and
  8. asking a follow-up that deepens the argument.

```

### \*\*Placeholder guide\*\*

Placeholder	Insert...	Example
	----- ----- -----	
`OPINION_QUESTION`   "What is your opinion...?" prompt	Should universities scrap final exams?	
`EVIDENCE_TYPE`   Evidence style		
longitudinal study		

---

**\*\*How Would You Improve This?\*\***

```

**Prompt**

I'll paste a {WORK\_SAMPLE} on {TOPIC}.

- First, **\*\*I\*\*** list three concrete improvements.
  - You then
    9. score each suggestion for impact (★-scale) and feasibility (\$ -scale),
    10. offer one high-leverage improvement I missed and
    11. challenge me to draft an action plan for the highest-impact item.
- ```

**\*\*Placeholder guide\*\***

| Placeholder | Insert...                                     | Example           |
|-------------|---|-------------------|
|             | ----- ----- -----                             |                   |
| --          | `WORK_SAMPLE`   Draft / design / code snippet | executive summary |

---

|                   |             |
|-------------------|-------------|
| `TOPIC`   Subject | sustainable |
| packaging         |             |

---

**\*\*Stronger Argument\*\***

```

**Prompt**

I'll present two arguments ({ARG\_A} vs {ARG\_B}) about {ISSUE}.

- **\*\*I\*\*** choose which is stronger and justify in ≤ 120 words.
  - You respond by
    12. steel-manning the side I \*didn't\* pick,
    13. surfacing one hidden assumption in my reasoning and
    14. asking whether revising that assumption alters my verdict.
- ```

### \*\*Placeholder guide\*\*

Placeholder	Insert...	Example
`{ARG_A}` / `{ARG_B}`	Argument summaries	pro vs con
on remote work		
`{ISSUE}`	Debate topic	workplace
productivity		
<hr/>		
<hr/>		

## Creating

??? note "Example Prompts for Creating"

### \*\*Rapid Prototype Planner\*\*

```

#### Prompt

I'll describe a {RAW\_IDEA} for a {PRODUCT\_TYPE}.

- First, \*\*I\*\* identify the core user need.
- You then
  1. outline a no-code or low-code way to test the idea in ≤ 3 steps,
  2. list one metric for each step to validate success and
  3. suggest one resource (tool, tutorial, template) to accelerate execution.

```

### \*\*Placeholder guide\*\*

Placeholder	Insert...	Example
`{RAW_IDEA}`	Concept / feature description	habit-tracking app
for ADHD		
`{PRODUCT_TYPE}`	Category	mobile app
<hr/>		
<hr/>		

### \*\*Story Remix\*\*

```

#### Prompt

I'll paste raw {FACTS} about {TOPIC}.

- \*\*I\*\* note the target audience's reading level.
  - You respond by
    4. weaving the facts into a 4-paragraph story arc (setup → conflict → climax → resolution),
    5. embedding an analogy and a vivid sensory detail and
    6. ending with a thought-provoking question to spur reflection.
- ```

**Placeholder guide\***

| Placeholder | Insert...           | Example                   |
|-------------|---------------------|---------------------------|
| `{FACTS}`   | Bullet list / notes | climate change statistics |
| `{TOPIC}`   | Subject             | polar ice melt            |

---

**Teach-Back Mini-Course\***

```

**Prompt**

I want to teach {SUBJECT} to {LEARNERS}.

- \*\*I\*\* outline one constraint (time, format, prior knowledge).
  - You then
    7. draft a concise 3-module syllabus,
    8. propose an interactive activity for each module and
    9. provide a quick formative assessment to measure learning gains.
- ```

**Placeholder guide\***

Placeholder	Insert...	Example
{SUBJECT}	Topic	SQL joins
{LEARNERS}	Audience description	bootcamp graduates

---

## Studying

In this section I want to look at studying as the process of building an effective practice for learning new information.

For that we need to define:

1. What does it mean to study effectively?
2. What does an effective study session looks like?
3. How to build a consistent study practice leveraging AI tools

## 1. What does it mean to study effectively?

In the start of this article I stated that learning effectively was correlated with the amount of intentional effort you put into it. When discussing the effectiveness of studying I'll frame it as the process of getting the absolute most out of the intentional effort you put into studying whatever you want to learn.

In practice this means the following:

1. Setup our environment to increase the likelihood of achieving some kind of 'flow'
2. Setup a goldilocks feedback loop
- 3.

\* Intro - Poor use of ChatGPT is a function of external factors and internal factors imagine a phd student \* Intro - F(lack of supervision, thesis deadline, lack of feedback and support, nervousness) = ChatGPT write my thesis \* Intro - its about learning what to off load and how so people spend time more on the harder thinking stuff rather than on boilerplate stuff - Start with boiler plate summary - Open Ended chat about the topics and concepts of the paper/book - Go into quizzes of the core stuff (getting feedback) - Settle on the information you should definitely know (perhaps even with input from the model itself) - Create bulk anki flashcards - This simple flow allows you to stay in the flow, have intellectual agency and ownership over the knowledge being acquired, and then - create the flashcards that guarantee you won't forget the information - Getting timestamps with youtube videos for quick link references to video parts - <https://chatgpt.com/share/6808b294-5790-8004-ab98-47f5247abc19> - \* Study - Creating study guides from course syllabus \* Study/reseach - Use case - superwhiper/ChatGPT transcription for interacting with the chat interface \* Study/researxh- Advanced mode for natural conversations about X \* Studying - Demonstrate the language learning with advanced mode option - [ ] Study - You can edit and customize feedback on a quiz, make it more or less precise, customize the type of questions etc... cause thinking about the questions is extremely effortful heavy Also, image generation for creating visual handouts and stuff like that - Knowledge Capture & Note-Taking - Chat with Your Notes: Obsidian/Notion + RAG on PDFs - Extracting "Bites" from papers, arguments, LLM cocreation - [ ] Study/research - Talk about my bites extraction stuff? - YouTube & Video: - NotebookLM for summaries (timestamps + quotes) - NotebookLM for brainstorming across multiple sources - NotebookLM for interactive maps - Extract YouTube summaries - Mind-maps & Diagrams: Excalidraw export → editable diagrams - [memorizing procedures] (<https://chatgpt.com/share/6806cb45-8124-8004-ba86-3c4ce08df6e2>) - "Socrático" brainstorming over PDFs - Prompt for an AI-based teaching assistant - Question Engineering - Brainstorm open-ended questions - "What If" Loops in ChatGPT for exploration - Deep Research points - Using "Projects" for exam preparation

## 2. What does an effective study session looks like?

### Tips for Effective Study Sessions

- Avoid reasoning models for actually doing the quiz (they are too slow for the feedback loop you're looking for)
- Generate questions in batches of 10 or 20 - put them into a custom app - try them out - track your score - etc....
- Use Custom GPTs for when you're reusing a given prompt too much, and projects for when you need to organize and integrate information across many files and sources

- A 'meta-cognitive' tip is that when facing topics you are completely unfamiliar with ask the model which questions should you be asking given the stage you're in.

??? note "Learning with AI Is Learning Self-Control" As we've discussed before learning properly with AI is directly related to your ability to self-control and contain the impulse to outsource the wrong things to an LLM. However, that's easier said than done, given the individual's energy levels throughout a day, week or month varies depending on a bunch of external factors, the fact that we can't necessarily have full control of these represents a significant danger in this self-regulatory battle.

What I mean is that, as our energy levels go down, the likelihood of outsourcing the wrong things to AI goes up, meaning that if you're tired, you have an exam coming up, you're not sleeping well, and you have to read say a 45 page manual on quantum mechanics, you may start asking for answers more than actually engaging with the material meaningfully.

To prevent that it's important to develop through either daily logs or some serious self-talk a powerful sense of your internal state that allows you to know at any point in time whether or not you're progressing or if you're just fooling yourself with low quality sessions, specially given that AI can produce this very powerful false impression of knowledge acquired through blind generation of information.

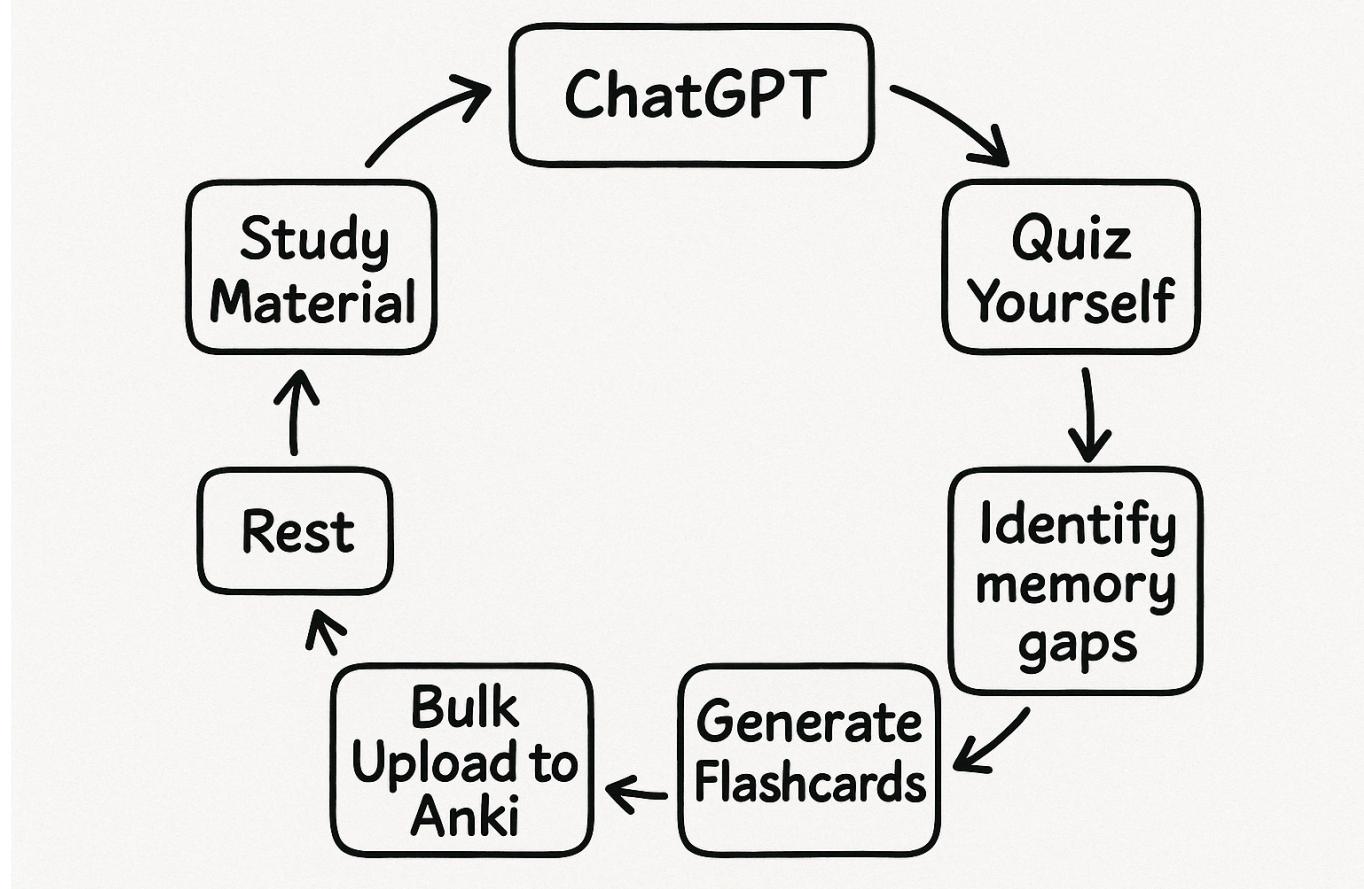
### 3. How to build a consistent study practice leveraging AI tools

In this section we'll learn how to **build practice** with the help of AI tools and some simple principles for effective study sessions.

This practice will be essentially a result of constructing **micro-flows** which encompass:

1. A regular environment with predictable regularities
2. A concrete tangible feedback loop
3. A pipeline for gradually increasing challenges

For example a micro flow for preparing for a biology exam might look like:



*Image generated with GPT-4o*

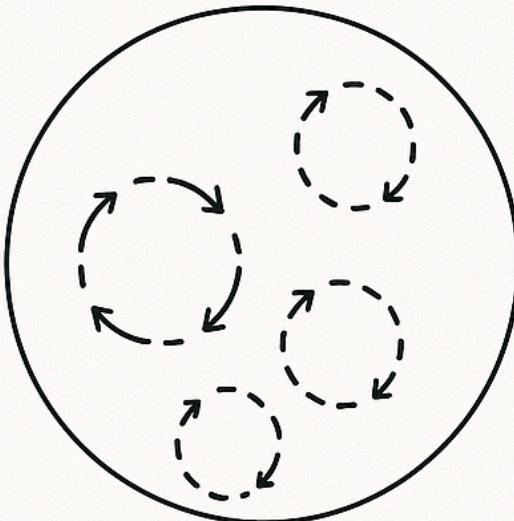
learner/student etc... Building these micro-flows I think, improves quite a bit your productivity as a

- <https://stanforddaily.com/2025/04/06/ganesan-how-to-be-an-ai-student/>
  - Use AI as a personal grader. Run your essays through AI and ask: What level is this? How can I improve it? You'll get valuable feedback that can help you refine your writing before turning it in.
  - Challenge yourself. Write down a statement related to the lecture and ask AI to argue against it. Engaging in debate with AI can sharpen your critical thinking skills.
  - Use AI to break through writer's block. If you're stuck, write messily and then ask AI: What are the main points in this? This can help you structure your ideas and gain clarity without falling into perfectionism paralysis.

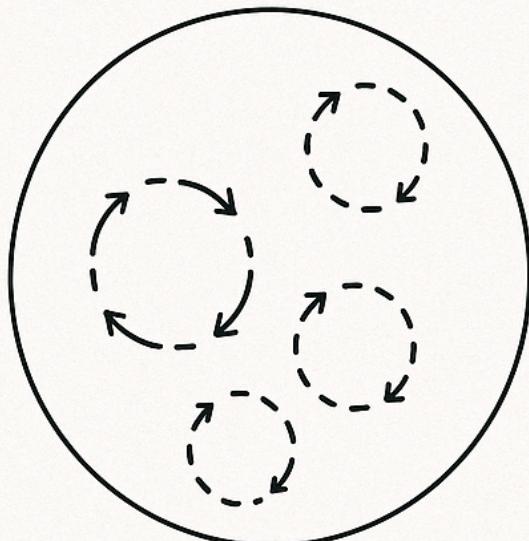
However, its important to note that building these is not a result of you learning tool X or Y, but mostly identifying how you yourself do things, which tools you're comfortable with then finding that perfect middle ground that balances the tradeoff between the friction of learning new tools and approaches with the knowledge and tooling you already have to get you to build flows that work perfectly for you.

- audio transcription → notes

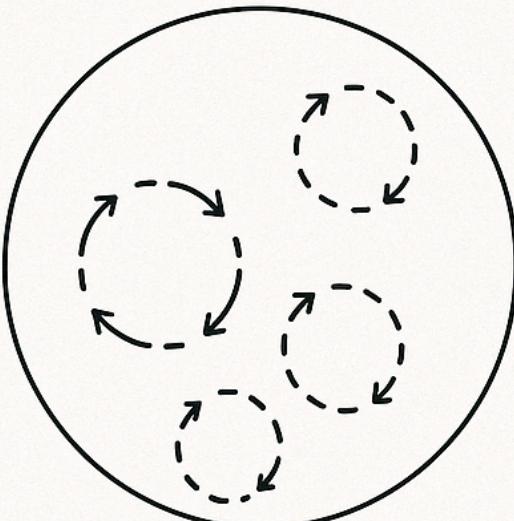
## Studying Math



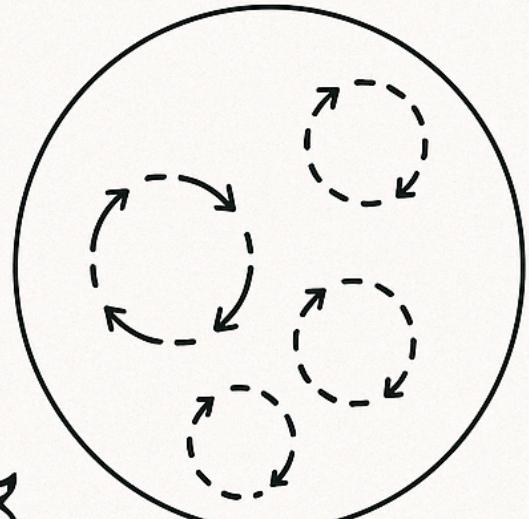
## Learning Mandarin



## Coding



## Exam Preparation



### *Image generated with GPT-4o*

- Share the generating HTML/Javascript approach + structured outputs to quiz yourself quickly - Workflow as a Skill: repeatable AI-powered processes (creation of those micro flows) - Example: - [ ] Compare to how musicians learn complex pieces for the idea of micro-flows? Acknowledging that you can't learn everything like that - [ ] refer to aresol piano youtube channel for reference on that

## Additional Points on Learning with AI

- Learning with Reasoning LLMs (!= models != usage) - Diagramming - Unsticking yourself - AI strategies to unblock oneself, Overcoming Analysis Paralysis: AI strategies to unblock learners - Managing Cognitive load
- Image generation? - Be Specific: learner, objective, context → what/how to create - Style-Guide Generation & QA: AI-driven scripting standards & rubric checks - audio transcription → notes

## Researching

### Personal Context

- My limited experience as a researcher
- My motivation → Friends have low tech skills

There is a different level of concern with sources when working in research

- Integrating with a table as a pattern for effective research then create a flow to review and so on how would it integrate with phd thesis writing?
- How to integrate diagramming systematically?
- Leveraging table formats for fact extraction organization
- Leverage Structured Data Extraction + Table Conversion?

### Addressing Specific Pain Points

- Lit. Review
- Citations?
- Collecting Paper references with structure [Show Google AI Studio Example](#)
- Inspecting Evidence
- Analyzing Insights from X Papers
- Data Management + Organization
- ChatGPT/Claude for Data Analysis
- Diagrams
- Data extraction
  - Table-like formats
  - (e.g. elicit)
- a standardized way of reading with LLMs - Look into that Stanford paper about the 3 reading pass
- Special mention: Gemini for Data Analysis: step-by-step in Colab
- Practice listening to papers with TTS
- Deep Research points
- Elicit (academic reports)

- Using "Projects" for research

## Patterns for Effective AI Usage

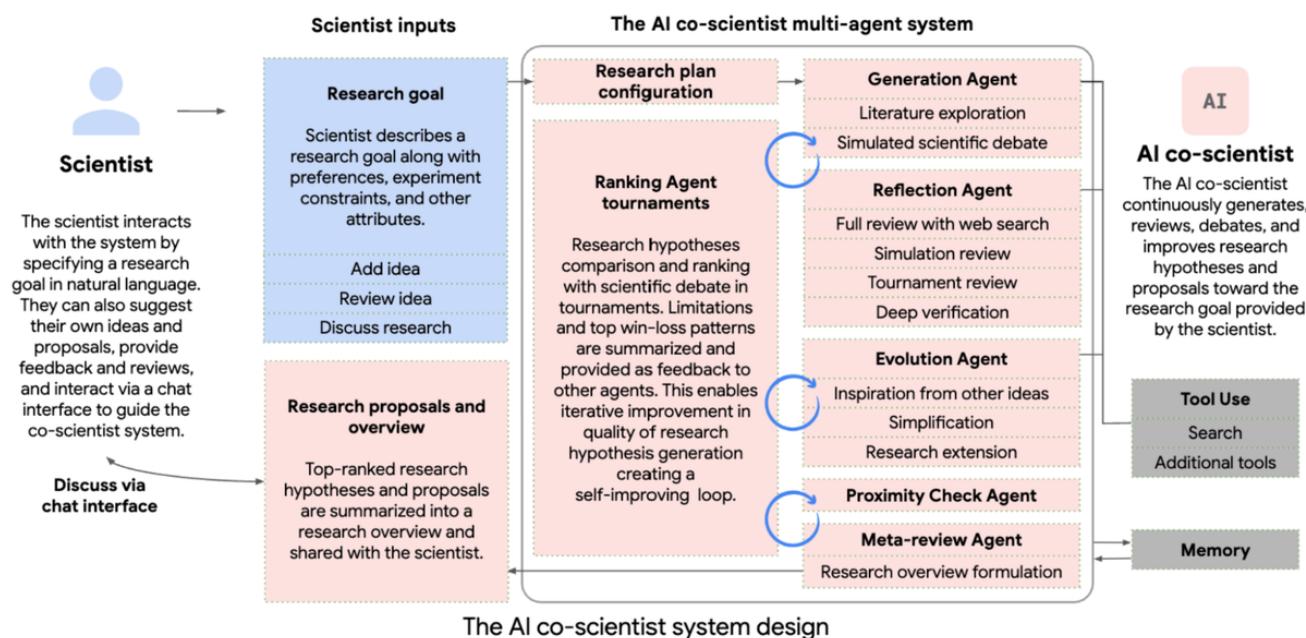
- \* General tips intro - Use Customer instructions to prototype experiment and then custom GPT once you have the used case clear your mind

## Browser Level Quick Data Extraction Techniques

- custom html/js app to avoid paying for quiz apps - What is this paradigm represented by increasingly compressed approach to data processing like: - gitingest - r.jina.ai - arxiv-text - etc....

## Thoughts on Future of Human-AI Integration

### AI Co-Scientist?



Gottweis et al. 2025

Include note on the future of science with these approaches

Another example of papers like these:

Automated Hypothesis Validation with Agentic Sequential Falsifications: <https://arxiv.org/abs/2502.09858>

### AI Scientist V2?

- 1. Hallucination Examples & common-sense checks - 2. Misinformation by Omission & reference-spotting limits - 3. Data Security (OpenAI Academy note) - 4. GenAI Risks in Learning & Research - 5. NYT Guidelines: advised vs. forbidden AI uses in newsrooms

## Conclusion

I wrote this piece in preparation for a [workshop](#) I'll be teaching next Saturday in Lisbon with the same title.

- George Polya Quote - Teaching Math is education of the will - 1. AI Control Center Vision for learning - 2. Granular Effects on productivity and expertise - 3. LLMs as Co-creation Partners - Mention fabric as a good source for finding patterns that work? - Primitives with LLMs

A tool must be predictable

Super whisper + create modes to summarized rambling thoughts

Create a comprehensive table with tool use case category maybe like proper way to use it, how not to use it make it like a big table for people to use



*Image generated with GPT-4o*

Introduce something about this here? Cognitive Endurance: Training attention span as human capital. - [ ] - [ ] Like a general intro before diving into the specific branches? - [ ] Complexity translation - [ ] Patterns like context (docs...) + precise instructions - [ ] - How to Pick a Model? - - [ ] Intro - Include a "Which model to use for what section asking about leaderboards, benchmarks, artificial analysis etc..." - Match Model to

Task: "Planners" for thinking vs. "workhorses" for execution + Learning with Reasoning LLMs table. -

Metacognitive Benefits: How reasoning LLMs help tackle vague/complex tasks. - Have a prediction - If you have no prediction for what's coming, like when I give an example of asking it to generate a huge essay, you end up with some output that you have no models in your mind for how it should look. That is a problem. It forces you to make a decision between accepting this slop—slop meaning AI-generated output—or saying to rewrite it, which puts you into an infinite loop that never ends. - Manage Cognitive Load: Bite-sized steps that fit working memory. - Extracting Insights from paper and organizing them into a table - Note on programmable attention from matuschak - Note from Matuschak's principle for learning stuff could be interesting - Talk about my workflow of generating small focused research reports to read in batches.

## References

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- [https://eclasse.uoa.gr/modules/document/file.php/PPP242/Benjamin%20S.%20Bloom%20-%20Taxonomy%20of%20Educational%20Objectives%2C%20Handbook%201\\_%20Cognitive%20Domain-Addison%20Wesley%20Publishing%20Company%20%281956%29.pdf](https://eclasse.uoa.gr/modules/document/file.php/PPP242/Benjamin%20S.%20Bloom%20-%20Taxonomy%20of%20Educational%20Objectives%2C%20Handbook%201_%20Cognitive%20Domain-Addison%20Wesley%20Publishing%20Company%20%281956%29.pdf)