



How Generative AI can Support Innovative Teaching Practices

DR. NURUL FARHANA JUMAAT
Department of Advanced Learning Technology
Faculty of Educational Sciences and Technology
Universiti Teknologi Malaysia
nfarhana@utm.my

Name: Nurul Farhana Jumaat
Affiliation: UTM



Outline

1. AI-assisted lesson materials and content generation.
2. Personalized learning pathways using AI.
3. AI-powered formative and summative assessments.
4. Case studies of AI integration in university courses.

Introduction

What is Generative AI?

- AI that creates content, such as text, images, videos, and code. It creates content based on user's prompt or request.
- Examples: ChatGPT, Canva AI, Synthesia, and Gradescope.
- It helps educators create, personalize, and automate teaching materials.

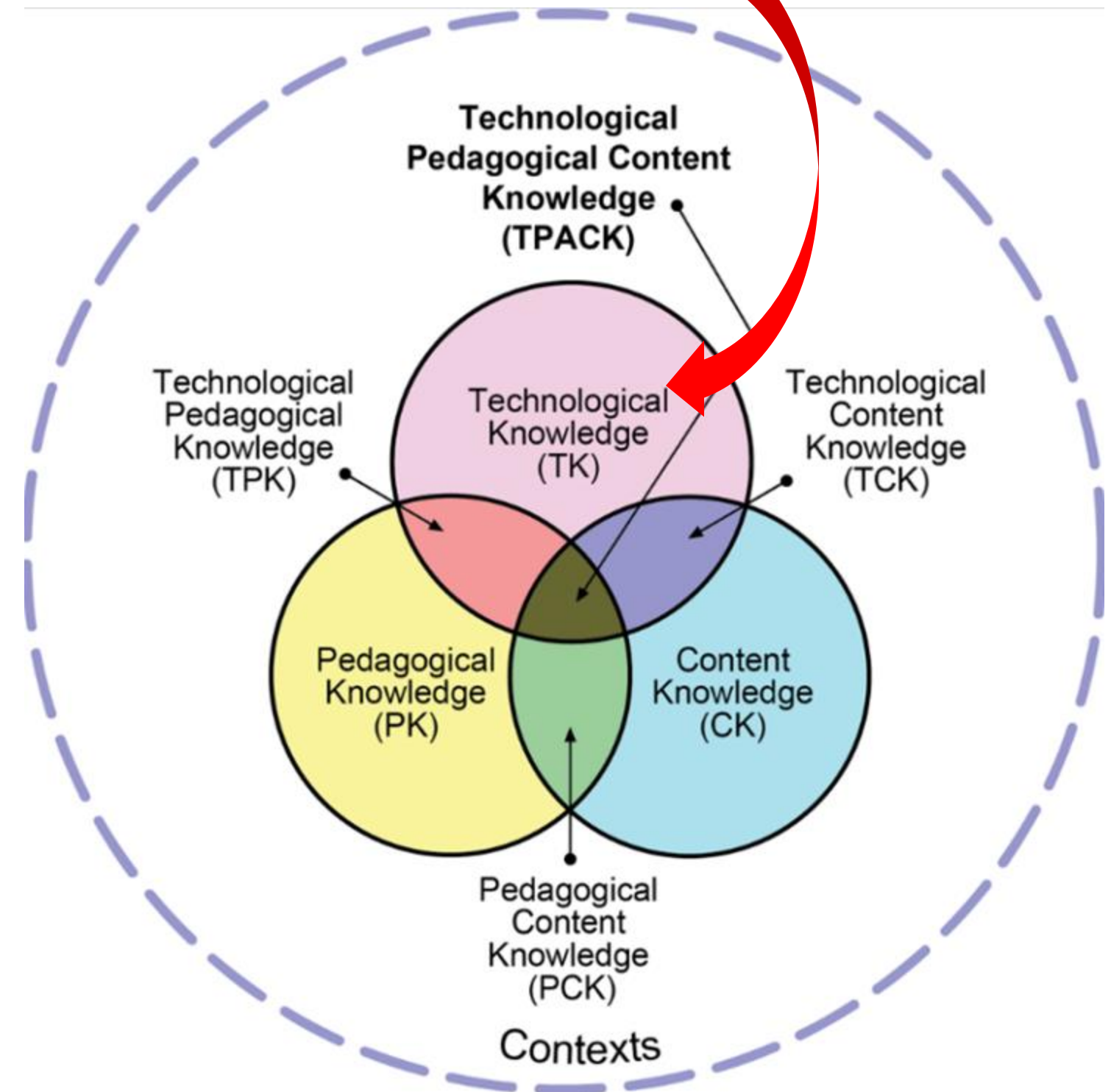
Why is AI Important in Education?

- Enhances **teaching efficiency** by automating repetitive tasks.
- Supports **personalized learning** for students.
- Provides **real-time feedback** and instant resources.
- Encourages **interactive and engaging lessons**.

Consider how we
integrate AI into
teaching and learning

**using pedagogy to
reframe our perspective**

AI is a tool



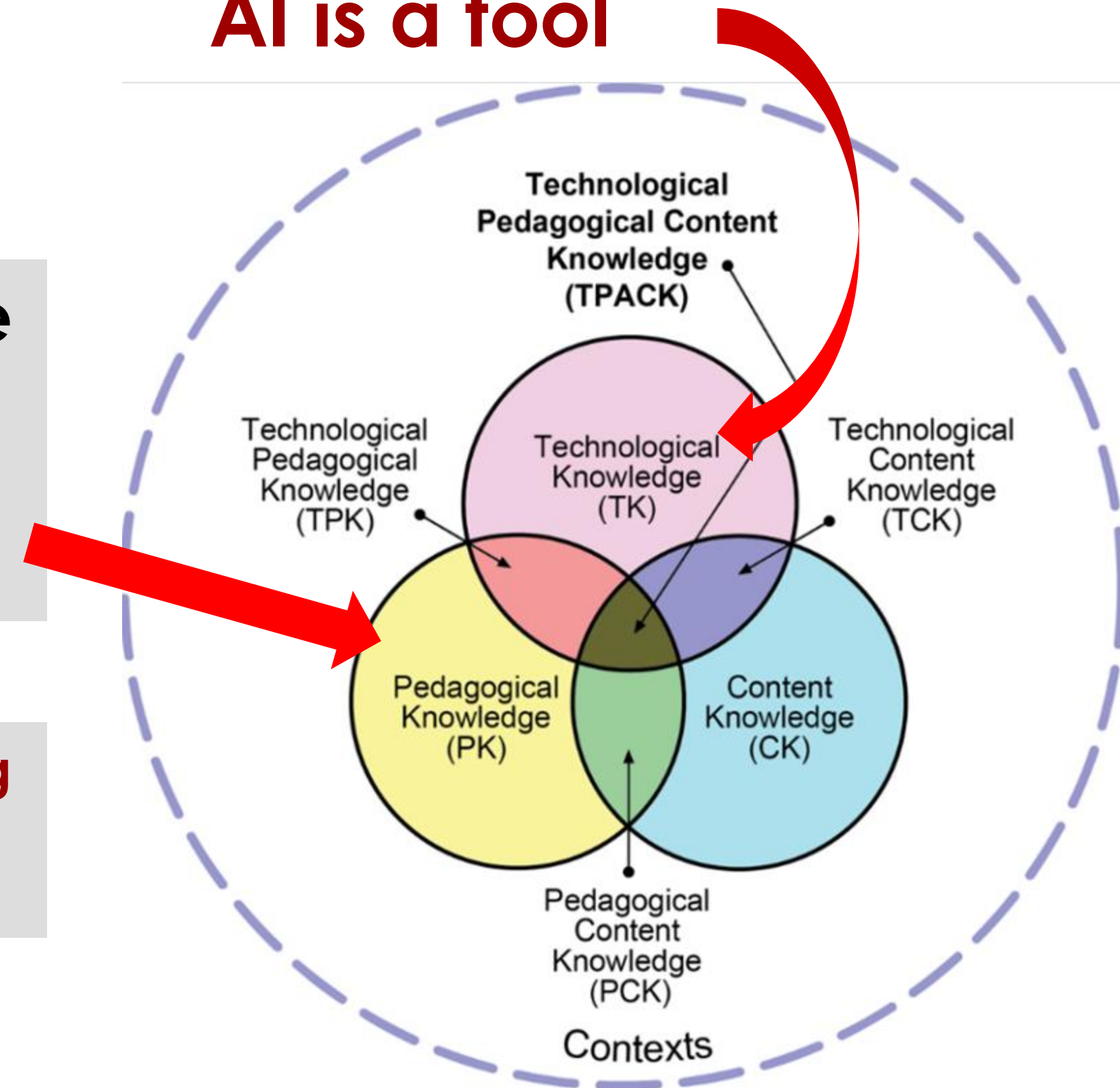
Improve creativity, critical thinking, engagement, leadership quality...etc.

The challenge: is to identify the appropriate pedagogy and innovate to enhance its effectiveness.

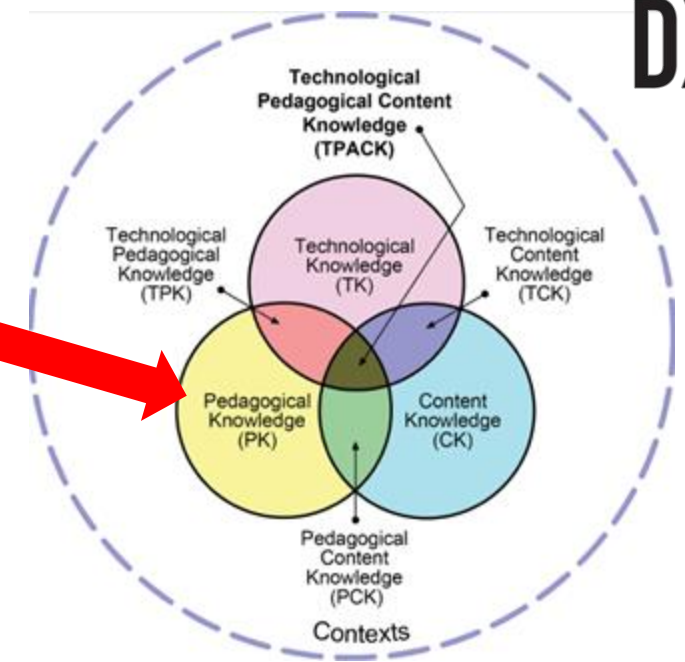
The pedagogy should facilitate **co-learning** and be **personalized** to cater to e.g, Generation Alpha's needs.

Many Alphas will already have started their own companies when they enrol into university (myforesight, 2019)

AI is a tool



Teaching methods or pedagogy should be designed to promote **co-learning** and **personalization**



- Project-Based Learning (PjBL)
- Flipped Classroom
- Peer Teaching and Mentoring
- Differentiated Instruction
- Student-Centered Learning
- Collaborative Learning Groups
- Personal Learning Plans (PLPs)
- Gamification [Make learning content fun and engaging]
- Competency-Based Education (CBE)
- Learning Analytics
- Multimodal Learning
- Community-Based Learning
- etc.



Implementation of Cognitive and Social Apprenticeship Frameworks to Nurture Creativity in a Social Networking Site

AI-assisted lesson materials and content generation

AI for Content Creation

How AI helps educators create learning materials:

- Generates lecture notes & slides.
- Summarizes research papers & articles. AI tools for research purposes.
- Creates quizzes, exams & grading rubrics.
- Designs visual content (diagrams, infographics, presentations).

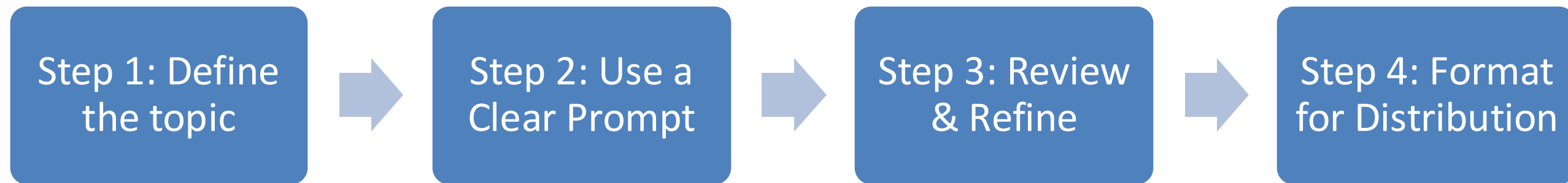
Example: ChatGPT for text, Canva AI for images, Quizlet for quizzes.

Generating lecture notes using ChatGPT

Generating lecture notes using ChatGPT

In ChatGPT, a **prompt** is the text input you provide to instruct the model and shape its response. It acts as the starting point, helping the AI understand your request and generate relevant content. A **well-structured, clear, and specific prompt** ensures that the AI delivers accurate and meaningful answers tailored to your needs.

Generating lecture notes using ChatGPT



Some Tips

- Be Clear and Specific:** Clearly state the topic, context, or task you want the AI to address
- Use Direct Instructions:** Provide clear instructions on what you want the AI to do. Use direct imperative sentences, like "Describe," "Explain," "List," "Compare," etc.
- Break Down Complex Tasks:** If your request involves multiple steps, break them down into separate prompts. This prevents confusion and ensures more accurate responses.

Effective Prompts

Example of prompt:

Act as a university professor. Generate lecture notes for a 1-hour class on "Introduction to Artificial Intelligence."

Include:

- A brief introduction
- Key concepts
- Real-world applications
- Challenges and ethical issues
- Summary and discussion questions

Output

1. Introduction (10 Minutes)

What is Artificial Intelligence (AI)?

- AI refers to the ability of machines to perform tasks that typically require human intelligence.
- It involves **learning, reasoning, problem-solving, perception, and language understanding**.
- AI is used in various fields such as healthcare, finance, transportation, and education.

Brief History of AI:

- 1950s: **Alan Turing** proposed the idea of machine intelligence.
- 1956: **Dartmouth Conference** marked the birth of AI as a field.
- 1980s-1990s: AI saw improvements in **machine learning (ML) and neural networks**.
- 2000s-Present: Advancements in **deep learning, big data, and automation**.

2. Key Concepts in AI (15 Minutes)

Types of AI:

1. **Narrow AI (Weak AI):**
 - Designed for specific tasks (e.g., voice assistants like Siri, Google Assistant).
2. **General AI (Strong AI):**
 - AI with human-like intelligence and decision-making (not yet achieved).
3. **Super AI:**
 - Hypothetical AI that surpasses human intelligence.

AI Technologies:

- **Machine Learning (ML):** AI learns from data without being explicitly programmed.

3. Real-World Applications of AI (15 Minutes)

How AI is Used in Different Fields:

Healthcare:

- AI diagnoses diseases (e.g., AI-assisted radiology, IBM Watson).
- Drug discovery and personalized medicine.

Finance:

- AI-powered fraud detection.
- Algorithmic trading in stock markets.

Education:

- AI tutors (e.g., Khan Academy AI).
- Personalized learning experiences.

Transportation:

- Self-driving cars (e.g., Tesla Autopilot).
- AI-powered traffic management.

Retail & E-commerce:

- AI chatbots for customer support.
- Personalized recommendations (e.g., Amazon, Netflix).

Effective Prompts

Simple prompt: "Create a lesson plan on topic bouyancy for secondary students with learning objectives, activities, and assessment methods."

Detailed prompt: "Design a comprehensive lesson plan on the topic of buoyancy for secondary students. The plan should include clear learning objectives, engaging student-centered activities, and suitable assessment methods to evaluate understanding. Incorporate hands-on experiments or real-world applications to enhance learning."

Effective Prompts

Simple Prompt:

"Write an essay about climate change."

Detailed Prompt:

*"Write a **1,000-word persuasive essay** on climate change, focusing on its **causes, effects, and possible solutions**. Structure the essay with an **introduction, three body paragraphs, and a conclusion**. Use **real-world examples**, include at least **two scientific studies**, and maintain a **formal academic tone**."*

Effective Prompts

Simple Prompt:

"Write a Python script for sorting a list."

Detailed Prompt:

*"Write a **Python script** that sorts a **list of integers** using the **Merge Sort algorithm**. The script should be **well-commented** and include a function that accepts **user input**, sorts the list, and then prints both the **unsorted and sorted lists**. Ensure the code is **optimized for efficiency** and follows **best coding practices**."*

Creating an image

Detailed Prompt:

"Create a digital illustration of a female lecturer sitting in a well-lit academic office, with a modern computer in front of her. She is engaged in research, surrounded by books, papers, and a whiteboard with diagrams related to online learning and mobile learning. The computer screen displays graphs, charts, and e-learning content. The room has a professional yet cozy ambiance, featuring a bookshelf, a coffee mug, and a window with natural light filtering in. The scene should feel intellectual, warm, and inspiring, emphasizing her passion for digital education."

16

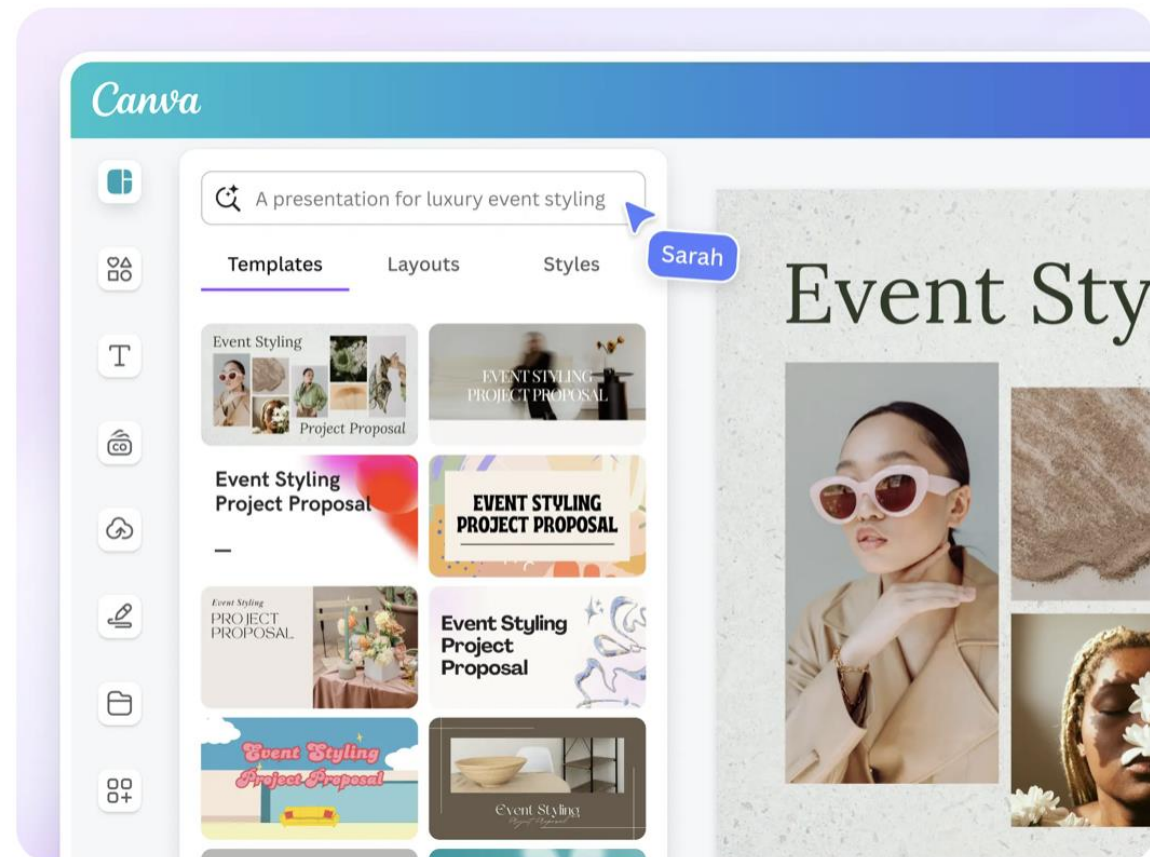


Creating presentation slides

Some **free AI tools** that can help you create **presentation slides** quickly and efficiently:

- Canva (Magic Design)
- Gamma AI
- Tome AI
- Slidesgo (AI Presentation Maker)
- Microsoft Copilot (PowerPoint AI)

Canva Magic Design



Fast-track presentations with AI

Fast-track your next pitch with [Magic Design™ for Presentations](https://www.canva.com/magic-design/). Simply type your idea and watch it generate professional-looking pages filled with your topic, outline, and sample content. Your first draft is fully designed with captivating content in seconds.

Try Magic Design

<https://www.canva.com/magic-design/>

Gamma AI

[English](#)[Pricing](#)[Careers](#)[Login](#)[Try for free](#)

You have ideas. Gamma
brings them to life.

Powered by AI.

Your ideas are brilliant. The universe deserves to see them. A captivating pitch deck? Easy. A stunning website?

Done. Make anything you can imagine almost as quickly as you can think it up.

[Sign up for free](#)

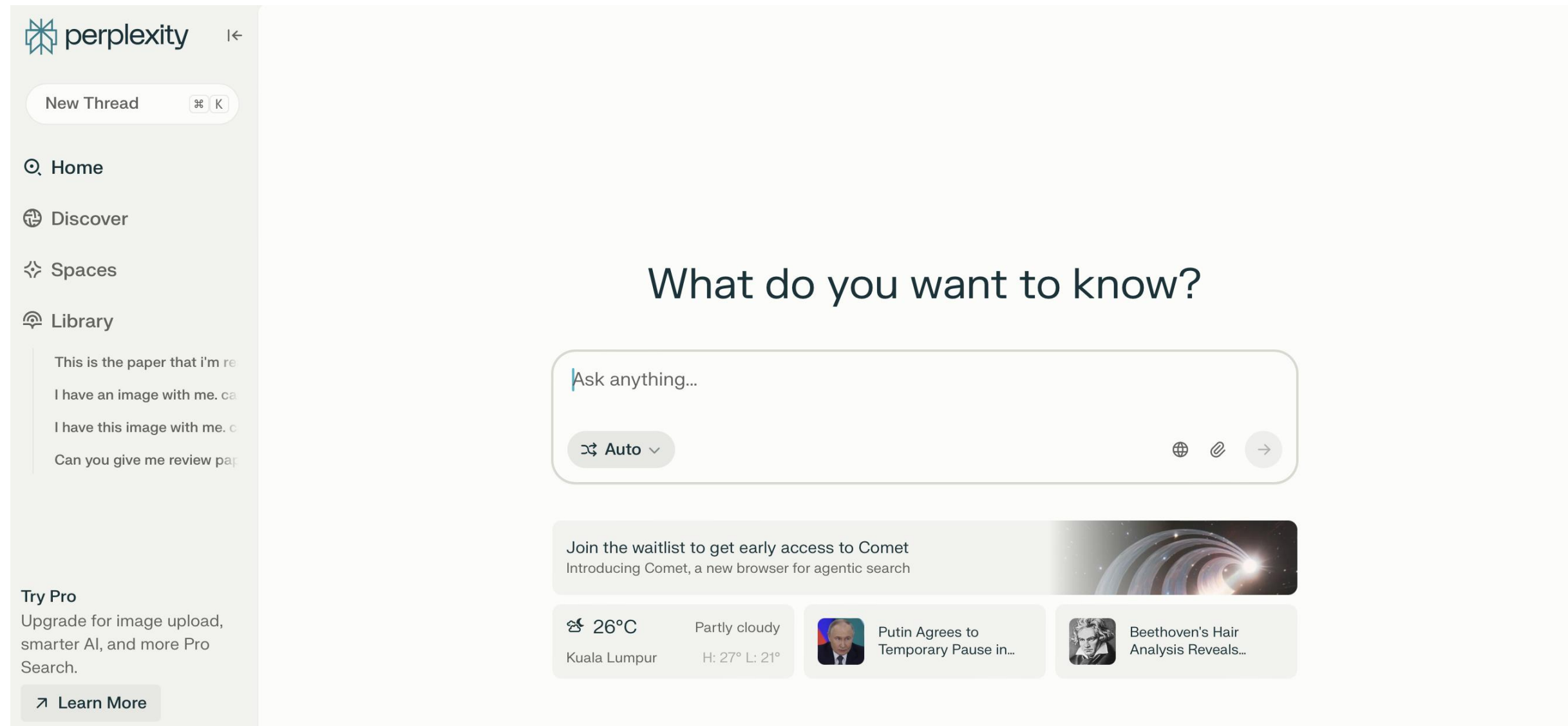
<https://gamma.app>

AI tools for research purposes

Some of AI tools for research purposes:

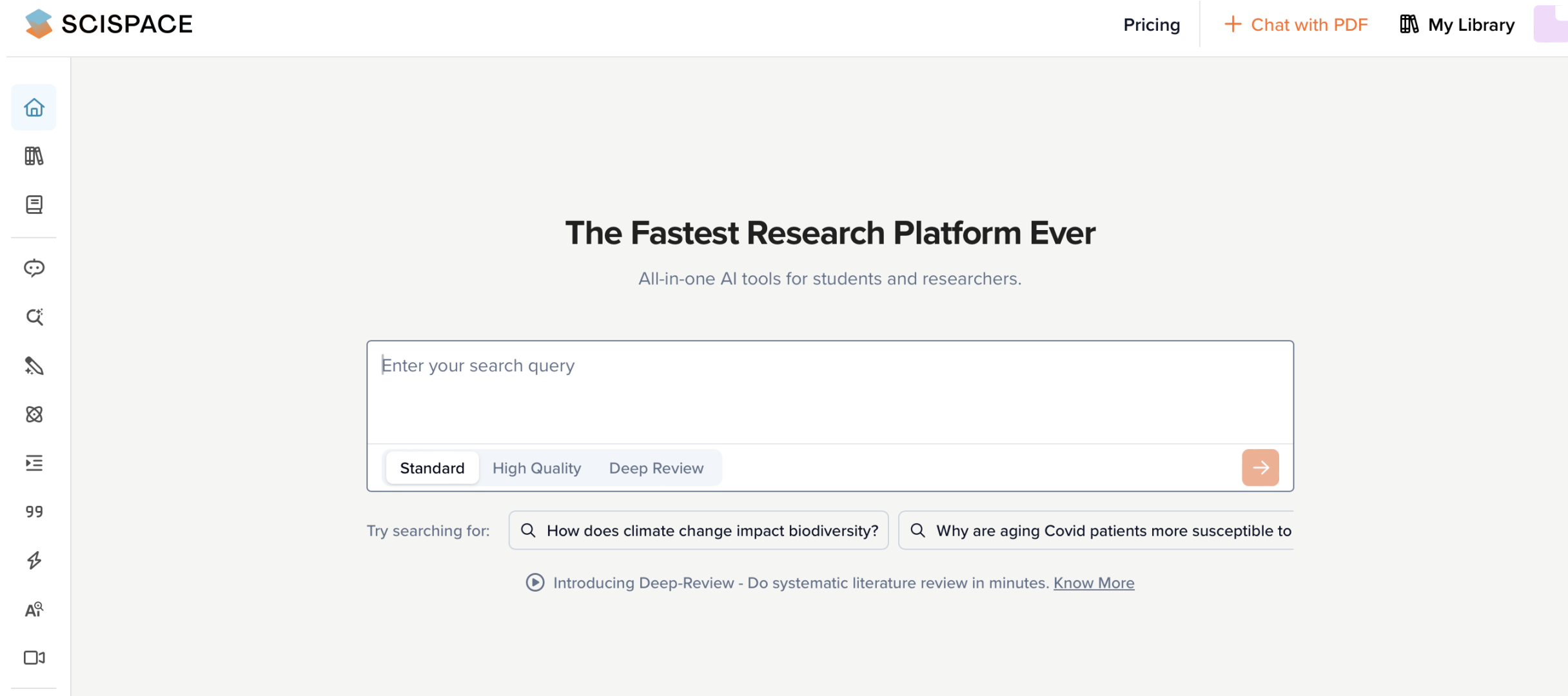
- Google Gemini
- Perplexity
- Scispace
- Elicit
- Quillbot

AI tools for research purposes



<https://www.perplexity.ai>

AI tools for research purposes



<https://scispace.com>

AI tools for research purposes

The screenshot displays the QuillBot Premium Paraphrasing Tool interface. The top navigation bar includes the QuillBot Premium logo, the title 'Paraphrasing Tool', and a link to 'Apps and Extensions'. Below this, a row of modes is shown: Standard, Fluency, Humanize, Formal, Academic (selected), Simple, Creative, Expand, Shorten, and Custom. The left sidebar contains icons for Paraphraser, Grammar Checker, AI Detector, Plagiarism Checker, and a 'More' option. The main content area is split into two columns. The left column shows the original text under the heading 'Pressure in Liquids'. The right column shows the paraphrased text under the heading 'Hydrostatic Pressure in Fluids'. At the bottom of the interface, there is a 'Rephrase' button, a word count of '156 Words', and a status bar indicating '1 / 10 Sentences • 146 Words'.

QuillBot PREMIUM Paraphrasing Tool Apps and Extensions

Modes: Standard Fluency Humanize Formal **Academic** Simple Creative Expand Shorten Custom

Pressure in Liquids

Pressure in liquid is something that happens in water or any liquid that we can see in daily life. If we go inside a swimming pool, we feel heavier when we go deeper. This is because pressure in water increases when depth increases.

Formula to calculate pressure in liquid is $P = hpg$, where h is depth, p is density of liquid, and g is gravity. When depth increase, pressure increase. If we see deep-sea divers, they need to wear special suits because pressure at deep sea is very high and can be dangerous to human body.

Pascal's principle says that pressure in liquid is transmitted equally in all directions. For example, if we press a water bottle with holes, water will come out with same pressure from all holes. This principle is used in many things like hydraulic brake system in cars, hydraulic pump, and also barber chair that can go up and down.

156 Words

Rephrase

Hydrostatic Pressure in Fluids

Pressure in liquids occurs in water and any observable liquid in daily life. Upon entering a swimming pool, we experience an increase in weight as we descend deeper. Pressure in water escalates with increasing depth.

The formula for calculating pressure in a liquid is $P = hpg$, where h represents depth, p denotes the density of the liquid, and g signifies gravitational acceleration. As depth increases, pressure escalates. Deep-sea divers must don specialized suits due to the elevated pressure in the deep water, which poses significant risks to the human body.

Pascal's principle states that pressure within a liquid is uniformly transmitted in all directions. For instance, if we compress a water bottle with perforations, water will emerge with uniform pressure from all openings. This principle is applied in various mechanisms, like as hydraulic brake systems in automobiles, hydraulic pumps, and adjustable barber chairs.

1 / 10 Sentences • 146 Words

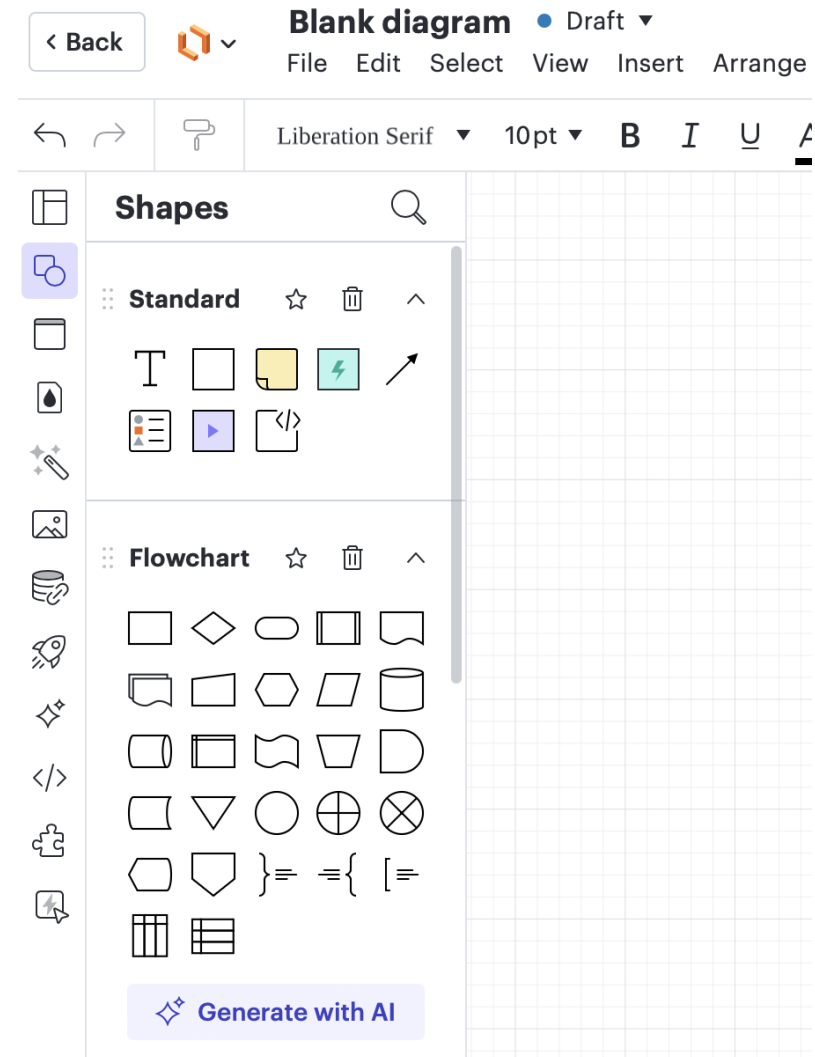
<https://quillbot.com>

Design visual content (diagrams, infographics, presentations)

Some AI tools to design visual content (diagrams, infographics, presentations).

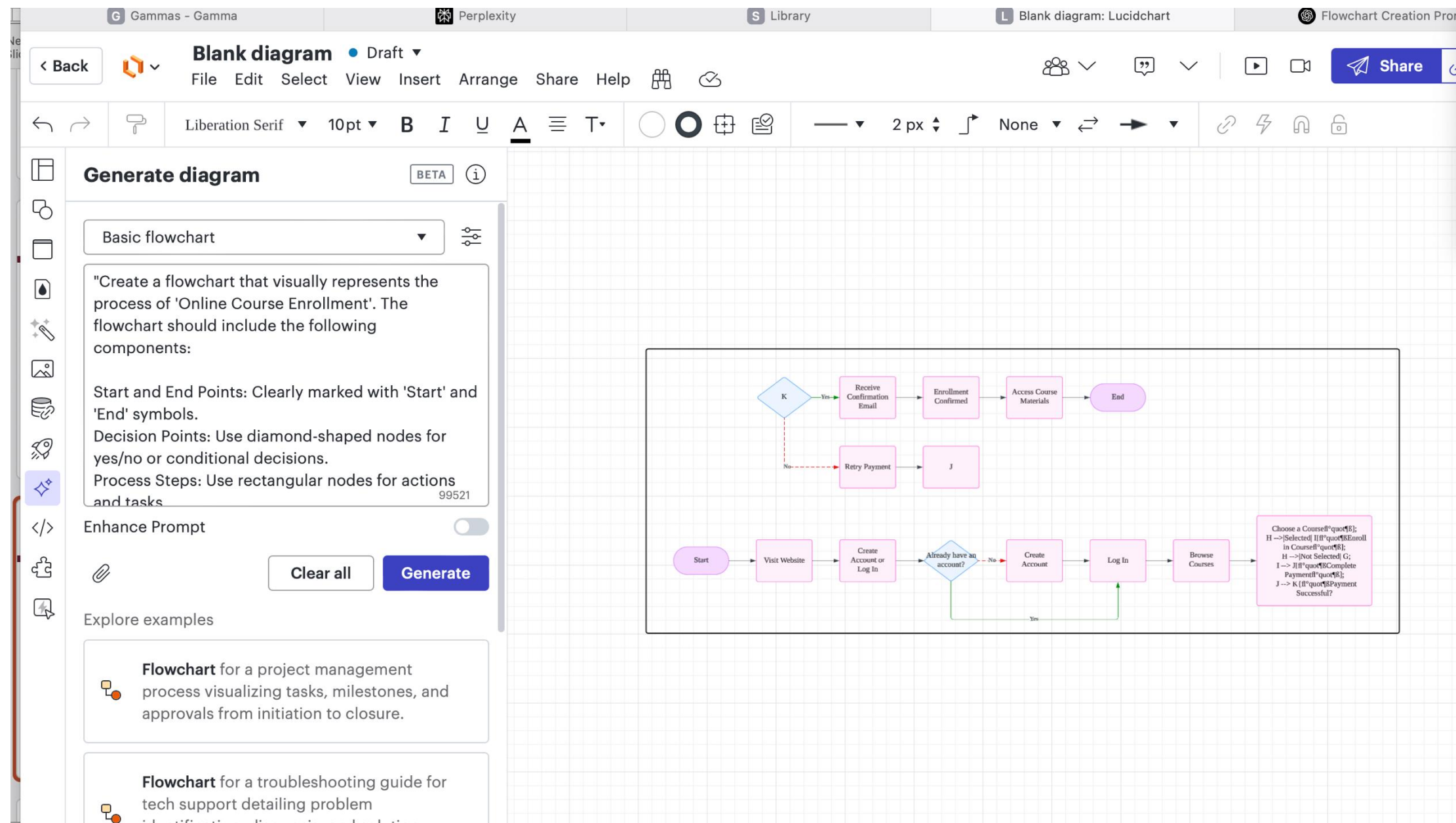
- Lucidchart
- Microsoft Visio
- Miro
- Visme
- Piktochart

Lucidchart



<https://lucid.app/>

Lucidchart



"Create a flowchart that visually represents the process of 'Online Course Enrollment'. The flowchart should include the following components:

Start and End Points: Clearly marked with 'Start' and 'End' symbols.

Decision Points: Use diamond-shaped nodes for yes/no or conditional decisions.

Process Steps: Use rectangular nodes for actions and tasks.

Connectors: Use arrows to indicate the flow direction.

Swimlanes (if needed): Organize the flow by department, role, or system."

Personalized learning pathways using AI.

How AI adapts to different learning styles:

- **Adaptive learning** - AI adjusts difficulty levels based on student progress.
Adaptive learning uses AI algorithms to **adjust the difficulty and pacing** of educational content based on a student's performance. Instead of a one-size-fits-all approach, AI **customizes lessons**, ensuring students receive challenges suited to their skill level.
- **AI Tutors:** Tools like Khanmigo and Socratic provide real-time explanations.
- **Voice Assistants:** Assist visually impaired or differently-abled students.

Example: Khan Academy AI Tutor, Google Socratic, Tutor Ocean.

Tutor Ocean

G

Gammas - Gamma

Perplexity

S

Library

Documents

Flowchart Creation Pro...

AI Tutor for Homework...

go

TutorOcean

Learn ▾

Teach ▾

AI ▾

Business ▾

English ▾

Login

24/7 Study Help Made Easy

🤖 AI Tutor for Quick Answers

👩🎓 👨🎓 Human Tutors for Deep Understanding and Motivation

Ask anything...

⊕ Attach

➤ Send

Michael

★★★★★ 5 (31)

Expert Chemistry, Biology, Anatomy, CASPER & MCAT Lecturer + Tutor - 10 years experience - Medical Resident

Michaela

★★★★★ 5 (31)

Fun in learning is how I approach tutoring with my students! A good balance of oral, written, and reading work, combined...

Reza

★★★★★ 5 (84)

UBC+SFU+TRU+BCIT+UVIC+Langara Math tutor. Online Math,Calculus & Statistics tutor.

Brooke

★★★★★ 5 (7)

Experienced Chemistry Tutor for University and High School

🔗 View all top-rated tutors

https://www.tutorocean.com


AI-powered formative and summative assessments

How AI simplifies grading & feedback:


- **Automated Grading:** AI checks assignments (Gradescope, Turnitin AI).
- **Instant Feedback:** AI suggests improvements in writing (Grammarly, Quillbot).
- **Student Progress Tracking:** AI provides learning insights.

Example: Turnitin AI for plagiarism detection, Gradescope for grading.


Gradescope




Computer Science




Physics




Math




Chemistry



Biology



Engineering

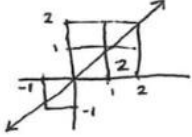


Economics

(c) Suppose that $f(x)$ is a continuous function where $\int_2^7 f(x) dx = 11$.

For the following expression, evaluate it or state that there is not enough information.

$$\int_2^{-1} (f(x) + x) dx + \int_{-1}^7 f(x) dx$$
$$\int_2^{-1} f(x) dx + \int_2^{-1} x dx + \int_{-1}^7 f(x) dx$$
$$\int_2^7 f(x) dx + \int_2^{-1} x dx$$
$$11 + \int_2^{-1} x dx \quad 11 + 2 - \frac{1}{2} = 11 + 1.5 = 12.5$$



Total Points

0.5 / 1.0 pts

1

-0.0

Correct

2

-0.5

You had trouble calculating

$$\int_{-1}^2 x dx$$

Now that we have spent some time practicing how to integrate, go back and look over this.

3

-0.5

$$\int_2^{-1} x dx \neq \int_{-1}^2 x dx$$

Why not? What is the big difference?
Can you use the net change lens to justify this?

Case studies of AI integration in university courses

"How do you think AI is already shaping university education?"

Case Study 1: AI-Powered Content Creation

Example: Harvard University – AI for Course Material

- **How it's used:** Harvard uses **ChatGPT** to help professors generate **lecture notes, quizzes, and course summaries.**

Impact:

- Saves time in content preparation.
- Allows educators to focus on interactive³² discussions.
- Customizes learning materials based on student needs.

Case Study 2: AI for Personalized Learning

Example: Georgia Tech – AI Teaching Assistant

- **How it's used:**
 - Georgia Tech developed "Jill Watson," an AI teaching assistant for an online computer science course.
 - AI answers **common student questions**, reducing instructor workload.

Impact:

- Faster responses to students.
- More engagement in online discussions.
- Students reported improved satisfaction with instant AI support.

Case Study 3: AI in Assessments & Feedback

Example: University of Edinburgh – AI Grading & Feedback

- **How it's used:**
 - Uses **Gradescope AI** to **automate grading** of assignments and exams.
 - AI detects patterns in students' mistakes and provides **instant feedback**.

Impact:

- Reduces grading workload for large classes.
- Gives students **real-time suggestions for improvement**.
- Improves grading consistency.

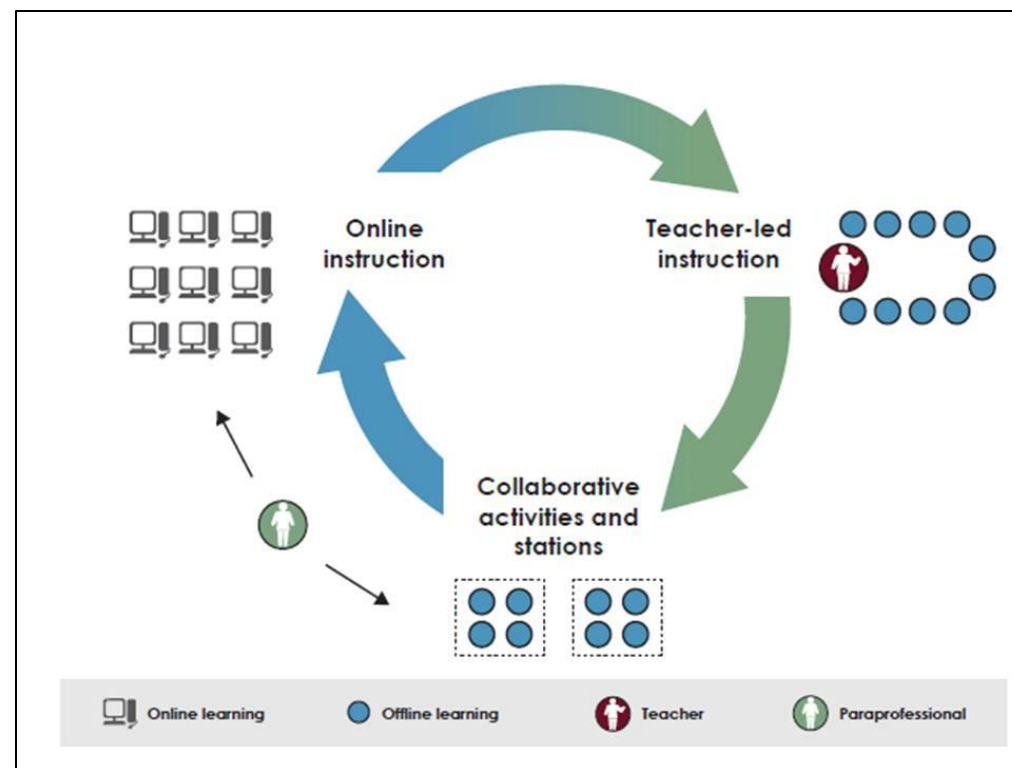
Ethical Considerations & Challenges

- **Over-reliance on AI:** Students must still develop **critical thinking** skills.
- **Bias in AI:** AI-generated feedback can sometimes be **inaccurate** or **biased**.
- **Data Privacy:** Universities must **protect student data** when using AI tools.

Solution: AI should **support**, not replace, human instructors.

Conclusion & Takeaways

- AI is enhancing university education, not replacing teachers.
- Case studies show AI improves efficiency, engagement, and feedback.
- Educators should explore AI responsibly for better learning experiences.



Station rotation model



Co-funded by
the European Union

DX.sea

THANK FOR YOUR ATTENTION

