

AI Tools in Secondary Education





Agenda

- 1 | The rise of LLMs
- 2 | LLMs for general use: The case of ChatGPT
- 3 | Tailored Solutions: Exploring AI Tools for Specific Needs
- 4 | Q&A and Discussion

The rise of Large Language Models

A **Language Model** is a probabilistic model of a natural language that can generate probabilities of a series of words, based on text corpora it was trained on. For example, for the sequence of words “She is wearing a red ...”, the language model might predict the word “dress” as the most probable.

Large Language Models (LLMs) are advanced AI systems **trained on vast amounts of text data to understand and generate human-like language**. LLMs are revolutionizing education by providing **personalized learning experiences, automating administrative tasks, and enhancing curriculum development**. They rely specifically on **Transformer Architectures**, which excel at processing and generating sequences of data, such as text.

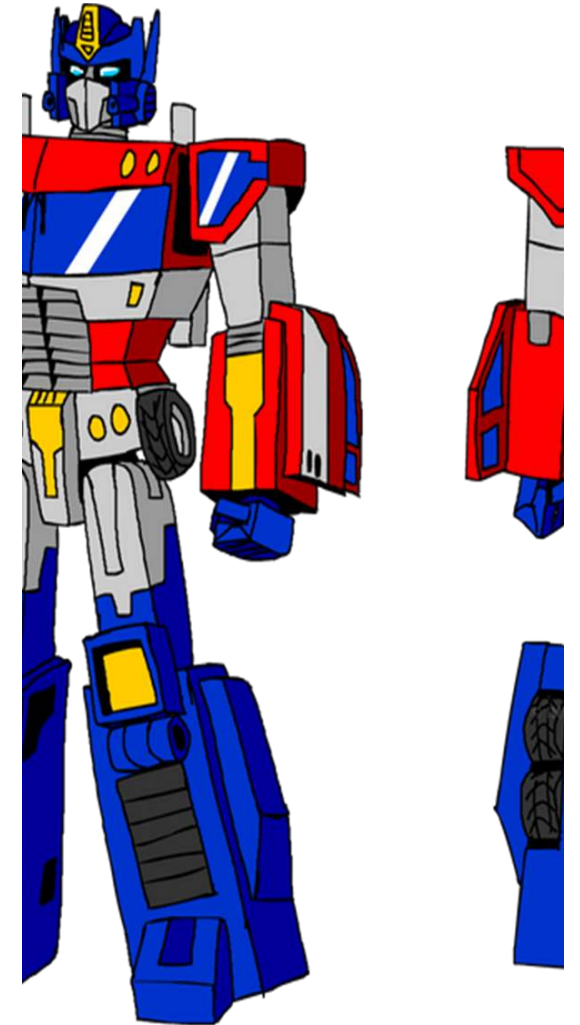
Training Process

Pre-training: LLMs are trained on massive datasets containing text from books, articles, websites, etc. They learn to predict the next word in a sentence, capturing patterns in language.

Fine-tuning: After pre-training, models are fine-tuned on specific tasks or domains (e.g., education, healthcare) to improve their accuracy and relevance.

How They Generate Text

When given a prompt, LLMs use their learned patterns to generate a continuation by **predicting** and **outputting** words in sequence. The model considers context, meaning, and grammar to produce coherent and contextually relevant responses.



ai_tools



Natural Language Understanding

LLMs can process and comprehend human language, enabling personalized learning experiences and automated grading/feedback.



Content Generation

LLMs can generate engaging educational content, such as summaries, explanations, and practice questions, to supplement teacher-created materials.



Multilingual Support

LLMs can translate and localize educational resources, making them accessible to diverse student populations.



Personalized Learning

LLMs can adapt learning materials and pace to individual student needs, improving engagement and learning outcomes.

Large Language Models have the potential to revolutionize secondary education by enhancing natural language understanding, content generation, multilingual support, and personalized learning experiences, ultimately empowering both teachers and students.

LLM for general use: ChatGPT

1 | What is ChatGPT

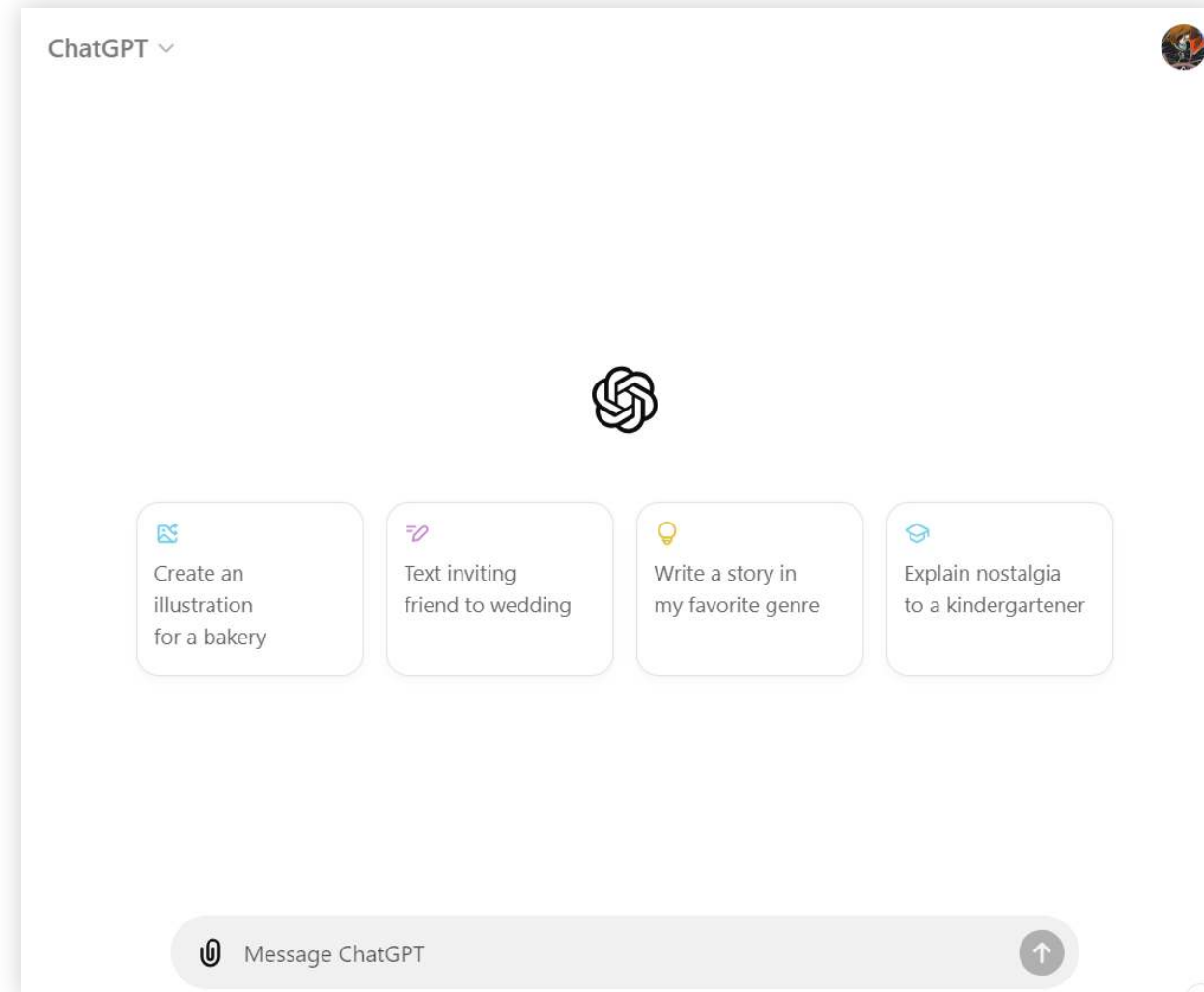
A conversational AI developed by OpenAI, based on the GPT (Generative Pre-trained Transformer) architecture.

2 | Main Features

- Can be used for a **wide range of tasks** including answering questions, drafting emails, writing essays, and more.
- Available via web interface, API, and integrations
- Remembers and utilizes context within a conversation to provide relevant and coherent responses.

3 | Ethical use

Emphasis on responsible usage, including awareness of **limitations**, potential **biases**, and the importance of **human oversight**.



Limitations of ChatGPT



Lack of common sense



Access to the Internet



Limited Knowledge



Cannot Multitask



Lacks Creativity



Lacks in-depth information



Biased Answers



Can't Understand Context

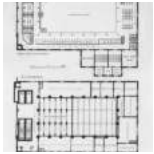


Can't Express Emotions



Need to Fine-tune

Potential uses of ChatGPT in secondary education



Lesson Planning

Generate outlines, objectives, and activities tailored to specific topics or grade levels



Essay and Assignment Feedback

Offer constructive feedback on students' written work, highlighting areas for improvement



Content Creation

Assist in drafting lecture notes, assignments, and educational materials



Quiz and Test Generation

Create multiple-choice questions, short answers, and other assessment formats quickly



Student Support

Provide personalized tutoring and answer students' questions outside of classroom hours



Classroom Engagement

Develop interactive stories, role-play scenarios, or discussion prompts to foster student participation and critical thinking

""Tell me everything about World War II."

A bad prompt

Too Broad: The prompt is overly general, leading to an overwhelming amount of information that may not be useful or relevant to the teacher's specific needs.

Lacks Specificity: It doesn't specify what aspect of World War II the teacher is interested in (e.g., causes, major battles, impact on society, etc.).

No Context: The prompt doesn't provide any context about the grade level, the focus of the lesson, or the purpose of the information.



World War II was a global conflict that lasted from 1939 to 1945, involving most of the world's nations. It was the deadliest and most widespread war in history, with significant impacts on the political, social, and economic structures of the 20th century. Here's an overview of the key aspects:

Causes

1. **Treaty of Versailles:** The harsh terms imposed on Germany after World War I fostered resentment and economic hardship, which contributed to the rise of Adolf Hitler and the Nazi Party.
2. **Expansionist Policies:** Aggressive expansion by Germany, Italy, and Japan challenged the existing international order. Hitler aimed to create a Greater German Empire, Mussolini sought to build a New Roman Empire, and Japan pursued territorial expansion in Asia.
3. **Failure of the League of Nations:** The League was unable to enforce its resolutions or prevent aggression by Axis powers.

Major Participants

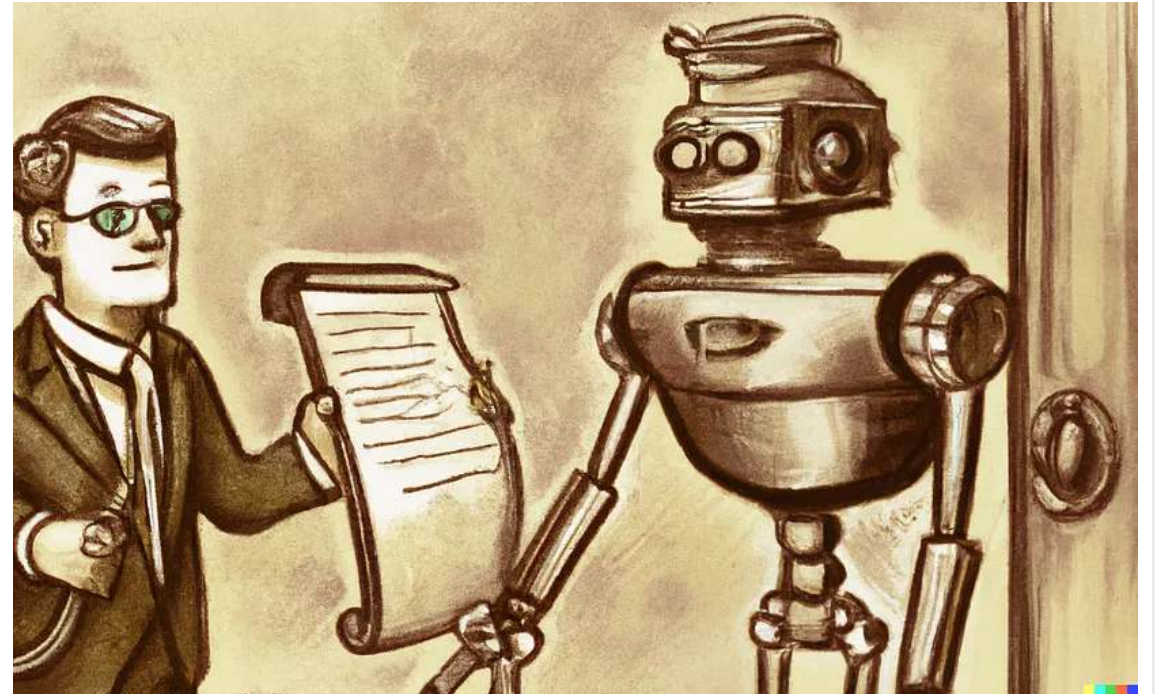
- **Allied Powers:** Primarily led by the United States, the Soviet Union, the United Kingdom, and China. Other significant allies included France, Canada, Australia, and various other nations.
- **Axis Powers:** Led by Germany, Italy, and Japan. Other Axis nations included Hungary, Romania, and Bulgaria.



Prompt Engineering

Prompt engineering is crucial for optimizing interactions with ChatGPT and other AI language models. It involves designing and refining the inputs (prompts) given to the model to elicit the most accurate, relevant, and useful responses. Here's why it's important:

- Clarity and Specificity
- Contextual Understanding
- Reducing Bias and Misunderstandings
- Efficiency and Relevance



Prompt Engineering: Effective prompts for basic tasks

knowledge	Ask for...	Prompts
	explanations:	Explain 'non-linear equations' to a grade-12 student at 2pm on a Friday.
	metaphors:	Create three metaphors to explain the concept of 'confirmation bias.'
	examples:	Provide vivid examples to explain the principle of 'risk management.'
	comparison:	What are the similarities and differences between mitosis and meiosis?
	arguments:	Provide arguments and counterarguments regarding personalized AI tutoring.
	main points:	Identify, in point form, the main points of Karl Marx's Das Kapital.
	practical implications:	What are possible practical implications of [this theory, ideology, or fictional story]?

Prompt Engineering: Effective prompts for basic tasks (II)

creative assistance	brainstorming:	Help me brainstorm a list of 5 in-class activities to introduce [this topic].
	class plans:	Plan a two-hour class on the topic of 'time management.'
	role-playing:	Act as the ancient Greek philosopher Socrates and tell me about your life in Athens and your perspective on the pursuit of knowledge.
	scenarios:	As a doctor, I need to announce to a patient that his test results turned out positive. Create one real-life scenario and offer me options to handle this situation. Then, ask me to choose one option. On and on.
	storytelling:	Act as a historical fiction writer and write a short story about the living conditions of a young worker in a weaving factory during the first industrial revolution in Great Britain.
	dialogues:	Generate a dialogue between Martin Luther King Jr. and Malcolm X on the topic of Civil Rights Strategies.
	text completion:	Complete the following text by adding a conclusion and a title: "text here."
	quizzes:	Create a multiple-choice quiz on [this topic]. Offer competitive choices.

Prompt Engineering: Effective prompts for basic tasks (III)

tutoring	Q&A:	Ask me open-ended questions, one question at a time, about the American civil war.
	feedback:	As an English teacher, provide constructive feedback on the following text: "text."
	risk management:	Identify potential risks that could prevent this in-class activity from attaining its main objectives, and suggest strategies to mitigate these risks: "activity plan here."
formatting	writing styles:	Describe the writing style in this text: "text."
		Rewrite this text to make it easier for grade-12 students to understand: "text."
	organization:	Organize the following class notes into sub-groups: "class notes here."
	tables:	Create a table to organize and present the causes and effects of inflation.
	summaries:	Summarize Charles Darwin's book 'On the Origin of Species.'
	translations:	Translate this sentence into English: "Il vaut mieux faire que dire."



Prompt Engineering: Multiple Prompts

After asking ChatGPT to explain a concept, such as 'the water cycle,' you may guide the conversation by using some specific prompts

→ ask to develop, clarify, or exemplify a specific point in the initial response

→ ask to rephrase the explanation in a style that is more/less formal or more/less advanced

→ point out some vagueness, oversimplification, or inaccuracy, and ask for a revised explanation

→ ask to generate a quiz or short written assignment on this topic

AI's identity, audience,
and format of response

Prompt Customization

Persolalized
experience by
modifying settings
such as the tone,
length, depth and
detail, and language of
the response.

Examples of prompts **assigning a role or identity to ChatGPT:**

"Tell me about the American Revolution **in the style of Howard Zinn.**"

"As an **enthusiastic biology college teacher**, explain the process of cellular respiration."

"**In the style of the New Yorker magazine**, write a text on the different kinds of economic systems."

"**Imagine you are an expert editor.** Make suggestions to improve the following text: [text]."

Examples of prompts **identifying the target audience:**

"Explain the concept of photosynthesis to a **college student with limited [or advanced] knowledge in biology.**"

"For a **grade-12 history class**, explain the causes of World War II."

"Explain photosynthesis in three ways: for **elementary, high school, and college students.**"

To control the **tone** of the response:

"ChatGPT, provide a **formal yet engaging** explanation of [topic]."

"Can you give me a **casual** perspective on [topic]?"

"Examine the implications of [topic] with a **serious [or playful]** tone."

To determine the **length** of the response:

"Give me a **brief** overview of [topic] in **two paragraphs.**"

"Can you **summarize** [topic] in one sentence?"


"Explain [topic]. Develop your response over at least **three well-developed paragraphs.** "

Building Complex Prompts

- AI's role
- target audience
- task
- context
- response (style and format)
- examples and step-by-step instructions
- appeal to AI's emotion



Example 1: Explaining a concept for an advanced audience

Parts of the prompt	Components
As a knowledgeable and experienced sociology professor	role
provide a formal and scholarly analysis	tone / goal
of the impact of social media on interpersonal communication	topic
for a group of graduate students.	audience
The response should be developed over at least 3 well-developed paragraphs,	length / format
rich in details, and demonstrate an in-depth understanding of the topic.	depth & detail
Be sure to include relevant sociological theories and evidence to support your points.	content
This is important for my career, so follow these instructions closely.	appeal to emotions 

Tailored AI tools: Plagiarism Detection

ChatGPT Detection Tools

GPT-Zero

GPT2 Output Detector

Hello-SimpleAI ChatGPT Detector

Writer's AI Content Detector

ZeroGPT

Tailored AI tools:
Presentations skills

PowerPoint Speaker Coach

It is a feature in Microsoft PowerPoint designed to help users **improve their presentation skills**. It's part of Microsoft's suite of AI-driven tools aimed at enhancing productivity and effectiveness.

- Speech Metrics
- Performance Insights
- Practice Recommendations

Your Rehearsal Report (Preview)

Summary

Good job rehearsing! Keep up the hard work.

4:25

total time spent

14

slides rehearsed

Fillers

To sound more polished and confident, try to avoid using filler words. Pause or take a breath to relax. Some filler words to avoid are:

umm

[Learn More](#)

Sensitive Phrases



No sensitive phrases found. Great job using inclusive speech.

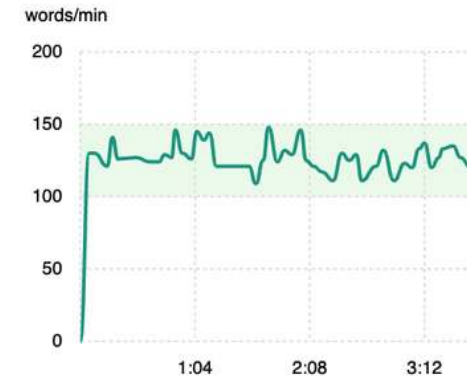
[Learn More](#)

Pace



Your pace is just right! Keep it up!

Your average pace over time



[Learn More](#)

Speech Refinements

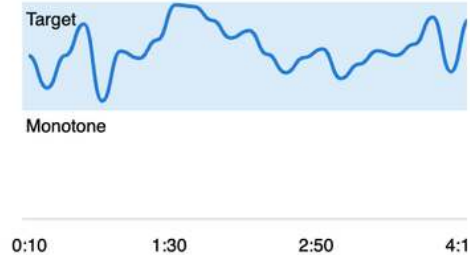
Consider rephrasing these sentences to

[Rehearse Again](#)

How was your experience? ☆☆☆☆☆

Pitch

Low pitch variation will make your audience lose interest. Try increasing the tone for your key points.



[Learn More](#)

Body Language



Great job keeping your gaze forward, maintaining good distance from the camera, and giving the audience a clear view of your face.

NEW

Grade All Subjects

Gradescope supports variable-length assignments (problem sets & projects) as well as fixed-template assignments (worksheets, quizzes, bubble sheets, and exams).



10) Many bacteria that are able to metabolize citrate (as seen in the Krebs cycle) produce negative results in the citrate test. Why? Be specific. (8 points) [max 4 sentences]

The citrate test doesn't test for the Krebs cycle. It tests for citrate permease. Citrate permease is found in bacteria that can undergo citrate fermentation, and can survive solely on citrate as a carbon source. This has nothing to do with the TCA cycle, which is why many TCA cycle bacteria test negative for the citrate test. Only bacteria with citrate permease will grow on the citrate test medium.

Total Points

6.0 / 8.0 pts

1 +2.0

Citrate (citric acid) is the intermediate of the Krebs cycle [where it is ultimately converted to CO₂ and oxaloacetic acid].

2 +2.0

However, the citrate test is designed to detect the ability of a bacterium to perform the Krebs cycle.

3 +2.0

It detects the ability of a bacterium to obtain citrate from the environment and use it.

4 +2.0

Thus, an organism cannot use its own citrate in the citrate test. It must be able to use citrate from the environment.

Tailored AI Tools: Automatic Grading

Gradescope

Gradescope is an AI-powered **grading and assessment** tool that is gaining popularity among educators recently. It is designed to make paper, assignment and exam grading more efficient and effortless. The best part is, Gradescope is able to support grading for a wide range of subjects and levels in science and humanities.

Gradescope has a **built-in plagiarism checker**, which helps teachers detect unoriginal work without exiting the platform. Additionally, Gradescope provides detailed analytics that allows teachers to identify areas for improvement.

Gradescope comes with **both free and institutional versions**. The institutional version provides more features, including the ability to create custom rubrics, integrate with other tools, and collaborate with colleagues. Institutional pricing is available upon request.

Quizizz

Quizizz AI is an enhancement to the Quizizz platform, which is widely used for creating and administering quizzes and interactive learning activities. The AI features in Quizizz are designed to improve the quiz creation process, enhance the learning experience, and provide better insights for educators.

The screenshot shows the 'Create a new quizzes' interface. On the left, a sidebar titled 'Start from' offers three options: 'Import worksheets' (with a clipboard icon), 'Generate with AI' (highlighted with a star icon), and 'Create from scratch' (with a pencil icon). The main area has a top navigation bar with 'Document', 'Generate from text' (selected with a purple underline), 'Website', and 'YouTube'. Below this is a text input field labeled 'Enter quiz topic or paste content to generate using AI'. A 'Preferences' section follows, including an 'Output language' dropdown set to 'English', a 'Number of questions' section with buttons for 'Automatic', '5', '8', '10', and '15' (where 'Automatic' is selected), and a 'Grade and Subject' section with a dropdown set to 'English' and a 'Select grade' button. A purple 'Continue' button is at the bottom right. The footer states 'Powered by Quizizz AI'.

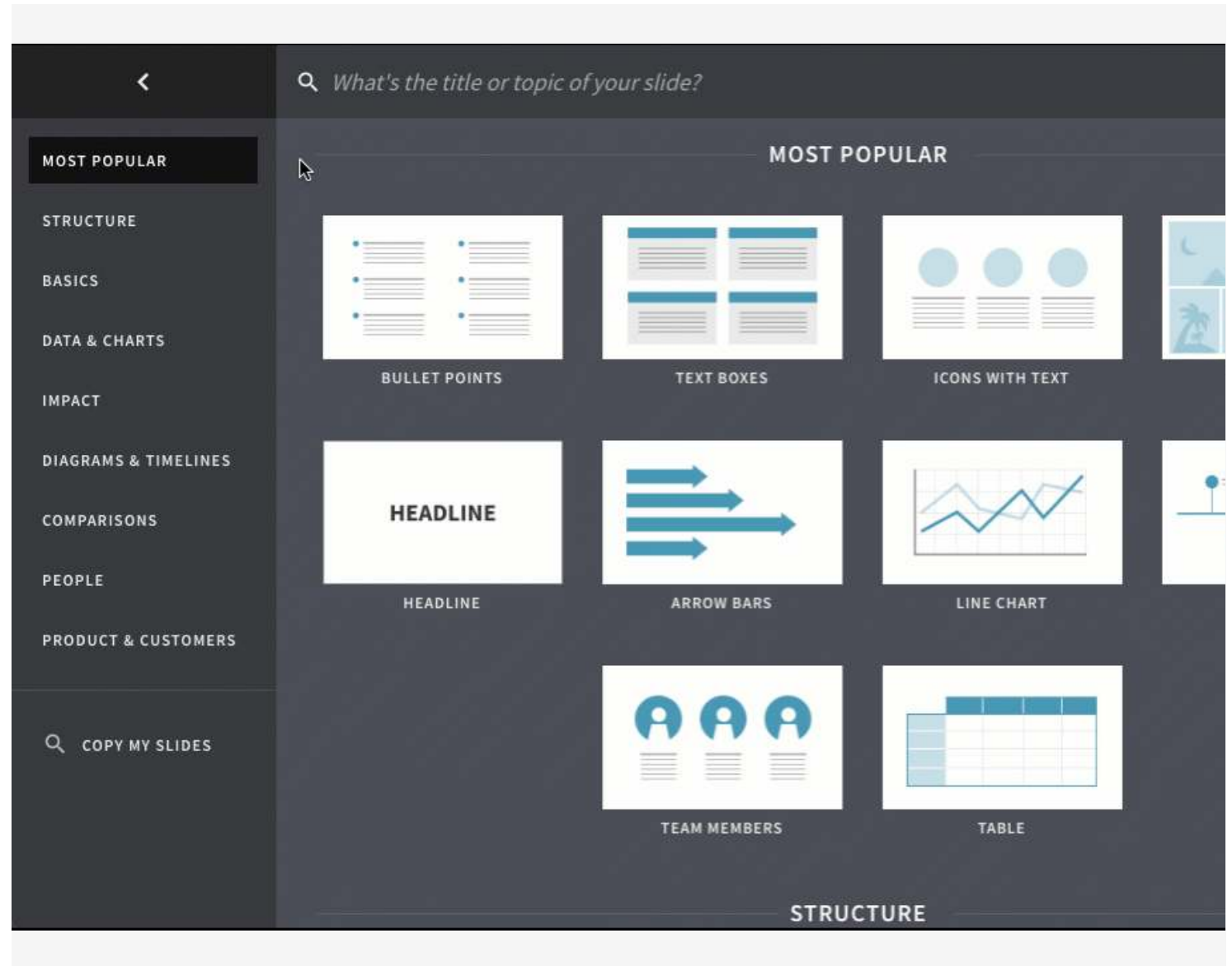
Questions can be generated via:

- External Resources
- AI-based tools
- Questions databases

Tailored AI Tools: Slides Generation

Beautiful.ai is a presentation design tool that uses AI to help users create visually appealing and professional presentations with ease.

SlidesAI is a tool that focuses on using AI to generate and enhance presentation slides based on textual input. Here's an overview of its features:



Text

Themes

Refer a friend

Get Help

Your Account

English



Enter Text

Or try an example →

Presentation Type

Educational



No. of Slides

8

☒ Add Title and Thank you Slide

In the future, robot vehicles may look entirely different from the hands-free/big-screen version we expect. Envision a transport capsule that blurs the boundaries between home, car, entertainment centre, workplace and wellbeing hub – and a whole new in-car services industry.

Central AI software may control urban traffic systems, directing traffic flow so congestion and road accidents are both consigned to history.

The UK government's Future of Mobility fund has already funded three self-driving pilot projects: DRIVEN, a trial fleet of fully autonomous vehicles in urban and inter-urban areas that will culminate in autonomous journeys in Oxford and London; RoboPilot, creating autonomous driving for an electric delivery van that could be adapted to buses and larger trucks; and, StreetWise, a demonstration of the technology, safety validation, insurance and service models for autonomous personal mobility to replace the urban commuter car.

In the US, Ford, Argo AI and Walmart are collaborating on a delivery service located in Austin, Miami and Washington. The service will use Ford's self-driving vehicles paired with Argo AI's self-driving system technology. According to executives, delivery capacity is projected to expand over time.

[Click to format text](#)

3756 characters ([How does it work?](#))

☐ Replace existing slides

Create Slides

Tailored AI Tools: One-stop-shop

Magic School

Magic School is an AI-driven tool designed to assist educators and students by providing a range of educational resources and functionalities.

- **Personalized Learning**
- **Interactive Content**
- **Automatic Content Creation**
- **Virtual Tutoring**
- **Instant Feedback**
- **Performance Tracking**



Magic Tools

Raina (Chatbot)

Output History

Launch to Students

Love

Training

Share the Magic

MagicStudent Intro

Upgrade

TEACHERS ARE
MAGiC



MagicSchool

MagicStudent



All

Planning

Content

Questions

Intellectual Prep

Student Support

Communication

Favorites [Change Order](#)



Lesson Plan

Generate a lesson plan for a topic or objective you're teaching.



AI-Resistant Assignments

Receive suggestions on making assignments challenging for AI chatbots..

All Tools



MagicSchool for Students Ideas

NEW!

Get ideas on how to use MagicStudent tools in your student activities and assignments.



Multiple Choice Assessment

Create a multiple choice assessment for a standard(s), or criteria!



Lesson Plan

Generate a lesson plan for a topic or objective you're teaching.



Report Card Comments

Generate report card comments and areas for growth.



Informational Texts

Generate original informational texts for your class, customized to the topic of your choice.



Rubric Generator

Have AI write a rubric for an assignment in your class in a table format.



Text Dependent Questions

Generate text-dependent questions for students based on any text that you input.



Professional Email

Generate a professional e-mail for teachers and other professionals.



Student Work Feedback

Based on a custom criteria, have AI give areas of strength & areas for improvement.



Text Summarizer

Take any text and summarize it.



Hands-on

Activity: Customizing Your Lesson Plan

- Lesson Plan Development

Task: Use ChatGPT to draft a lesson plan outline. Include objectives, key concepts, and suggested activities relevant to your subject area.

Prompt Example: “ChatGPT, please help me create a lesson plan for [subject] focusing on [specific topic]. Include learning objectives, key concepts, and suggested activities.”

Adjustments: Review and refine the lesson plan based on your subject’s specific needs and teaching style.

- Difficult Term Explanation

Task: Identify 3-5 terms from your subject area that might be difficult for students. Use ChatGPT to generate clear, student-friendly definitions and examples.

Prompt Example: “ChatGPT, provide simple explanations for the following terms in [subject]: [term 1], [term 2], [term 3].”

Adjustments: Ensure that definitions are relevant and understandable for your student

- Discussion Questions Generation

Task: Use ChatGPT to create discussion questions related to the lesson topic.

Prompt Example: “ChatGPT, generate discussion questions for a lesson on [topic in subject]. The questions should encourage critical thinking and analysis.”

Adjustments: Select and modify the questions to suit your classroom dynamics and learning objectives.





Activity: Customizing Your Lesson Plan

- **Content Generation**

Task: Ask ChatGPT to generate a brief reading passage, summary, or additional content relevant to the lesson topic.

Prompt Example: "ChatGPT, create a brief summary or reading passage about [specific topic in subject]."

Adjustments: Review and tailor the content to fit your lesson plan and student needs

- **Quiz Generation**

Task: Use ChatGPT to generate a set of quiz questions on the lesson topic. Include various question types (e.g., multiple-choice, true/false).

Prompt Example: "ChatGPT, create a quiz with multiple-choice and true/false questions on [specific topic in subject]."

Adjustments: Review and refine the quiz questions for clarity and alignment with your learning objectives.

- **Fine-Tuning and Reflection**

Task: Evaluate the effectiveness of the lesson plan, term explanations, discussion questions, content, and quiz generated with ChatGPT.

Prompt Example: "Review the materials generated for the lesson on [topic]. Make any necessary adjustments to ensure they meet the learning objectives and are suitable for my students."

Reflection: Discuss what worked well, what could be improved, and how you might implement these materials in your classroom.



Activity: Role Playing

- **Historical Role-Playing:** Social studies teachers can use ChatGPT to create historical role-playing activities for their students. For example, “Hello ChatGPT, I am Thomas Jefferson. I would like to discuss my role in drafting the Declaration of Independence.”
- **Literary Character Role-Playing:** Students can be assigned a literary character to role-play as, and then have a conversation with ChatGPT in the persona of that character. For example, “Can you play the role of Elizabeth Bennet from Pride and Prejudice? I want to know more about your thoughts on love and marriage.”
- **Science experiment:** Students can role-play as scientists who are conducting an experiment. They can assign roles such as the researcher, the lab technician, or the data analyst. The teacher can provide a list of materials and instructions for the experiment, and students can work together to design the experiment, collect data, and analyze the results. For example, students can role-play as scientists who are testing the density of different objects.

-



Activity: Role Playing

- **Math and Science concepts:** ChatGPT can generate scenarios that involve math or science concepts, such as measuring ingredients for a recipe, conducting a science experiment, or solving a real-world math problem. These scenarios can be used as the basis for role-playing activities. For example, ChatGPT can ask the students to design and build a bridge using math and science concepts
- **Historical science figure role-play:** Students can role-play as historical science figures, such as Galileo or Marie Curie. They can research and learn about the contributions of their assigned figure and present their findings to the class in the form of a role-play. This activity can help students develop research skills and learn about the history of science. For example, "Bonjour, ChatGPT. I am Marie Curie. Can we discuss my discoveries in radioactivity and how it has impacted science?"
- **Foreign language scenario:** ChatGPT can generate scenarios that involve real-life situations that students might encounter when communicating in a foreign language, such as ordering food at a restaurant, asking for directions, or making small talk with a new acquaintance. These scenarios can be used as the basis for role-playing activities. For example, ChatGPT can provide a scenario where the students need to buy tickets for public transportation in the target language. The students can assign roles such as the ticket seller, the commuter, or the tourist.