



Pros and Cons of AI in Education

إيجابيات وسلبيات الذكاء الاصطناعي
في التعليم

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Outline

- Artificial Intelligence
- Applications of AI
- AI in education
- Advantages of AI in education
- Disadvantages of AI in education



Artificial Intelligence

What is AI?

- AI is the science of making machines intelligent.
 - It is a technology that enables computers and machines to simulate human intelligence and problem-solving capabilities.
 - Any technique that enables the machine to learn and reason like a human.
- Weak AI: Machines can perform some specific tasks (e.g., Apple Siri, Amazon Alexa).
- Strong AI: Machines and humans are equal. Machines have the ability to solve problems and plan for the future. (Superintelligence).
- The AI technologies nowadays belong to weak AI but can improve over time.

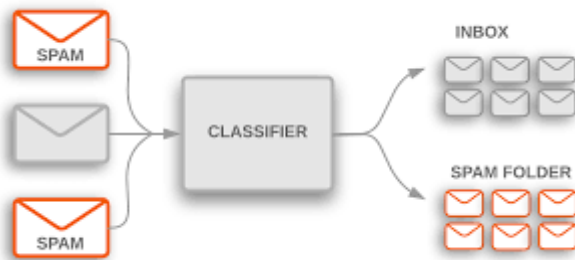
How Have You Used It Already?

- Categorizing Email
- Face ID
- Personalize Recommendations From Streaming Services
- Personalized Advertising
- Virtual Assistants (Siri, Alexa)
- Autonomous Vehicles
- Fraud Detection
- Design Suggestions in PowerPoint

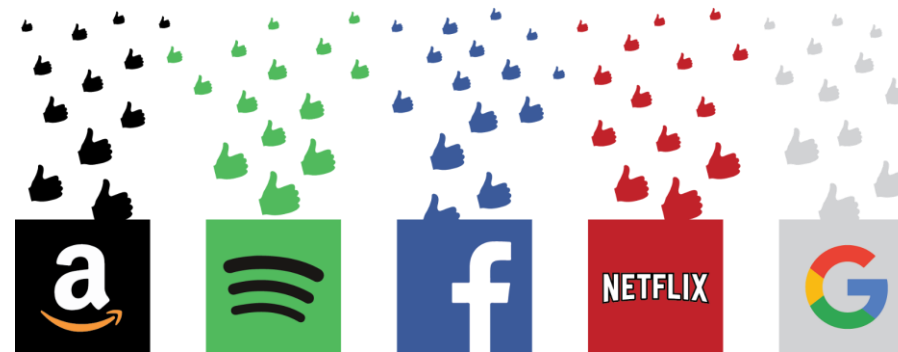
Key components of AI

- Machine Learning (ML): involves the development of algorithms and statistical models that allow computers to learn from and make predictions or decisions based on data.
- Deep Learning: a specialized subset of ML that involves the use of artificial neural networks with multiple layers of interconnected nodes (neurons).

Spam detection



Recommender systems

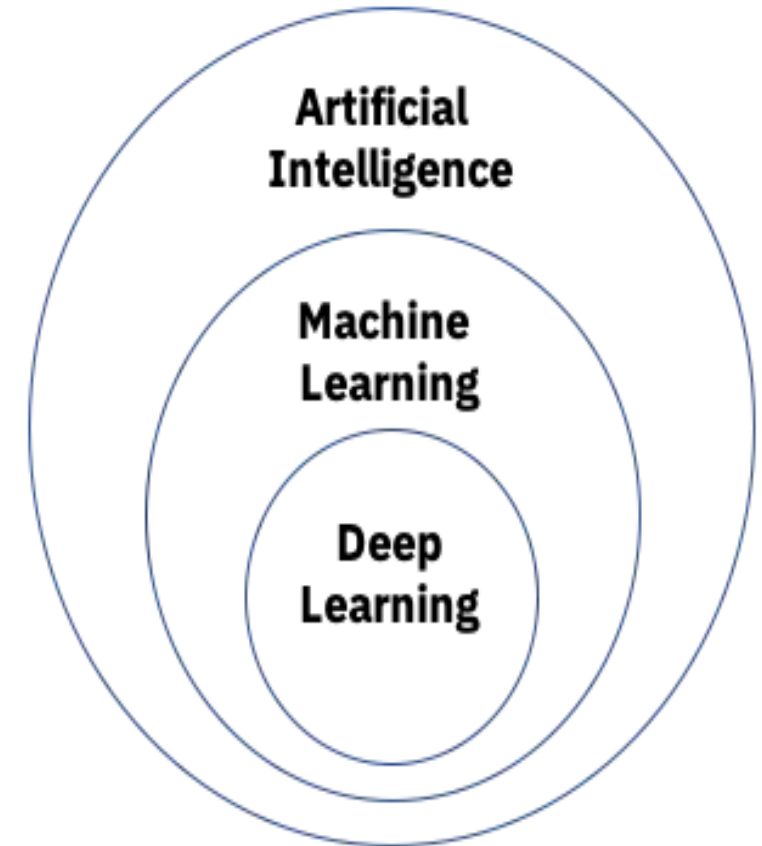


Fraud detection



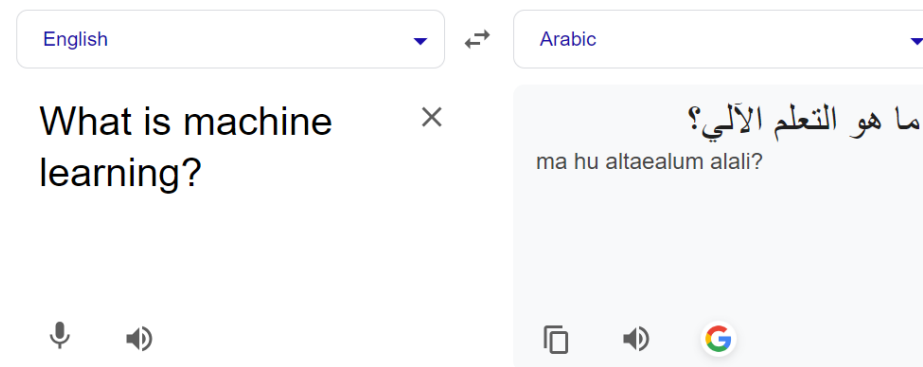
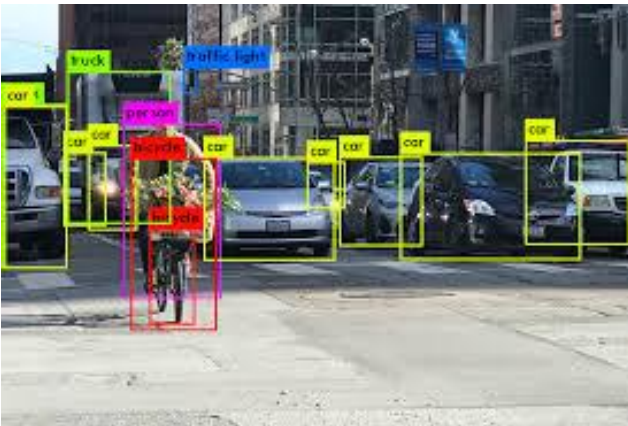
AI vs. ML vs. DL

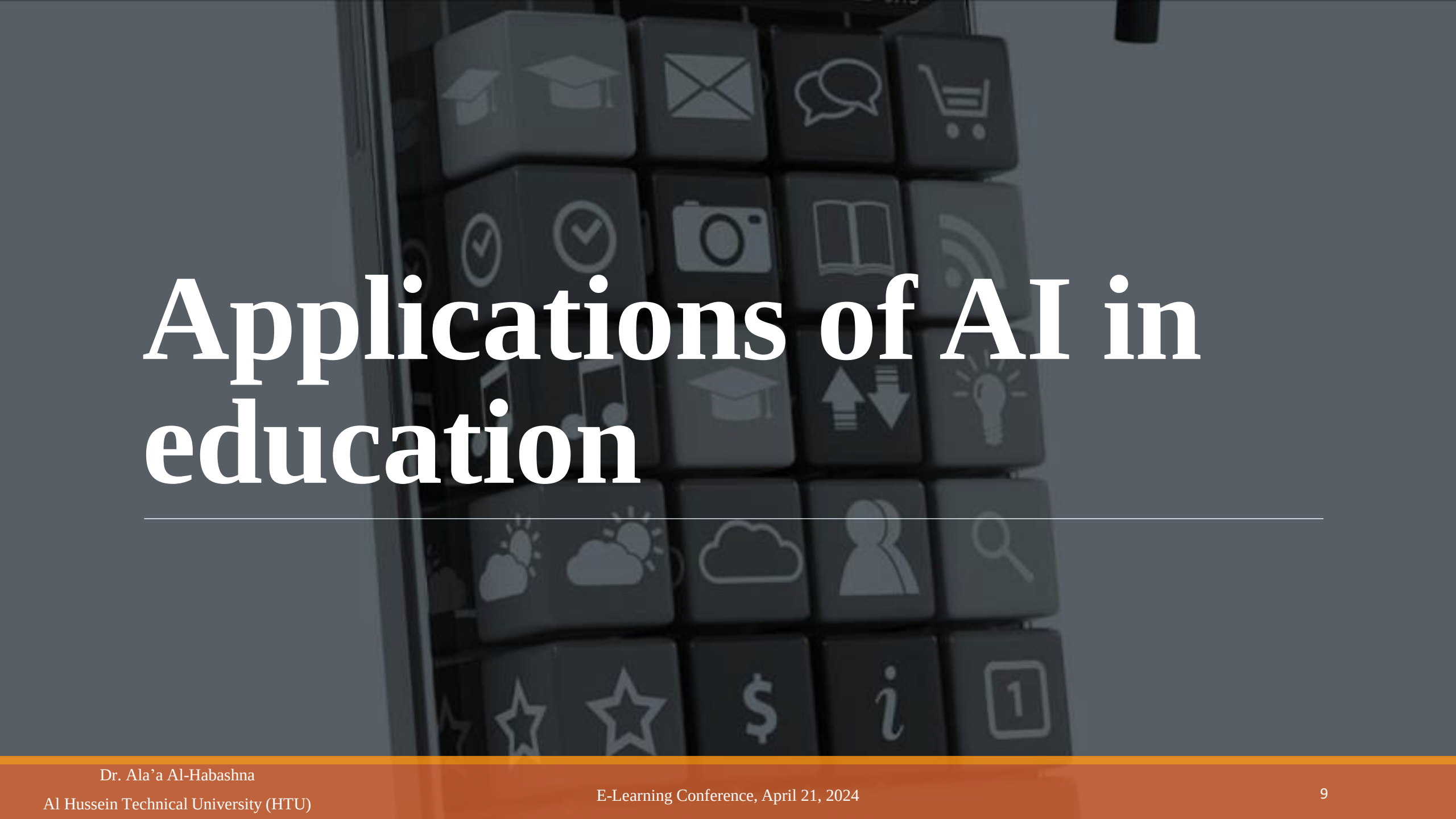
- ❑ Machine Learning and Deep Learning are subsets of AI.
- ❑ Machine Learning: Enable the machine to learn by itself (training) to make future predictions.
- ❑ Deep Learning: The same as Machine Learning, however it mimics human brain by applying neural networks.



Key components of AI

- Computer Vision: a field of AI that enables computers to interpret and understand visual information from the real world.
- Natural Language Processing (NLP): NLP is a branch of AI that focuses on enabling computers to understand, interpret, and generate human language.
- Robotics: Robotics combines AI with mechanical engineering to create machines that can perform tasks autonomously or semi-autonomously





Applications of AI in education

AI techniques with use in education

- Machine Learning (ML)
 - ML algorithms can analyze student data to personalize learning experiences, predict student performance, and recommend appropriate resources.
 - ML is also used for automated grading, natural language processing, and adaptive learning systems.
- Natural Language Processing (NLP)
 - NLP enables computers to understand, interpret, and generate human language.
 - In education, NLP can be used for automated essay grading, language translation, sentiment analysis of student feedback, and chatbots for answering student queries.

AI techniques with use in education

- Deep Learning
 - Deep learning, a subset of ML, has been particularly effective in tasks such as image recognition, speech recognition, and natural language processing.
 - In education, deep learning models are used for personalized learning, content recommendation, and enhancing educational applications with voice and image recognition capabilities.
- Recommender Systems
 - Recommender systems can analyze user preferences and behaviors to recommend relevant educational resources, such as courses, books, articles, and videos.
 - These systems help students discover new learning materials tailored to their interests and learning goals.

AI techniques with use in education

- Intelligent Tutoring Systems (ITS)
 - ITS combines AI techniques such as ML, NLP, and expert systems to provide personalized tutoring and feedback to students.
 - These systems adapt to individual learning styles, track progress, and provide targeted assistance in areas where students are struggling.
- Virtual Assistants and Chatbots
 - AI-powered virtual assistants and chatbots provide students with instant support and guidance, answering questions, providing explanations, and directing students to relevant resources.
 - These systems can enhance student engagement and facilitate continuous learning outside the classroom.

AI in education



Duolingo

- A language-learning app provides listening, reading and speaking exercises for over 40 global languages.
- By applying AI, lessons are paced and leveled for each student according to their performance.
- Duolingo offers a classroom version for schools as well as a mathematics education app known as Duolingo Math.



- An application that uses computer vision and augmented reality (AR).
- Blippar's products combine computer vision intelligence technology and augmented reality to enhance the way students learn in the classroom.
- The interactive materials bring subjects like geography, biology and physics to a visual space.
- For example, instead of reading about a volcanic eruption, the system shows students a virtual 3D model of the eruption process.
- [Blippar in education.](#)

- **Personalized Learning**

- Coursera uses AI algorithms to analyze student data and behavior to provide personalized recommendations for courses, assignments, and study materials.
- This helps students focus on areas where they need improvement and progress at their own pace.

- **Content Recommendation:** AI algorithms analyze user preferences, browsing history, and course performance to recommend relevant courses, specialization paths, and additional learning resources.

- **Assessment and Grading**

- Some courses on Coursera employ AI-based systems for grading assignments and providing feedback.
- These systems can assess written assignments, code submissions, and even subjective tasks like peer-reviewed assignments.



AI tools

Large Language Models (LLMs)

LLM is a language model notable for its ability to achieve general-purpose language generation and other natural language processing tasks such as classification.

AI System	What is it	Major Thing People Get Wrong
 ChatGPT/ GPT-3.5	This is the free version of ChatGPT that came out in November. It is very fast and pretty solid at writing and coding tasks.	It is not connected to the internet. If you ask it to look up anything since late 2021, it will get those things wrong. Doesn't do math
 ChatGPT/ GPT-4	New. Currently available to paying customers. Disturbingly powerful at times, it is the most capable model. Slow. Does a lot.	It is also not connected to the internet, though it is better at not making stuff up. Does better at math.
 ChatGPT/ Plugins/Web/ Code Interpreter	Adds new capabilities to ChatGPT. Plugins and web browsing still have rough edges. Code Interpreter lets the AI run Python code.	As a system in early testing, plugin and web capabilities are not completely clear, but Code Interpreter is a huge advance.
 Bing AI	Connected to the internet. Extremely powerful. Somewhat weird. Creative mode uses GPT-4, the other modes (precise, balanced) don't seem to	Being in the wrong mode will get you bad results (Creative mode is most full featured). AI with personality.
 Google Bard	Current model is not very good. Future models may be very powerful.	Since it is Google, expecting it to not lie. It makes stuff up more than other models.
 Anthropic Claude	Equivalent to GPT-3.5, but with a model that feels much more sane to use. Less popular	Also not connected to the internet

The symbol can help you know what system is being used in screenshots

From One Useful Thing

Use cases of LLM-tools for students

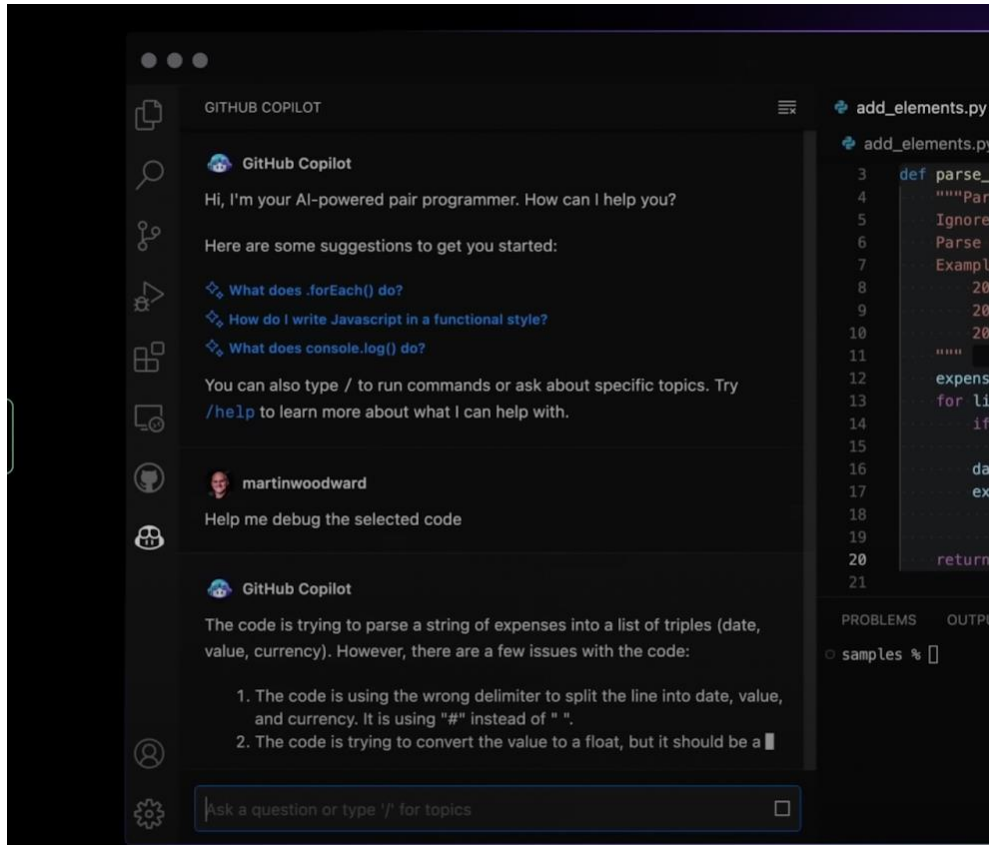
- **Research Assistance:** When working on projects or assignments, students can ask ChatGPT for explanations, references, or additional information on topics they're studying.
- **Homework Help:** Students can ask ChatGPT questions related to their homework assignments or problems they're stuck on.
- **Language Practice:** ChatGPT can assist students in practicing languages by engaging in conversations or asking for translations or explanations of phrases.
- **Concept Clarification:** Students can use ChatGPT to clarify concepts they find confusing in their textbooks or lectures.

Use cases of LLM-tools for students

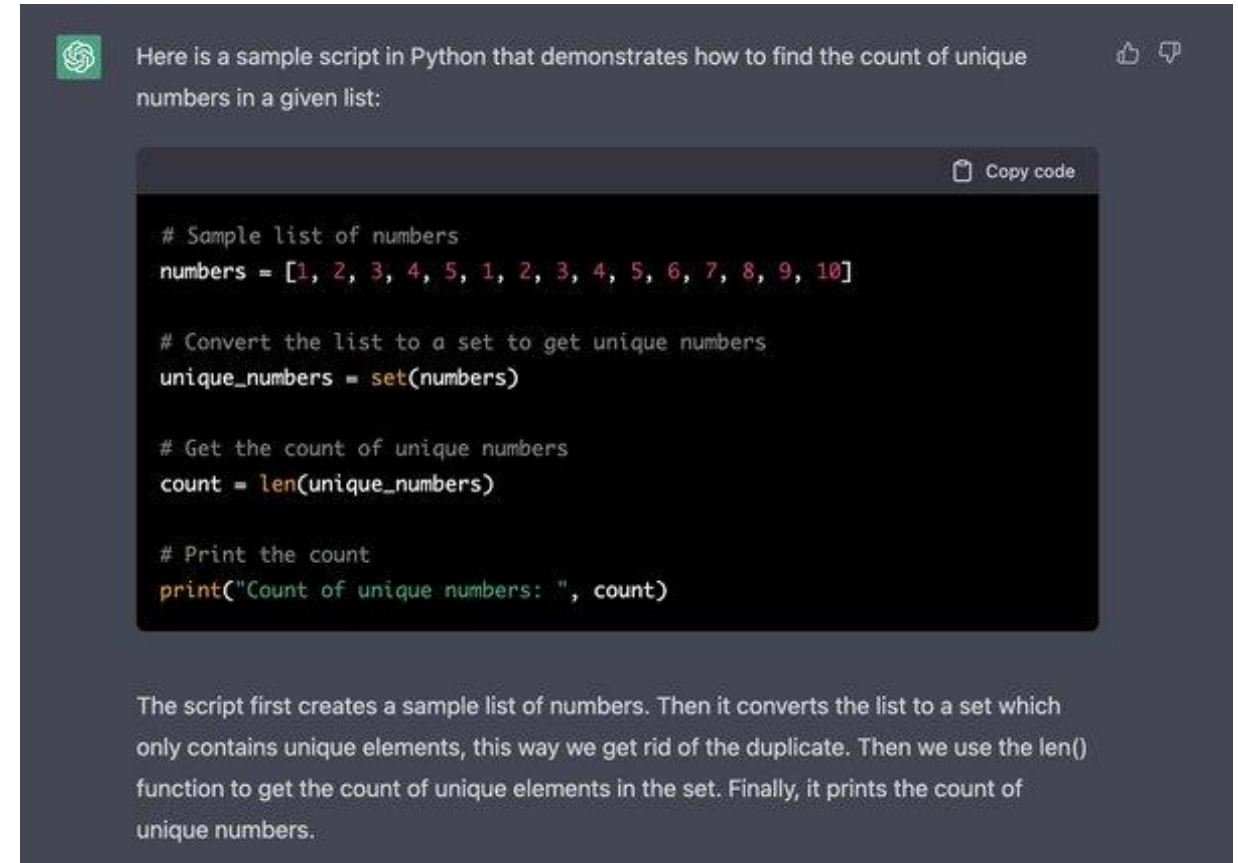
- **Writing Assistance:** ChatGPT can help students with writing tasks such as essay brainstorming, outlining, proofreading, or generating ideas.
- **Studying and Revision:** ChatGPT can quiz students on various topics to help them review material for exams or tests.
- **Coding Assistance:** For students learning to code, ChatGPT can provide explanations of programming concepts, help debug code, or offer suggestions on how to approach coding problems.
- **Exploring New Topics:** ChatGPT can introduce students to new topics or areas of interest by answering questions and providing insights on a wide range of subjects.

Coding

GitHub Copilot



[ChatGPT](#)



Coding

OpenAI Codex

The screenshot shows the OpenAI Codex Playground interface. At the top, there's a navigation bar with links for Overview, Documentation, Examples, and Playground (which is highlighted). On the right of the navigation bar are links for Upgrade, Help, and a user profile icon labeled 'Pers'. Below the navigation bar, the interface is split into three main sections. On the left is a 'Get started' sidebar with instructions on how to use the playground and a 'KEEP IN MIND' section with three bullet points. The middle section is the 'Playground' area, which has a dropdown menu set to 'Natural language to python'. Below this is a text input area containing a list of instructions: '1. Get a reputable news api website', '2. Generate code to call the api and request 20 of the latest news articles', and '3. Print the news stories'. To the right of the input area is a panel with various settings: Engine (set to 'code-davinci-001'), Temperature (a slider), Response length (set to 3), Stop sequences (a text input), Top P (a slider), Frequency penalty (a slider), Presence penalty (a slider), and Best of (a slider). At the bottom of the playground area is a 'Generate' button and a status bar showing '37' and 'Plain text'. A notification at the bottom of the playground area states: 'The Codex models are currently in private beta. Usage is free during this period. Learn more.'

Overview Documentation Examples **Playground** Upgrade Help B Pers

Get started ×

Enter some text or select a preset, and watch the API respond with a **completion** that attempts to match the context or pattern you provided.

You can control which **model** completes your request by changing the engine.

KEEP IN MIND

- Use good judgment when sharing outputs, and attribute them to your name or company. [Learn more.](#)
- Requests submitted to our models may be used to train and improve future models. [Learn more.](#)
- Most models' training data cuts off in October 2019, so they may not have knowledge of current events.

Playground Natural language to python × ▾ Save View code Share

```
1 """
2 1. Get a reputable news api website
3 2. Generate code to call the api and request 20 of the latest news articles
4 3. Print the news stories
5 """
```

Engine [What's new](#)

code-davinci-001

Temperature

Response length 3

Stop sequences

Enter sequence and press Tab

Top P

Frequency penalty

Presence penalty

Best of

Generate 37 Plain text ▾

i The Codex models are currently in private beta. Usage is free during this period. [Learn more.](#) ×

Dragon

- Nuance makes speech recognition software used by students and faculty to transcribe up to 160 words per minute.
- The technology is especially helpful for students who struggle with writing or have limited mobility.
- It also enhances spelling ability and word recognition.
- Instructors use the software to dictate lectures for later use or quicken repetitive tasks like document and email creation.

Nuance®
Dragon®



Advantages of AI in education

Benefits to students

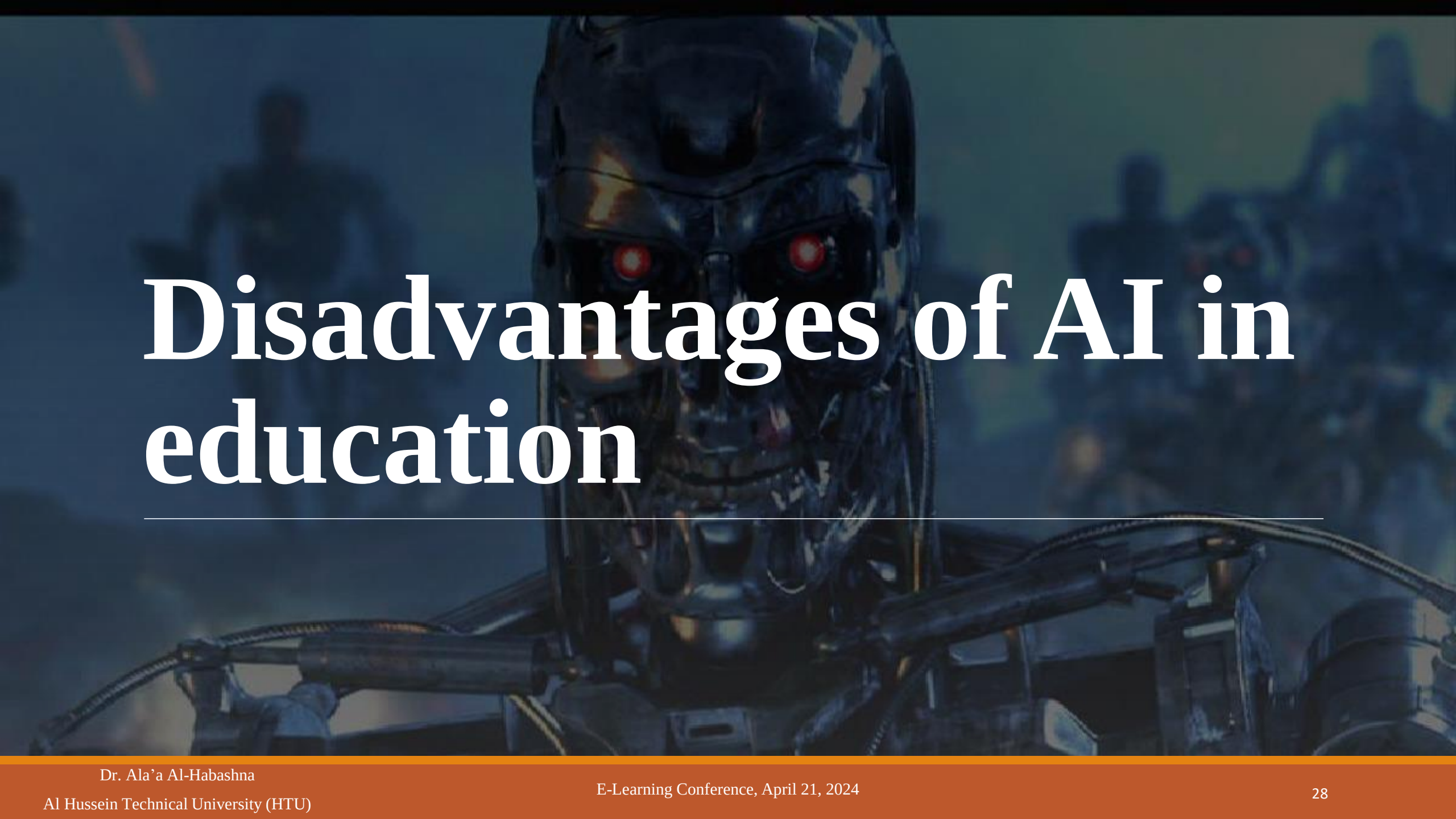
- **Personalization:** AI systems easily adapt to each student's individual learning needs and can target instruction based on their strengths and weaknesses.
- **Tutoring:** AI systems can gauge a student's learning style and pre-existing knowledge to deliver customized support and instruction.
- **Grading:** AI can compile data about how students performed and even grade more abstract assessments such as essays.
- **Feedback on course quality:** AI can zero in on the specific information or concepts that students are missing, so educators can deliver targeted improvements in materials and methods.
- **Meaningful and immediate feedback to students:** Some students may be shy about taking risks or receiving critical feedback in the classroom, but with AI, students can feel comfortable to make the mistakes necessary for learning and receive the feedback they need for improvement.

Benefits to Teachers

- **Personalized Learning:** AI can analyze student data to provide insights into individual learning needs and preferences. This allows teachers to tailor their instruction to better meet the needs of each student, fostering improved learning outcomes.
- **Content Creation and Curation:** AI tools can assist teachers in creating and curating educational materials. For example, AI-generated quizzes, exercises, and lesson plans can save teachers time and provide additional resources to enhance their teaching.
- **Automated Grading and Feedback:** AI-powered grading systems can help teachers automate the grading process for assignments, quizzes, and exams. This frees up time for teachers to focus on providing personalized feedback and support to students.

Benefits to Teachers

- **Data Analysis:** AI algorithms can analyze large volumes of educational data to identify areas where students are struggling, predict student performance, and assess the effectiveness of teaching strategies.
- **Virtual Teaching Assistants:** AI chatbots and virtual teaching assistants can provide instant support to students by answering questions, providing explanations, and offering guidance on coursework.
 - This can help teachers manage their workload more efficiently and provide timely support to students outside of class hours.
- **Professional Development:** AI-powered tools can support teachers' professional development by providing personalized recommendations for training courses, resources, and best practices based on their individual needs and goals.
- **Classroom Management:** AI systems can analyze classroom dynamics and student behavior to help teachers identify potential issues and implement strategies to improve classroom management and student engagement.



Disadvantages of AI in education

Disadvantages of AI in education

- **Cheating:** Students can use ChatGPT to write entire essays, answer quiz questions, or do their homework.
 - Ironically, now there are AI programs that can detect AI writing to help teachers determine if their students are cheating.
 - But sometimes those programs may falsely identify a student's original work as plagiarism.
- **Errors:** In addition to bias, artificial intelligence may generate misinformation.
 - The data that AI draws from may have errors, be outdated, or spread misinformation.
 - Neither students nor teachers should assume that information provided by AI is accurate.

Disadvantages of AI in education

- **Isolation:** If students interact with a software program more than with a teacher, they can begin to feel disconnected and isolated.
 - Their motivation and engagement may decrease, which could lead to an increase in dropout rates.
- **Jobs:** AI has the potential to be a powerful learning tool. Some teachers worry that AI will replace them.

Disadvantages of AI in education

- **Data Privacy Concerns:** AI systems require a vast amount of data to operate effectively, which could potentially put sensitive information about students at risk if it falls into the wrong hands.
 - Strict regulations need to be in place to ensure student data is protected.
- **Dependence on Technology:** Over-reliance AI it can lead to issues.
 - Should the systems fail or if there are technical glitches, the learning process could be halted.
 - Constant interaction with AI might lead students to lack the social skills that are developed through human interaction in a traditional classroom setting.
- **Lack of Human Touch:** While AI can mimic human responses, it cannot understand and react to the emotional needs of students.
 - Teachers play a crucial role in motivating and inspiring students, offering a human touch that cannot be replicated by AI.
 - Balancing the use of AI with the irreplaceable human touch of teachers is paramount for effective learning.

Disadvantages of AI in education

- AI can “hallucinate” or generate false content that seems very convincing
 - You must check all content
- Copyrights
- Academic Dishonesty
 - Can we detect if students use AI?
 - Should we allow them to?

Thank you!
