

Research-Based Curricula

Smart Minds: Learning AI Literacy for Real Life

Key Stage 5

Technology, Psychology &
Philosophy

Coursebook

2025

access

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Building global university
access programmes



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About this Pack

Who is this pack for?



- This pack was created for all students, regardless of whether this is your best or worst subject.
- It's not graded or marked by your teacher. It's a chance to explore the subject and learn in a new way that's different to the classroom.
- Each pack is written by a student at the University of Cambridge researching this topic and has special knowledge on the subject. When they were your age, they knew nothing about it either!
- By completing their mini-course, you will find out why it's interesting, and you will build the skills that help you improve at school.

So... why complete this pack?



- Learn new cool areas of a subject that you won't cover in the classroom
- Sharpen your academic skills, like short essay writing and interpreting data
- Experience what it's like to explore a subject freely
- Better understand what you enjoy and don't – it will help you make decisions about your future studies and career choices!

What's in this booklet?



Your RBC booklet is a pack of resources containing:

- ✓ More about how and why study this subject
- ✓ Four 'resources' each as a lesson with activities
- ✓ A final assignment to gauge learning
- ✓ Extra guidance throughout about the university skills you are building
- ✓ End notes on extra resources and where to find more information

Meet the Author

Name Iris Heung Yue Yim

Area of Study and Degree PhD in Education

University University of Cambridge

My background

Growing up bilingual in Cantonese and English in Hong Kong, my passion for education is deeply rooted in personal experience, especially as a parent of three, and driven by a deep desire to understand how learning enriches and transforms lives. I view education not simply as the accumulation of knowledge and the mastery of skills, but as a powerful means of empowerment, growth, and meaningful change.

My research

My current research centres on designing an AI literacy curriculum and AI learning tools for young students that employ innovative pedagogical strategies. I support a performative pedagogical approach, “Learning by Becoming”, which values creativity as equally important as knowledge and thinking skills. This pedagogy recognises the arts not merely as supplemental but as essential methodologies that help make abstract AI concepts accessible and tangible for young students. Through this work, I aim to create educational experiences that are dynamic, inclusive, and deeply impactful.

I think my subject is awesome because..

Studying education, especially teaching young students, is deeply rewarding because it lays the foundation for lifelong success, personal growth, and meaningful goal attainment. Education fosters critical thinking and creativity, empowering young people to navigate today’s complex economic, cultural, and environmental challenges. It cultivates adaptable leaders who drive innovation in a rapidly changing world while enabling educators to make a lasting, transformative impact on individuals, communities, and society. More than just a profession, education offers a profound sense of purpose and opens diverse opportunities worldwide, making it one of the most fulfilling careers.

Building Your Skills

Research-Based Curricula packs challenge you to build your skills in this subject and be used across any of your schoolwork.



Any time you see a badge, look out for a skill you'll be building!

These skills are the type of skills that teachers and universities look for as you progress, so see how many you know below.

Skills you may see and use in this pack.

Research *your ability to work on your own and find answers online or in other books*

Creativity *your ability to create something original and express your ideas*

Problem solving *your ability to apply what you know to new problems*

Source analysis *your ability to evaluate sources (e.g. for bias, origin, purpose)*

Data analysis *your ability to discuss the implications of what the numbers show*

Active reading *your ability to engage with what you are reading by highlighting and annotating*

Critical thinking *your ability to think logically to build an argument clearly*

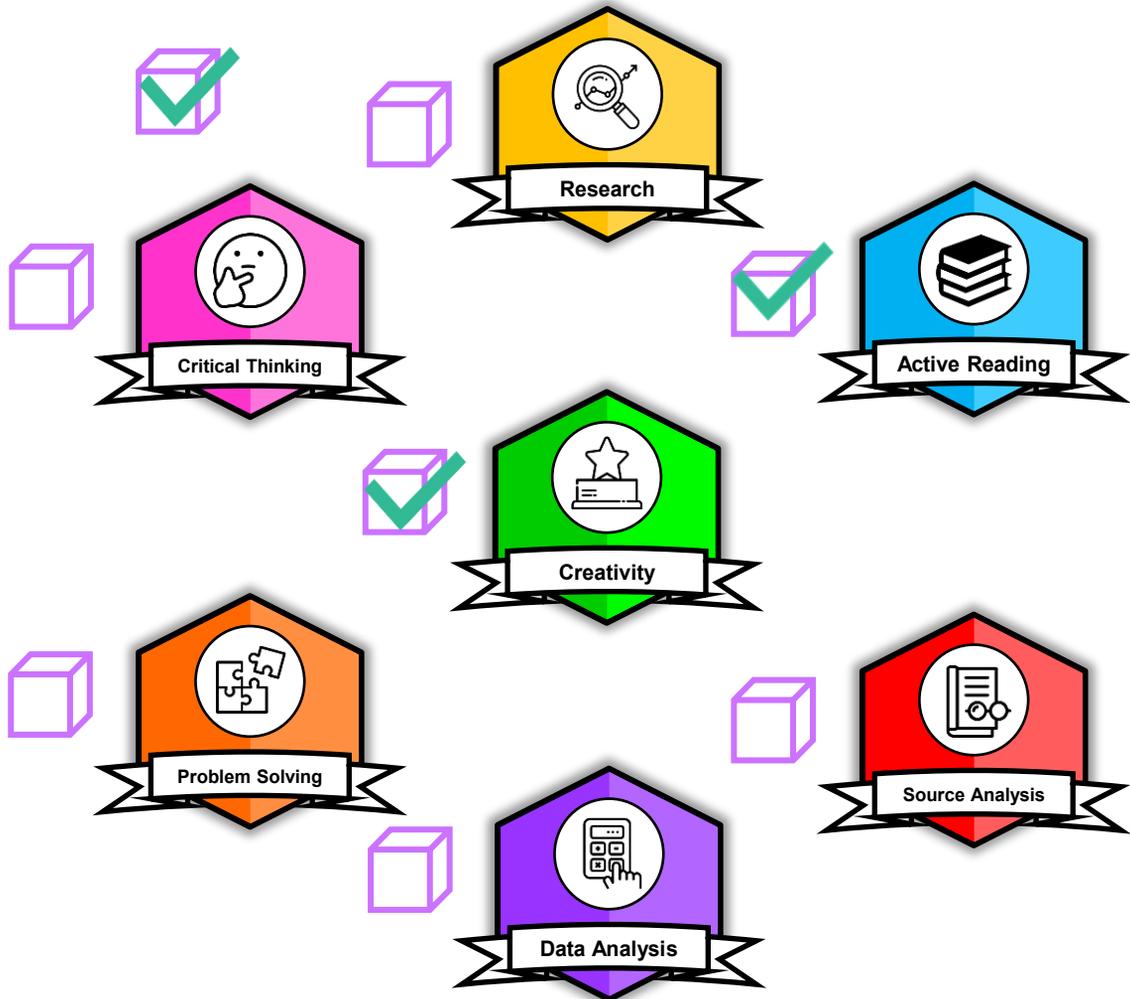


Psst! You can learn more about these skills in the Academic Study Skills section.

Your Skills Badges

As you work through this booklet, you'll have the chance to build the skills you have read on the previous page.

Make sure to revisit this page once you have mastered each skill. Tick off each skills badge below once completed!



Look out for these badges in the Data Source, Activities and Further Reading sections of each Resource. If you complete a skill more than once, write the number of times you completed it next to the badge.

When you've earned all seven skills badges, you can discuss with your teacher how to further build your skills!

Vocabulary

Be sure to use this section as you go through your booklet. If you see an emboldened word, you can find the definition here. If you are still unsure about the meaning or use of the word, we encourage you to use a dictionary or ask a teacher.



Term	Definition
AI-generated images	AI-generated images are pictures created by a digital device, such as a computer, using AI technology. The device generates images based on the descriptions you provide, turning your ideas into visuals or drawings.
Computational Thinking	Computational thinking is a way of solving problems by breaking them into smaller parts, finding patterns, focusing on important information, and creating step-by-step plans to solve them. It is a clear, organised approach that aims to help both people and computers understand and fix problems.
Data for AI	For AI, data is the information used to train the AI system so it can learn and make decisions. This data can take many forms, including numbers (numerical data), words (text data), pictures (image data), sounds (audio data), or other sensor data. AI uses this data to find patterns and learn how to solve problems.
Data literacy	Data literacy is the ability to understand, work with, and use data effectively. It involves knowing where data comes from, recognising high-quality data, and being aware that data can sometimes be misleading.
Digital literacy	Digital literacy is the ability to use digital tools such as computers, smartphones, and the internet to find, understand, create, and share information. It includes searching for information,, using technology safely, and communicating online.

Vocabulary

Term	Definition
Ethical decision-making	Ethical decision-making is the process of choosing what is right, appropriate, and fair by thinking carefully about rules, human values, and how actions affect others. It helps people make honest, kind, and respectful choices that benefit everyone and the planet.
Generative AI	Generative AI is a type of artificial intelligence that can create new content, such as text, images, music, or videos, by learning patterns from a large amount of existing data. It works by understanding examples it has been trained on and then making new things based on what it has learned.

When you find words that you don't recognise in a resource, look up their definition.

Introduction to Subject

Smart Minds: Learning AI Literacy for Real Life

This pack is designed to help you understand AI literacy and explore the exciting world of artificial intelligence (AI) - the technology behind many tools and apps you use every day. It is designed using the AI Thinking Theory framework. Some activities will involve interacting with AI tools to reflect on how AI affects your life and learning. If you don't have direct access to the internet, a computer, or AI tools and platforms, you can work with a partner who does or try to relate the ideas to other technologies you have access to, such as an iPad or a smartphone.

The topics in this pack include:

- Resource 1 Introduction.** The history of AI technology development
- Resource 2 What is AI and AI literacy?** A foundational chapter to introduce key concepts, helping students understand AI history, basics and the importance of AI literacy.
- Resource 3 Dialogue with AI.** Offer opportunities for students to engage interactively and develop critical thinking and communication skills through exploration of AI.
- Resource 4 Drawing with AI.** Perfect for fostering creativity through drawing and visual arts, allowing students to experiment with AI-generated images and understand AI's role and issues in artistic creation.
- Resource 5 Experiments with AI.** Complement the arts focus and encourage creative expression by reinforcing experiential learning through AI tools such as music, stories, and video generation.
- Resource 6 Human and AI ethics.** Crucial for cultivating responsible AI use, critical reflection, and awareness of AI's broader impact on society, environment and ethics.

Introduction to Subject

Smart Minds: Learning AI Literacy for Real Life

As you work through this pack, you will develop important skills in digital literacy, computational thinking, data literacy, and ethical decision-making. These skills will not only help you to use AI effectively but also think critically and creatively about its role in society. The thinking, reflective questions, and activities are designed based on the AI thinking learning cycles (Yim, 2026).

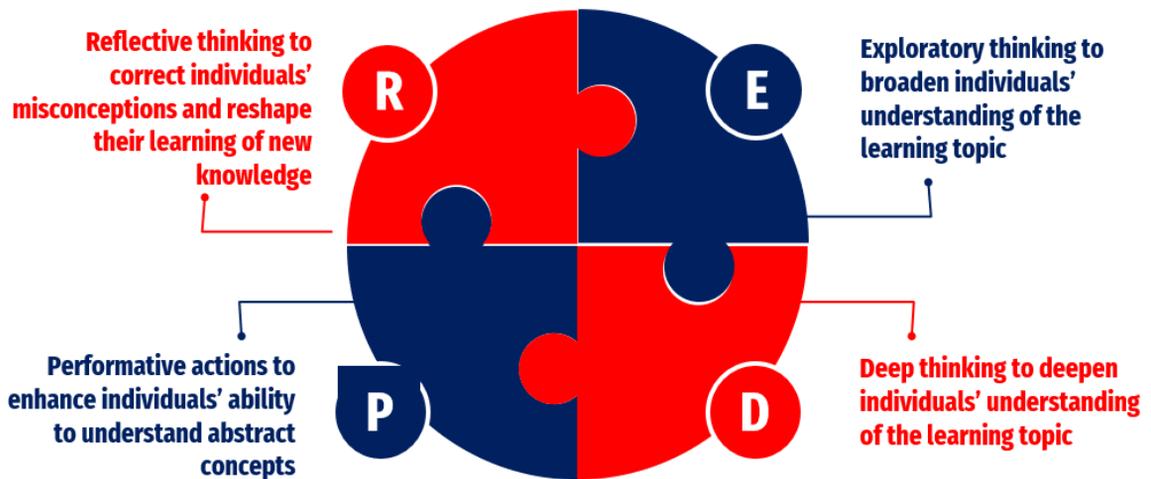


Image source: Process-oriented learning cycles (Yim, 2026)

Resource One

Overview

Topic Introduction - The history of AI technology development.

Key Stage 5 Subject Area Cognition and behaviour in Psychology
Epistemology, metaphysics of mind in Philosophy
Human Computer Interaction (HCI) in ICT

Objectives By completing this resource, you will be able to:

- ✓ Understand the history of AI technology development.
- ✓ Gain first-hand experience about how AI works and how it differs from regular machines.
- ✓ Clearly explain the concept of AI and highlight the differences between AI and human cognition.

Instructions

1. Complete the activities
2. Read the data source
3. Explore the further reading
4. Move on to Resource Two



Resource One

Activity

Activity 1

Welcome to Resource One. We are starting a gut reaction task, so please do not read beyond this page until you have completed this activity.



QR code to
Eliza AI

Experiments with AI Chatbot Eliza. Please scan the QR code or visit <https://www.masswerk.at/elizabot/> to interact with the AI Eliza chatbot for a few minutes. As you chat, write down your immediate thoughts and emotions. There are no right or wrong answers.



Image source: Masswerk



Gut reaction questions:

- What is your first honest reaction to chatting with ELIZA?
- Did it feel like you were talking to a real person or just a machine? How did it make you feel?

What is AI Chatbot ELIZA? ELIZA is an early AI chatbot developed in the 1960s that uses a rule-based system to simulate dialogue by recognising keywords and replying with a patterned script, often mimicking a psychotherapist. This differs from a basic machine, which follows fixed mechanical or programmed instructions without any language understanding or conversational ability.

Resource One

Data Source

Section A

Brief History of AI Technology

Welcome to Resource One. We begin with a brief history of Artificial Intelligence (AI) technology. AI as a concept began in the 1940s, when early researchers such as Alan Turing started exploring the possibility of machines simulating human thinking. A significant milestone occurred during World War II, when computers were used to break secret codes, demonstrating that machines could perform complex tasks.

In 1956, John McCarthy officially coined the term “Artificial Intelligence” at a conference held at Dartmouth College, marking the establishment of AI as a formal field of study. Throughout the 1960s and 1970s, AI research expanded with the development of early programs such as Eliza, the first natural language processing computer program. However, progress was slow at times, leading to periods called “AI winters” when funding and interest declined.

In the 1990s and 2000s, AI advanced significantly with breakthroughs such as IBM’s Deep Blue defeating chess champion Garry Kasparov in 1997 and the rise of machine learning, which enabled AI to learn from data. More recently, ChatGPT (Generative Pre-trained Transformer), a conversational AI chatbot developed by OpenAI, launched in 2022. Later, Grok 4 AI, a generative chatbot developed by xAI, was launched in July 2025 and includes reasoning abilities and multimodal capabilities, allowing it to process both text and images for interactive conversations.



Section B

Role of Human Cognition and Behaviour in AI Development

This section will explore the role of human cognition and behaviour in AI development.

Cognition and behaviour in psychology study how humans think, learn, and act. They explore how the brain processes information, makes decisions, and controls actions.

Resource One

Data Source

Section B
**Role of Human
Cognition and
Behaviour in AI
Development
(continued)**

AI is related because it also needs to “perceive” data, like images or sounds, and create internal “representations” to understand and decide. For example, AI creates digital “maps” from data, just as humans remember places. AI learns and adapts its behaviour based on new information, just like people do.

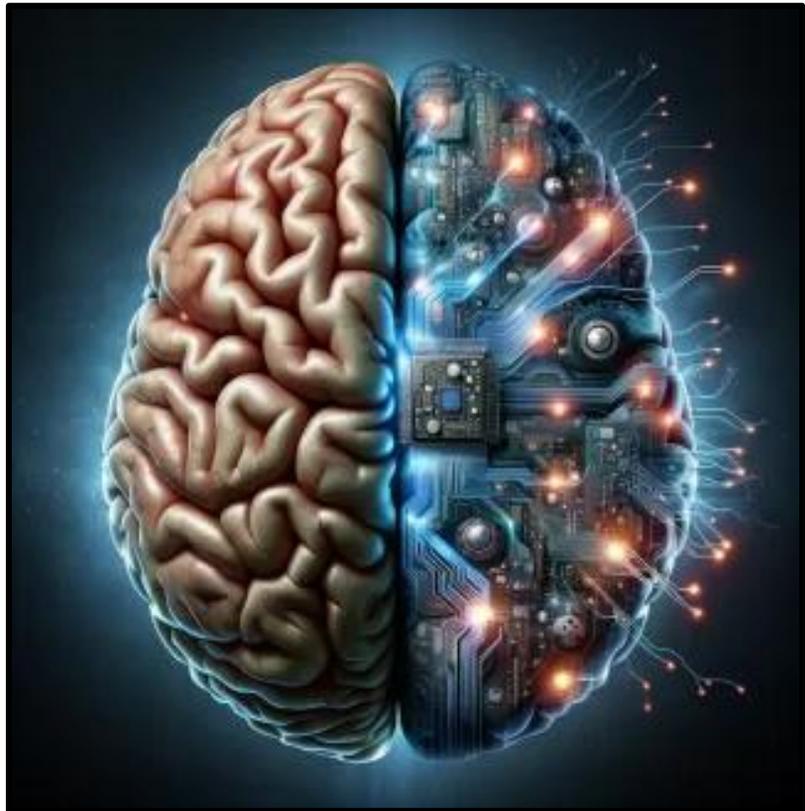


Image source: Psychology Today DALL-E/OpenAI



Human-AI interaction is the study of how humans and AI systems communicate, collaborate, and work together. It helps us understand AI and human cognition as two different yet complementary ways of thinking. This is why understanding human cognition and behaviour is important for building AI that can think, learn, and interact naturally with humans in real-world settings.

Resource One

Further Reading

Explore Eliza, the first chatbot, was developed in 1966 by Joseph Weizenbaum at MIT.

For more information about the history of ELIZA, please watch the short video for more details about the history of Eliza - The World's FIRST Psychiatrist Chatbot on YouTube:

<https://www.youtube.com/watch?v=zhxNI7V2IxM>.



QR code to
history of Eliza



Image source: Midjourney prompted by the decoder

Thinking questions: After watching the video about ELIZA, answer the following thinking questions:

- What was ELIZA designed to simulate in conversations? Why was ELIZA considered revolutionary at the time?
- What were ELIZA's limitations in understanding conversations? What is the Turing Test, and how does it relate to ELIZA?
- Why do you think people felt comfortable sharing personal thoughts with ELIZA despite knowing it was a program? Can AI truly understand human emotions? Why or why not?



Resource **Two** Overview

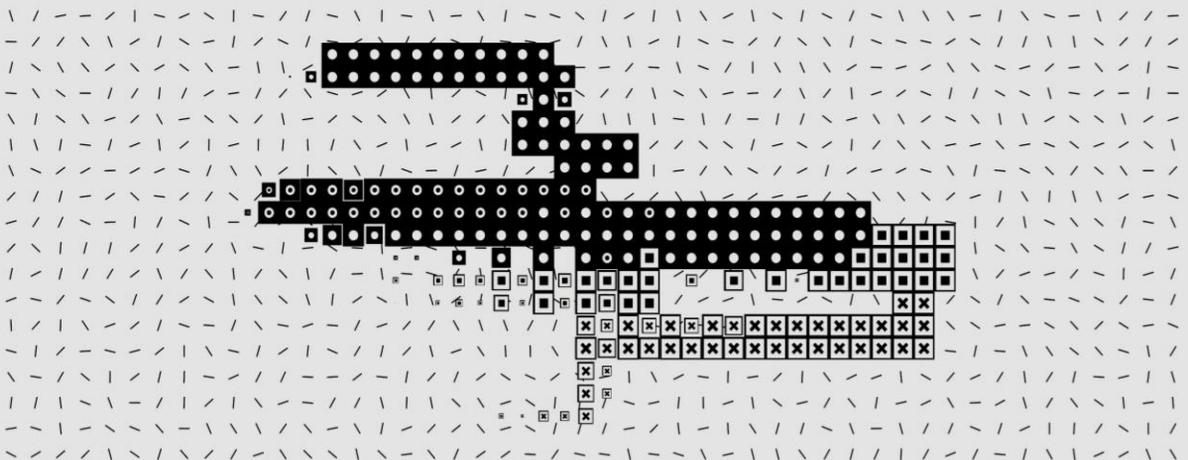
Topic **What is AI and AI literacy?** A foundational chapter to introduce key concepts, helping students understand the basics of AI and the importance of AI literacy.

Key Stage 5 Subject Area **Cognition and behaviour, Psychology in context, Epistemology, metaphysics of mind in Philosophy Human Computer Interaction (HCI) in ICT**

Objectives **By completing this resource, you will be able to:**

- ✓ Identify and discuss real-life examples of AI.
- ✓ Understand the major schools of thought of AI technology and development.
- ✓ Explain the concept of AI and how it differs from AI literacy.

- Instructions**
1. **Complete the activities**
 2. **Read the data source**
 3. **Explore the further reading**
 4. **Move on to Resource Three**



Resource **Two**

Activities

Activity 1 **Is it AI? Let's think it through and support it with reasons.**

Please identify the following items:

1. Siri,
2. solar panels,
3. regular calculators,
4. self-driving cars,
5. basic alarm clocks.

Thinking questions: After identifying the items, answer the following questions:

- Does this technology learn from experience or data to improve its performance over time?
- Does the technology make independent decisions, predictions, or recommendations without direct human instructions every time?
- Is the technology able to understand or interpret human language, images, or sounds?



Activity 2 **Watch this video from IBM Corporation:**



QR code to IBM Corporation

<https://www.youtube.com/watch?v=qYNweeDHiyU>.

After watching this video, please describe the terms **AI**, **Machine Learning**, and **Deep Learning** to demonstrate your understanding.

Resource **Two**

Data Source

Section A

What is AI? Major Schools of Thought



AI is widely seen as computer systems and tools that have evolved from solving problems to automating human-like thinking and actions. Today's AI combines different schools of thought, such as symbolism, connectionism, and behaviourism, to build systems that can perceive, learn, and interact. Which one do you think offers the best approach to understanding AI?

First, **Symbolic (classical) AI** algorithms work by processing symbols and rules, rather than numerical data. The approach is logic-based programming, in which rules are used to make inferences and draw conclusions for decision-making. For example, a school library system uses symbolic AI rules to remind students to return borrowed books on time.

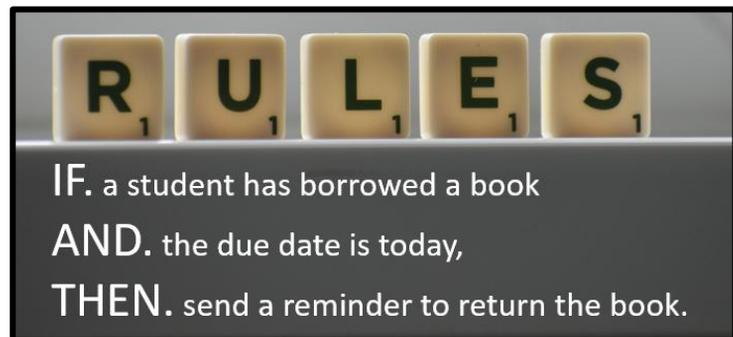


Image source: Heung Yue Yim

Connectionism, championed by Geoffrey Hinton, the Godfather of AI, uses neural networks inspired by the brain's structure, in which AI learns by finding patterns in data rather than following fixed rules. This approach, which requires a vast amount of data, has led to many recent AI successes, such as image and speech recognition.

Behaviourism's view on intelligence, on the other hand, teaches AI to learn through trial and error by receiving feedback in the form of rewards or penalties. This reinforcement learning helps AI improve its actions based on real-world experience.

Resource **Two**

Data Source

Section B

AI in Real-life

When you first learn about AI, you might think it only relates to big technological companies and not to our daily lives. In reality, AI is integrated into many daily activities, from taking school attendance to personalising social media feeds. AI plays a significant role in daily life, often without us noticing.

Facial recognition AI systems are used for security and convenience in various settings. For example, in India, some schools apply facial recognition technology to take student attendance, enhancing security and accuracy.



QR code for news headlines about facial recognition application at Indian schools



Image source: Independent UK News

Social media algorithms use AI to recommend content, filter harmful posts, and personalise news feeds based on individual behaviour. Platforms like Meta's Instagram, TikTok, and WeChat tailor content to users' interests. For example, Instagram prioritises stories and advertisements relevant to you, TikTok's For You page suggests videos based on interests, engagement and past likes, and WeChat personalises social updates while filtering spam.



Resource **Two**

Data Source

Section C

What is AI literacy?

Given how AI technologies are increasingly integrated into everyday life, students need to learn about and with AI. AI literacy integrates AI thinking, which involves ethical, cognitive, and creative interaction, engagement with AI technologies to help humans understand what AI is and how it works.

Learning AI literacy aims to develop individuals' knowledge, skills, and attitudes so they can become responsible and ethical users of AI today and innovators of AI in the future.

The image below, on the left, shows the key elements of AI literacy education for young students within the intelligence-based AI literacy framework. It demonstrates that AI literacy comprises several learning focuses, including computational thinking, digital literacy, data literacy, AI ethics, AI thinking, and transdisciplinary and interdisciplinary knowledge.

The image below, on the right, demonstrates the Theory of AI Thinking, which illustrates the human-AI cognitive process and is an effective way to develop AI literacy. Do you agree? Why or why not?

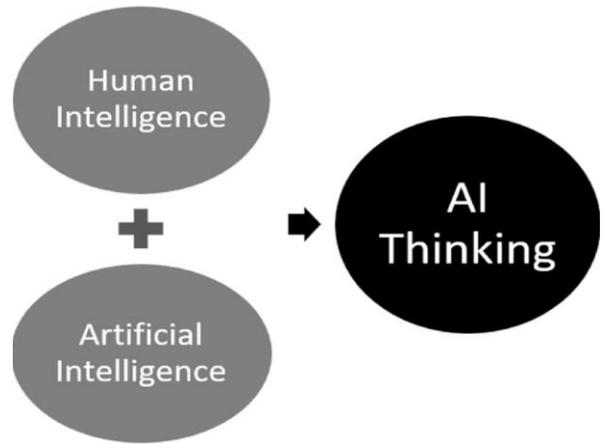
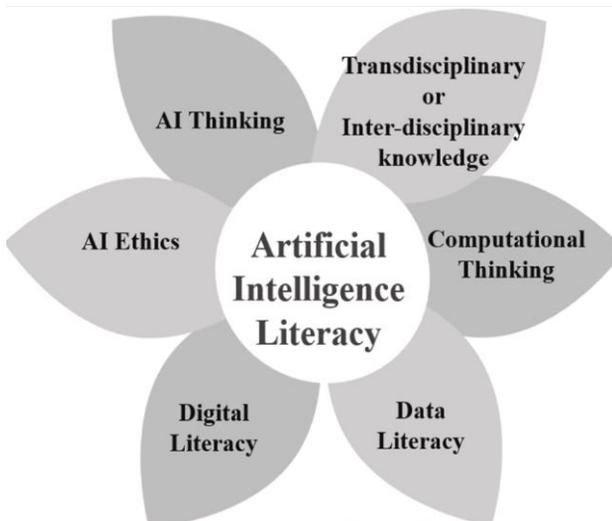


Image source: Yim (2024)

Resource **Two**

Further Reading

Explore For more real-life examples and impact of AI

1. Japan uses AI for earthquake prediction
<https://asianews.network/breakthrough-ai-system-for-rapid-epicenter-detection-tsunami-forecasting-for-nankai-trough-earthquake/#:~:text=The%20Japan%20News&text=TOKYO%20%E2%80%93%20A%20team%20of%20researchers,to%20just%20a%20few%20kilometers.>
2. US uses AI to forecast the future of forest fires
<https://www.youtube.com/watch?v=4msgG-IRsWs>
3. How AI impacts the labour market
<https://www.youtube.com/watch?v=RNGjQrCJXDQ>

Resource **Three**

Overview

Topic **Dialogue with AI** - Offer opportunities for students to engage interactively, developing critical thinking and communication skills by exploring AI as a thought partner.

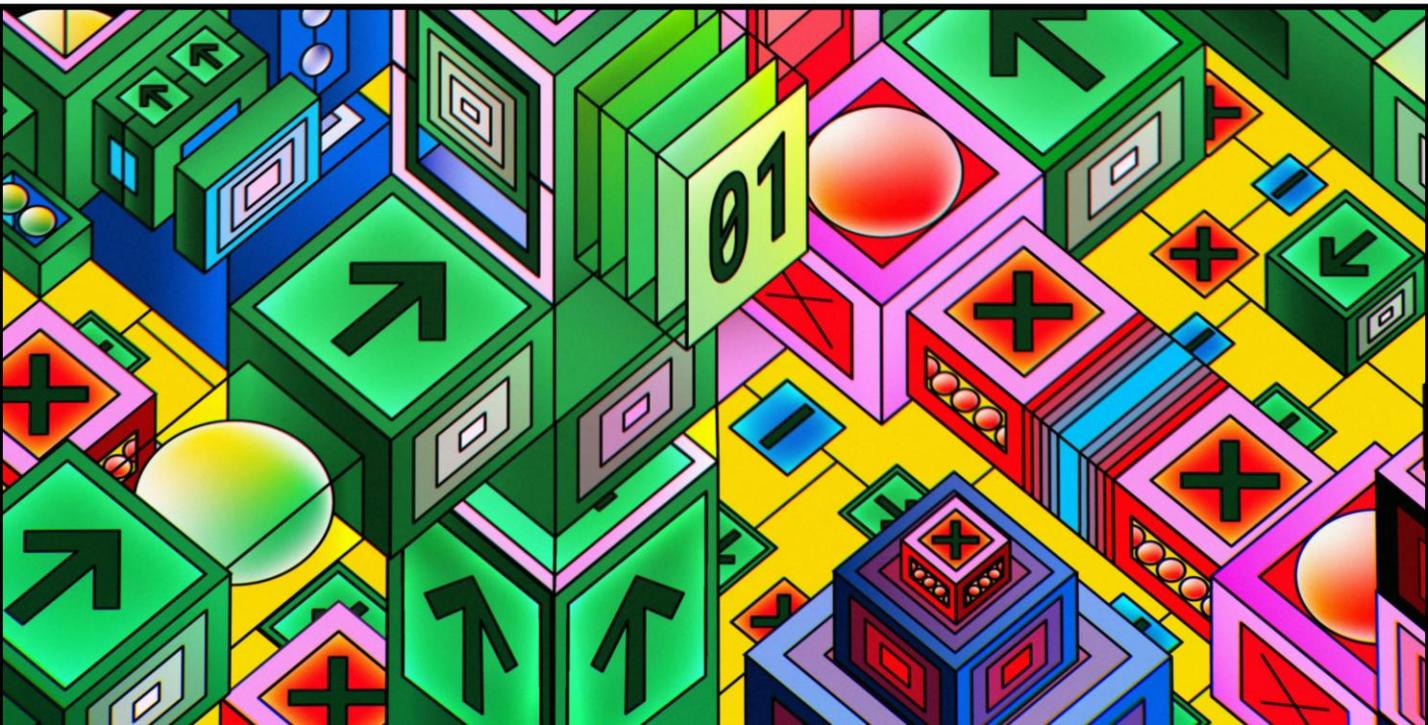
Key Stage 5 **Issues and debates in Psychology**
Subject Area **Human Computer Interaction (HCI) in ICT**

Objectives **By completing this resource, you will be able to:**

- ✓ Understand the Turing test and its purpose.
- ✓ Explain what generative AI and large language models are.
- ✓ Develop thinking skills by formulating questions, evaluating AI-generated responses, comparing them to human reasoning, and evaluating AI's strengths and limitations in simulating human intelligence.
- ✓ Effectively interact with AI (Grok and Copilot).

Instructions

1. **Complete the activities**
2. **Read the data source**
3. **Explore the further reading**
4. **Move on to Resource Four**



Resource Three

Activities

Activity 1



QR code to
access Grok 4



QR code to
Microsoft Copilot

Activity 2

Dialogue with AI Chatbot Grok. Before you start the Resource three data source, please visit <https://x.ai/> to chat with the AI Grok chatbot.

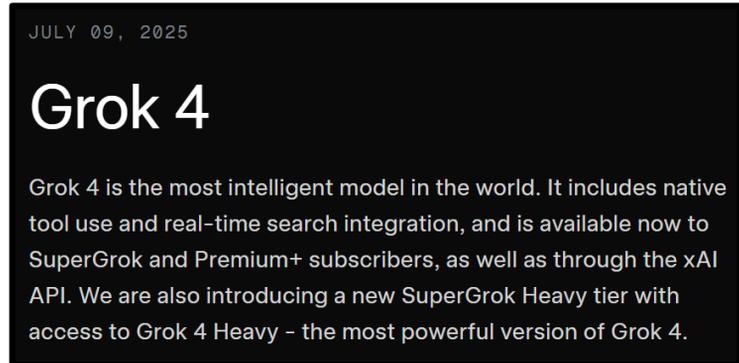


Image Source: X AI

Thinking questions: After chatting with X AI Grok, answer the following questions:

- How were the answers from the AI chatbot different from Eliza's in Resource One? Give some examples. Was it easy or hard to have a full conversation?
- How do you think the AI Chatbot "understood" what you said? Was it really understanding or just following rules?
- How does the AI Chatbot seem to understand and respond? Does it feel more human-like?
- What kinds of responses or behaviour make you think this AI Chatbot is intelligent or not?

Dialogue with Microsoft Copilot. Repeat the same activity you did with Grok, but this time interact with the AI Chatbot Copilot. Try experimenting by asking Copilot various questions to explore its responses.

Your thoughts on these AI Chatbots connect to a long-standing question in AI history: "Can machines think?"

Resource Three

Activities

Activity 3



QR code to
access Grok 4

Dialogue with Grok 4. This activity aims to help you explore how AI and humans think and to develop your thinking skills by formulating questions and evaluating AI-generated responses (Yim, 2026). Please follow the instructions below.

1. **Formulate questions, tell AI your role or assign AI a role, and request AI to provide its chain of thought process:**

Please design 1-2 thoughtful questions in different categories and write down your answers, such as

Factual questions (e.g., You are a secondary school dialogic teacher using the dialogic way of teaching and learning, "What causes rainbows? Before giving your answer, please provide your reasoning process and ask questions to help me deepen and broaden my thinking and perspective.

Opinion-based questions (e.g., I am a secondary school student, "What makes a good leader?" Before giving your answer, please provide your reasoning process.

2. **Human response:** Write down your answers to these questions.
3. **Interact with AI:** Input your questions into Grok 4, record the AI's responses and interact with the AI with more follow-up questions. It is encouraged that students ask the AI to explain its thought process and provide supporting reasons. They should also explore the topic from multiple perspectives and critically evaluate the accuracy of the AI-generated information. Fact-checking and revising to ensure accuracy are essential.
4. **Compare Human reasoning to AI response:** Share your own answers or discuss with peers what you think the answers should be. Take note of the similarities and differences between human and AI responses.



Resource **Three**

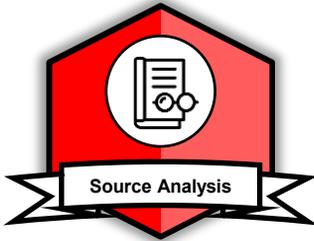
Activities

Activity 3 (continued)

What is dialogic learning? It is a form of learning that occurs through dialogue, in which knowledge is not merely transferred or constructed individually but is expanded collaboratively through interaction among multiple voices.

Activity 4

Below is an excerpt from the X AI website about the technology used for developing Grok AI. Please describe the term reinforcement learning in your own words.



Scaling Up Reinforcement Learning

With Grok 3, we scaled next-token prediction pretraining to unprecedented levels, resulting in a model with unparalleled world knowledge and performance. We also introduced Grok 3 Reasoning, which was trained using reinforcement learning to think longer about problems and solve them with increased accuracy. During our work on Grok 3 Reasoning, we noticed scaling trends that suggested it would be possible to scale up our reinforcement learning training significantly.

For Grok 4, we utilized Colossus, our 200,000 GPU cluster, to run reinforcement learning training that refines Grok's reasoning abilities at pretraining scale. This was made possible with innovations throughout the stack, including new infrastructure and algorithmic work that increased the compute efficiency of our training by 6x, as well as a massive data collection effort, where we significantly expanded our verifiable training data from primarily math and coding data to many more domains. The resulting training run saw smooth performance gains while training on over an order of magnitude more compute than had been used previously.

Image Source: X AI

Do you have trouble understanding this excerpt? Let's see if AI can help you learn.

Please follow the instructions below.

1. Use Grok 4 to Explain

Open Grok 4 <https://x.ai/news/grok-4> and paste the copied excerpt. Ask Grok 4: "Please explain this paragraph so that a Key Stage 5 student can easily understand it. Also, please provide additional research with sources and references to help me deepen and broaden my understanding."



Resource **Three**

Activity & Data Source

Activity 4 (continued)

2. Read and Reflect

Read the explanation Grok 4 gives. Think about whether the explanation is clearer and easier to understand compared to the original paragraph.

How does AI like Grok 4 help students learn differently from textbooks or teachers?

Section A

What is the Turing Test?



The Turing Test is a way to measure whether a machine can exhibit intelligence indistinguishable from that of a human. Proposed by British mathematician Alan Turing in 1950, it involves a human judge who interacts through text with both a machine and a human, without knowing which is which. If the judge cannot reliably tell the machine from the human based on their responses, the machine is said to have passed the test.

Turing introduced this test in his paper *Computing Machinery and Intelligence* to answer the question, "Can machines think?" by assessing whether machines can convincingly imitate human conversation.

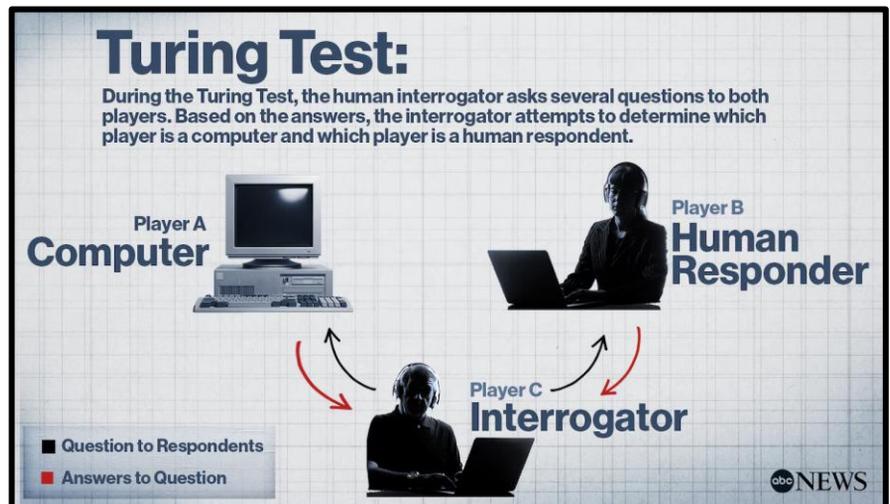


Image Source: ABC News

Resource Three

Data Source

Section A

What is the Turing Test? (continued)

The purpose of the Turing test is to evaluate a machine's ability to generate human-like responses, not necessarily to understand or possess consciousness. It remains a classic benchmark in AI research, though it has limitations, such as failing to measure actual understanding or reasoning.

Section B

What is Generative AI, and is it different from Large Language Models?

Generative AI is a type of artificial intelligence that creates new content, such as text, images, music, or videos, by learning patterns from large amounts of data. It works by studying examples it has been trained on and then using that knowledge to generate new creations.

Language Models (LLMs) are a type of generative AI focused primarily on understanding and generating human-like text from large amounts of language data.

Section C

What is Data in AI training and its source?

Data in AI training is the information used to teach AI models how to make predictions, recognise patterns, or generate content. It includes examples such as text, images, audio, or videos. This training data enables the AI to learn relationships between inputs (features) and outputs (labels) so it can apply this knowledge to new, unseen data.

Sources of training data come from various areas, including:

1. Content created and shared by internet users (such as web pages, social media posts, pictures, videos).
2. Public and government datasets compiled by organisations and research institutions.
3. Academic datasets compiled for research and development purposes.
4. Synthetic data is artificially created to mimic real-world data when real data is limited.



Resource **Three**

Data Source

Section C

What is Data in AI training, and its source? (continued)

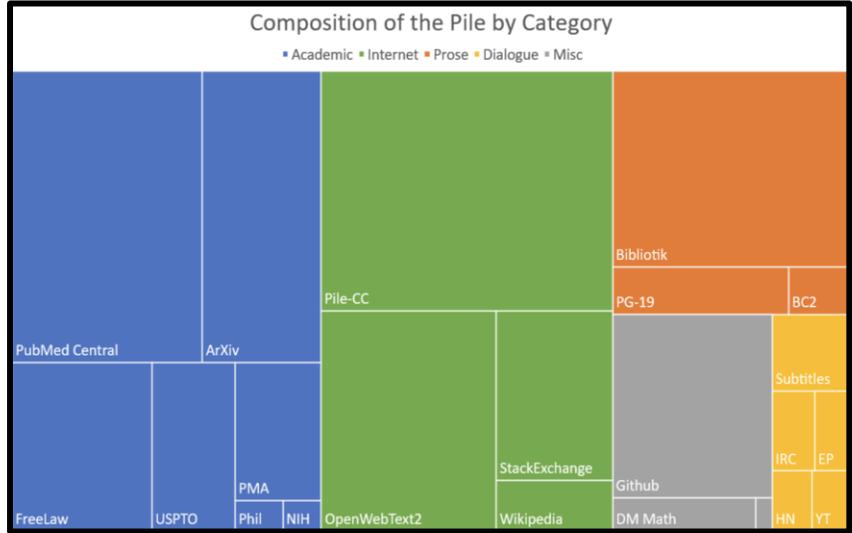


Image Source: Accelerate Programme for Scientific Discovery

Do you trust AI-generated content? Since AI creates information from large data sources, humans must ask generative AI tools to provide references and sources to ensure transparency. This allows verification of the content’s accuracy and reliability before using it.



Resource Three

Further Reading

Explore For more information about the history of the Turing test

1. Can AI pass the Turing test?

<https://abcnews.go.com/Technology/video/artificial-intelligence-pass-turing-test-104294452>

2. The extract below of the imitation game is now commonly called the Turing test. <https://academic.oup.com/mind/article-abstract/LIX/236/433/986238>

JOURNAL ARTICLE

I.—COMPUTING MACHINERY AND INTELLIGENCE

Get access >

A. M. TURING

Mind, Volume LIX, Issue 236, October 1950, Pages 433–460,
<https://doi.org/10.1093/mind/LIX.236.433>

Published: 01 October 1950

“ Cite
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Extract

1. The Imitation Game

I PROPOSE to consider the question, 'Can machines think?' This should begin with definitions of the meaning of the terms 'machine' and 'think'. The definitions might be framed so as to reflect so far as possible the normal use of the words, but this attitude is dangerous. If the meaning of the words 'machine' and 'think' are to be found by examining how they are commonly used it is difficult to escape the conclusion that the meaning and the answer to the question, 'Can machines think?' is to be sought in a statistical survey such as a Gallup poll. But this is absurd. Instead of attempting such a definition I shall replace the question by another, which is closely related to it and is expressed in relatively unambiguous words.

The new form of the problem can be described in terms of a game which we call the 'imitation game'. It is played with three people, a man (A), a woman (B), and an interrogator (C) who may be of either sex. The interrogator stays in a room apart from the other two. The object of the game for the interrogator is to determine which of the other two is the man and which is the woman. He knows them by labels X and Y, and at the end of the game he says either 'X is A and Y is B' or 'X is B and Y is A'. The interrogator is allowed to put questions to A and B thus:

Issue Section: [Articles](#)

Resource **Four**

Overview

Topic **Drawing with AI** - Perfect for fostering creativity through drawing and visual arts, allowing students to experiment with AI-generated images and understand AI's role and issues in artistic creation.

Key Stage 5 **Issues and debates in Psychology**
Subject Area **Moral philosophy in Philosophy**
Human Computer Interaction (HCI) in ICT

Objectives **By completing this resource, you will be able to:**

- ✓ Understand the concept of AI, such as perception and machine learning principles.
- ✓ Develop basic data literacy skills by critically evaluating how AI uses data to make predictions and recognising potential biases in AI systems.

Instructions

1. **Complete the activities**
2. **Read the data source**
3. **Explore the further reading**
4. **Move on to Resource Five**



Resource **Four**

Activities

Activity 1 **Drawing with AI:** **NewArc.ai** is an AI tool that generates images and 3D renderings from human sketches and line drawings. Before you start the Resource four data source, please visit <https://www.newarc.ai/> to experiment and create your own design.

QR code to
Newarc AI

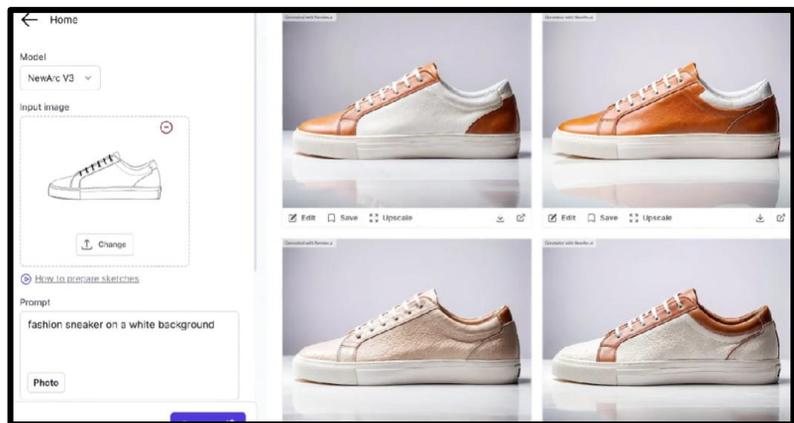


Image source: Newarc AI

Thinking questions: After creating your AI-generated designs, answer the following questions:

1. How do you think AI "sees" your sketches and creates designs? Please support with reasons (*Hint:* Think about AI perception.)
2. What does the AI model need to match your sketches with the right AI-generated images to make creative predictions? (*Hint:* Consider machine learning principles.)
3. What are some benefits of using AI tools like NewArc.ai for creative work?
4. What are the possible risks or drawbacks when relying on AI-generated designs?
5. Can AI learn new patterns or make mistakes? How might this affect how useful it is?



Resource Three

Data Source

Section A

Technology Behind Newarc AI

The AI concepts behind Newarc AI are primarily based on principles of perception and machine learning.

1. **Perception** AI perceives the world using sensors. NewArc.AI analyses and processes your sketch by recognising its shapes, lines, and patterns to understand the design intent, much as image recognition does.



2. **Machine Learning principle:** This AI model requires large amounts of paired data (sketches and corresponding photos) to learn how to match and generate realistic images. This AI tool has been trained on thousands of sketches and real images, learning how different sketch elements correspond to real-world designs. Using this learned knowledge, it generates detailed, realistic images that match your sketch.

Since AI relies heavily on the quantity and quality of data, understanding data literacy is crucial. If the training data lacks variety or balance (e.g., mostly showing certain styles or colours), the AI could produce biased or less accurate results.



Resource **Four**

Further Reading

Explore

Technology
Behind Newarc AI

Why do AI image generators give biased results?

<https://www.youtube.com/watch?v=0KFJf9QqfCw>.

How AI technology is transforming creative fields such as fashion and footwear design, please read Lysandre's blog:

<https://www.newarc.ai/blog/meet-lysandre>.



QR code to CBS news about AI-generated biased images



QR code to Lysandre's blog

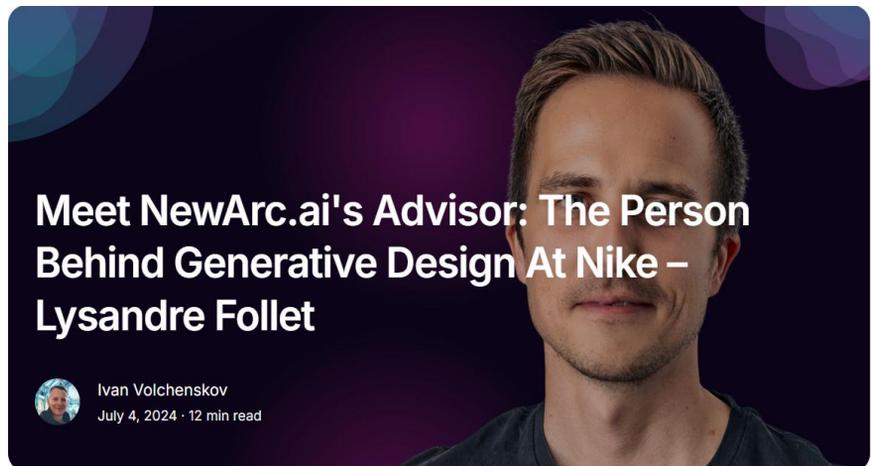


Image Source: Newarc AI

Thinking questions: After reading Lysandre's blog, answer the following questions:

1. What are the positive aspects of AI in creative and educational contexts? For example, it boosts creativity and confidence, accelerates the design and learning process, helps understand material and context, supports iterative design, provides free access to design education, etc.
2. What are the negative aspects and challenges of AI in creative and educational contexts? For example, over-reliance on AI, potential skill gaps, AI bias and limitations, and technical access, etc.



Resource **Five**

Overview

Topic Experiments with AI - Complement the arts focus and encourage creative expression by reinforcing experiential learning with AI tools for music, stories, and videos.

Key Stage 5 Subject Area Issues and debates in Psychology
Moral philosophy, metaphysics of mind in Philosophy
Human Computer Interaction (HCI) in ICT

Objectives By completing this resource, you will be able to:

- ✓ Understand what generative AI is, including Large Language Models (LLMs), and how it is trained.
- ✓ Create your own AI artefacts.
- ✓ Discuss real-life examples in different cultural and societal contexts that illustrate both the positive benefits and potential risks and challenges of AI.

Instructions

1. Complete the activities
2. Read the data source
3. Explore the further reading
4. Move on to Resource Six



```
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Resource **Five**

Activity

Activity 1 Experiments with AI. Suno AI is an AI platform that uses Generative AI to generate songs, including lyrics, vocals, and musical arrangements, based on text descriptions provided by humans. Before you start the Resource Five data source, please visit www.suno.com to experiment and create your own music.



QR code to
Suno AI

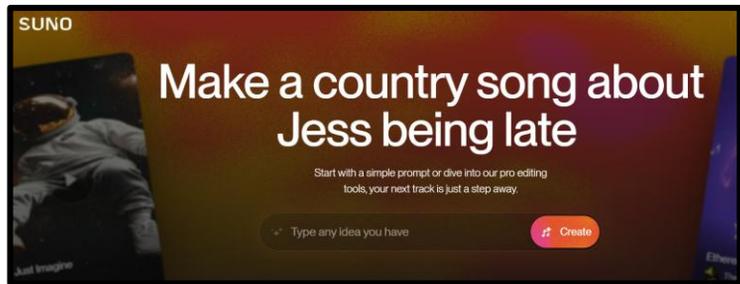


Image source: Suno AI

Thinking questions: After creating your AI-generated music, answer the following questions:

1. How did you feel listening to the music created by AI based on your text prompts? Did the music sound like something a human would create? Why or why not?
2. How do you think Suno AI creates music? What kind of data or information might it use? Does AI have the data owners' consent before using their work to develop the model?

Reflect on: Once you have answered the thinking questions, reflect on the following questions:

3. Does Suno AI promote global musical styles by blending them from around the world, or does it make us forget unique traditional songs from places like folk music?
4. How can we use tools like Suno AI ethically to celebrate cultural music without copying artists' styles or voices without permission?



Resource **Five**

Activity & Data Source

Activity 1 (continued)

To teach Suno AI how to make music, it is first given many examples, called training data. These examples include thousands of songs, lyrics, and melodies from different styles and cultures. The training data comes from public music libraries, licensed sources, and your inputs.

Section A Technology Behind Suno AI

The technology behind Suno AI primarily uses two methods: **transformer models** and **diffusion models**.

1. Transformer models understand and create sequences, like words in a sentence or notes in a song.

How it works: The Transformer learns by analysing thousands of songs to identify patterns, such as which notes usually go together or which beats come next. When you ask Suno AI to make a song, the Transformer guesses what note or sound should come next based on what it learned.

Example: For a happy pop song, the Transformer knows that upbeat rhythms and major chords are common, so it uses those to create fun music.

Illustration: A puzzle solver that sees one piece (a note) and figures out which pieces should come next to complete a beautiful picture (the song).



Resource **Five**

Data Source

Section A
Technology
Behind Suno AI
(continued)

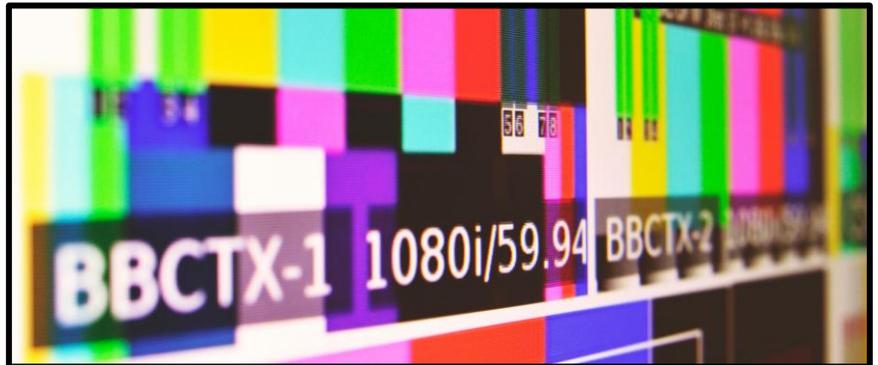


2. Diffusion Models create the actual sounds you hear, making the AI's music clear and pleasant.

How it works in music: It starts with random noise (like static) and gradually cleans it up step by step until the music becomes clear. This is like watching a blurry picture come into focus.

Example: It's like starting a video or game online; it might look pixelated or slow at first. Then, as it loads, the picture becomes smooth and colourful. Diffusion models clean up messy sounds in the same way, making music sound real and nice.

Illustration: A painter starts with a messy canvas and carefully adds colours and shapes until the painting (the music) looks perfect.



Resource **Five**

Further Reading

Explore How might AI-generated music affect cultural traditions and the uniqueness of music from different places?

Before you start, please watch the short CBS Morning News on YouTube: <https://www.youtube.com/watch?v=8uf8CCTItVo>.



QR code to CBS news headline

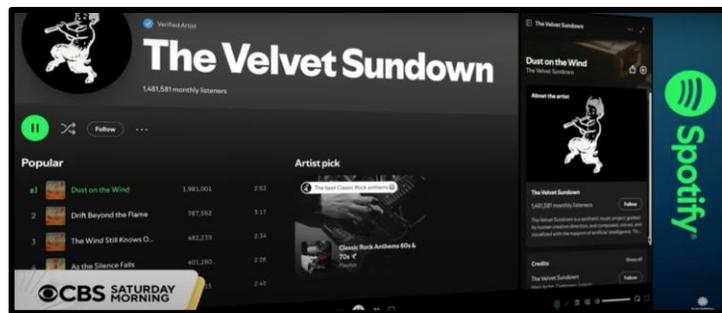


Image source: CBS News

Thinking questions: After watching, answer the following questions:

- What surprised people about the AI-generated artist “Sadie Wyinners”? How did human songwriters react when they heard the AI-created music?
- How do you think audiences will feel about listening to music made by AI versus music made by people?
- Where does the training data come from? Does AI have the artist's consent before using their work to develop the model?
- What are some concerns expressed about AI music replacing human musicians? What ethical issues arise when AI copies or mimics human voices and styles?
- Should there be rules or “guardrails” for how AI creates and shares music? What kind of rules would be fair?
- How can musicians use AI as a tool without losing their creative identity?



Resource **Six**

Overview

Topic **Human and AI ethics** - Crucial for cultivating responsible AI use, critical reflection, and awareness of AI's broader impact on society and ethics.

Key Stage 5 **Issues and debates in Psychology**
Subject Area **Moral philosophy in Philosophy**
Human Computer Interaction (HCI) in ICT

Objectives **By completing this resource, you will be able to:**

- ✓ Explain the concept of deepfake.
- ✓ Analyse the moral and societal implications of deepfakes.

Instructions

1. **Complete the activities**
2. **Read the data source**
3. **Explore the further reading**
4. **Move on to the Final Reflection Activity**



Resource Six

Activities

Activity 1



QR code to video of Jordan Peele using Deepfake

These activities aim to help you critically evaluate the power and risks of AI, reinforcing responsible use and protecting your personal information.

Before you start the Resource Six data source, please watch “Jordan Peele uses Deepfakes”

<https://www.youtube.com/watch?v=bE1KWpoX9Hk>.

Thinking questions: After watching, answer the following questions:

1. What is Deepfake? What risks come with sharing your personal photos or voice recordings with AI tools?
2. Why might it be hard or impossible to delete your data once it's in an AI system?
3. What can you do to protect your privacy when using AI tools?
4. Why should AI tools be clear and honest about how they collect, store, and use your information?



QR code to Deepfake maker

Thinking question: Will you use this deepfake website? <https://deepfakemaker.io/> Why or why not?



Image source: Deepfake maker

Reflect on: Once you have answered the thinking question, reflect on the following questions:

- How easy is it to create realistic but fake videos, images, or audio using AI?

Resource Six

Activities

Activity 2 (continued)

- How might people misuse deepfake technology for harmful purposes?
- What responsibilities do individuals have to stay safe and ethical when using or encountering deepfakes?

Activity 3



QR code to news
about the use of
AI in education in
Finland

AI's development and regulation vary across cultural contexts, which shape how AI is used in different educational settings. Below are two news stories on the use of AI in education: one from Finland and the other from Ghana.

Please read the two articles and answer the thinking and reflective questions.

Thinking questions: After reading the articles, answer the following questions:

1. Compare how Finland and Ghana learn AI literacy.
2. What kind of activities or tools do they use?



QR code to news
about the use of
AI in education in
Ghana

Reflect on: Once you have answered the thinking question, reflect on the following questions:

3. How do Finland and Ghana differ in terms of their AI literacy learning activities?
4. How might the cultural values of each country influence the way AI is regulated and used in schools?
5. What AI tools and teaching methods would suit your country's educational context?

Resource Six

Data Source

Section A

What is Deepfake?



According to the Cambridge Dictionary, a deepfake is a video or audio recording that replaces someone's face or voice with that of another person, in a way that appears real. The word Deepfake involves “deep learning” (a type of AI) and “fake”. This technology uses complex algorithms, often involving generative adversarial networks (GANs), which are composed of two AI neural network models, the Generator and the Discriminator, that work against each other.

The Generator tries to create fake images, videos, or sounds that look real. It starts by making fake content. **The Discriminator** tries to determine whether the images (or videos or sounds) it receives are real (from real data) or fake (generated by the generator).



QR code for an example of the British Council's use of deepfake

The process helps to create a deepfake.

When can deepfakes be helpful?

An example of how deepfake technology could be used to inspire students to learn a language

<https://www.youtube.com/watch?v=O9yZGB4eGyU>

Can you think of other positive uses of deepfake technology in the entertainment industry, video game development, education, and training?

Resource **Six**

Further Reading

Explore For more information about the Deepfake

1. <https://www.youtube.com/watch?v=B4jNttRvbpU>
2. <https://www.youtube.com/watch?v=U-mg7a1vwkw>



Image source: Global news

For more information about how to spot Deepfake AI photo

https://www.ted.com/talks/hany_farid_how_to_spot_fake_ai_photos

For more information about how AI affects our environments

1. <https://www.youtube.com/watch?v=SkWzwoDIGmE>
2. <https://www.youtube.com/watch?v=ZmRT7e25Kxg>

Final Reflection Activity

Further Guidance

Success Criteria

1. Show an understanding of the main ideas regarding facial recognition in the schools discussed in the two articles.
2. Clearly lay out your policy recommendations and ethical guidelines, supported by reasons or examples.
3. Express your ideas creatively in your chosen format.

Instruction

You are a policy advisor (or investigator) for your school's Digital Ethics Committee. The school is considering adopting facial recognition technology for safety and attendance monitoring. Your task is to develop policy recommendations or ethical guidelines that help your school decide whether this technology should be adopted, and, if so, how to use it responsibly.

Step 1: Read the abstract of the first article

Andrejevic, M., & Selwyn, N. (2020). Facial recognition technology in schools: Critical questions and concerns. *Learning, Media and Technology*, 45(2), 115-128.

ABSTRACT

Facial recognition technology is now being introduced across various aspects of public life. This includes the burgeoning integration of facial recognition and facial detection into compulsory schooling to address issues such as campus security, automated registration and student emotion detection. So far, these technologies have largely been seen as routine additions to school systems with already extensive cultures of monitoring and surveillance. While critical commentators are beginning to question the pedagogical limitations of facially driven learning, other this article contends that school-based facial recognition presents a number of other social challenges and concerns that merit specific attention. This includes the likelihood of facial recognition technology altering the nature of schools and schooling along divisive, authoritarian and oppressive lines. Against this background, the article considers whether or not a valid case can ever be made for allowing this form of technology in schools.

Final Reflection Activity

Further Guidance

Step 2: Read the abstract of the second article

Almeida, D., Shmarko, K., & Lomas, E. (2022). The ethics of facial recognition technologies, surveillance, and accountability in an age of artificial intelligence: a comparative analysis of US, EU, and UK regulatory frameworks. *AI and Ethics*, 2(3), 377-387.

Abstract

The rapid development of facial recognition technologies (FRT) has led to complex ethical choices in terms of balancing individual privacy rights versus delivering societal safety. Within this space, increasingly commonplace use of these technologies by law enforcement agencies has presented a particular lens for probing this complex landscape, its application, and the acceptable extent of citizen surveillance. This analysis focuses on the regulatory contexts and recent case law in the United States (USA), United Kingdom (UK), and European Union (EU) in terms of the use and misuse of FRT by law enforcement agencies. In the case of the USA, it is one of the main global regions in which the technology is being rapidly evolved, and yet, it has a patchwork of legislation with less emphasis on data protection and privacy. Within the context of the EU and the UK, there has been a critical focus on the development of accountability requirements particularly when considered in the context of the EU's General Data Protection Regulation (GDPR) and the legal focus on Privacy by Design (PbD). However, globally, there is no standardised human rights framework and regulatory requirements that can be easily applied to FRT rollout. This article contains a discursive discussion considering the complexity of the ethical and regulatory dimensions at play in these spaces including considering data protection and human rights frameworks. It concludes that data protection impact assessments (DPIA) and human rights impact assessments together with greater transparency, regulation, audit and explanation of FRT use, and application in individual contexts would improve FRT deployments. In addition, it sets out ten critical questions which it suggests need to be answered for the successful development and deployment of FRT and AI more broadly. It is suggested that these should be answered by lawmakers, policy makers, AI developers, and adopters.

Final Reflection Activity

Further Guidance

Step 3: Create Your Policy Output

Choose one of the following project formats to present your findings and recommendations:

1. A Policy Recommendation Report for your school leadership.
2. A School Ethical Guidelines Document outlining key dos and don'ts.
3. A podcast or video presenting your committee's recommendations and reasoning.
4. A creative proposal (poster, infographic, etc.) summarising fair and safe rules for use.

Guiding questions

1. What benefits and risks come with using facial recognition technology in schools?
2. How might the technology impact student privacy?
3. What ethical issues arise when the technology makes mistakes or displays biases towards certain groups?
4. Who should have the authority to decide on implementation?
5. What specific rules or safeguards should be established to ensure fairness and accountability?

Reference List



Below is a list of all the sources that were used to compile this RBC pack.

Journal Articles

1. Almeida, D., Shmarko, K., & Lomas, E. (2022). The ethics of facial recognition technologies, surveillance, and accountability in an age of artificial intelligence: a comparative analysis of US, EU, and UK regulatory frameworks. *AI and Ethics*, 2(3), 377-387.
2. Andrejevic, M., & Selwyn, N. (2020). Facial recognition technology in schools: Critical questions and concerns. *Learning, Media and Technology*, 45(2), 115-128
3. Cedir (2024) Retrieved from <https://www.educ.cam.ac.uk/research/groups/cedir/>
4. Garnelo, M., & Shanahan, M. (2019). Reconciling deep learning with symbolic artificial intelligence: representing objects and relations. *Current Opinion in Behavioral Sciences*, 29, 17-23.
5. Hinton, G. E. (1990). Connectionist learning procedures. In *Machine learning* (pp. 555-610). Morgan Kaufmann.
6. IBM (2025) Retrieved from <https://www.ibm.com/think/topics/chain-of-thoughts>
7. Kosinski, W., & Zaczek-Chrzanowska, D. (2007). Pavlovian, Skinner, and Other Behaviourists' Contributions to AI. Intelligent Motion and Interaction Within Virtual Environments.
8. Wegerif, R. (2001). Applying a dialogical model of reason in the classroom. *Rethinking collaborative learning*, 119-139

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9. Wegerif, R., & Major, L. (2024). A dialogic theory of educational technology. *Education and Dialogue in Polarized Societies: Dialogic Perspectives in Times of Change*, 121.
10. Xie, B., Sarin, P., Wolf, J., Garcia, R. C., Delaney, V., Sieh, I., ... & Lee, V. R. (2024, March). Co-designing AI education curriculum with cross-disciplinary high school teachers. In *Proceedings of the AAAI Conference on Artificial Intelligence* (Vol. 38, No. 21, pp. 23146-23154).
11. Yim, I. H. Y. (2023). Design of artificial intelligence (AI) education for primary schools: Arts-based approach. *Istes Books*, 65-90.
12. Yim, I. H. Y. (2024). Artificial intelligence literacy in primary education: An arts-based approach to overcoming age and gender barriers. *Computers and Education: Artificial Intelligence*, 7, 100321.
13. Yim, I. H. Y. (2024). A critical review of teaching and learning artificial intelligence (AI) literacy: Developing an intelligence-based AI literacy framework for primary school education. *Computers and Education: Artificial Intelligence*, 7, 100319.
14. Yim, I. H. (2026). Design of an Intelligence-Based Artificial Intelligence (AI) Literacy Curriculum for Primary Schools: A Generative AI Technological Approach. In S. Aikins, A. Kumi-Yeboah, & B. Yankson (Eds.), *Revolutionizing Secure Learning in the Age of AI* (pp. 93-124). IGI Global Scientific Publishing. <https://doi.org/10.4018/979-8-3373-0756-5.ch004>
15. Yim, I. H. Y., & Su, J. (2025). Artificial intelligence literacy education in primary schools: a review. *International Journal of Technology and Design Education*, 1-30.

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Journal Articles (continued)

16. Yim, I. H. Y., & Wegerif, R. (2024). Teachers' perceptions, attitudes, and acceptance of artificial intelligence (AI) educational learning tools: An exploratory study on AI literacy for young students. *Future in Educational Research*, 2(4), 318-345.

Image Sources

1. ABC News <https://abcnews.go.com/US/turing-test-determines-computers/story?id=101486628>
2. Academic UOP <https://academic.oup.com/mind/article-abstract/LIX/236/433/986238?redirectedFrom=fulltext&login=false>
3. Accelerate Programme for Scientific Discovery <https://www.cst.cam.ac.uk/accelerate>
4. AI uncovered
5. Britannica <https://www.britannica.com/biography/Alan-Turing>
6. CBS News
7. Copilot <https://copilot.microsoft.com/>
8. Deepfake maker <https://deepfakemaker.io/>
9. Finland <https://www.channelnewsasia.com/world/finland-education-minister-anders-adlercreutz-interview-artificial-intelligence-media-literacy-young-5495541>
10. Ghana <https://www.graphic.com.gh/news/general-news/over-1-4m-shs-students-to-use-new-ai-learning-apps-from-october-2025.html>
11. Independent Co UK <https://www.independent.co.uk/asia/india/karnataka-schools-face-recognition-system-attendance-b2810805.html>
12. Masswerk <https://www.masswerk.at/elizabot/>

Reference List

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13. Midjourney prompted by the de-coder
14. Newarc AI <https://www.newarc.ai/blog/meet-lysandre>
15. Psychology Today DALL-E/OpenAI
16. Suno AI <https://suno.com/home>
17. X AI <https://x.ai/>

More Subject Resources

A Deeper Look into AI Ethics



- Read**
1. Ten core principles lay out a human-rights centred approach to the Ethics of AI by UNESCO
<https://www.unesco.org/en/artificial-intelligence/recommendation-ethics>
 2. Elon Musk and others urge AI pause, citing 'risks to society'
<https://www.reuters.com/technology/musk-experts-urge-pause-training-ai-systems-that-can-outperform-gpt-4-2023-03-29/>

- Watch**
1. AI Is Dangerous, but Not for the Reasons You Think | Sasha Luccioni | TED
<https://www.youtube.com/watch?v=eXdVDhOGqoE>
 2. AI's hidden climate costs| CBS News
https://www.youtube.com/watch?v=RT8-GIA_rkM
 3. The ethics of AI assistants with Iason Gabriel Google Deep Mind <https://www.youtube.com/watch?v=aaZc-as-soA>

Study Skills, Tips & Guidance

This section includes helpful tips to help you complete this pack and improve your study skills for school.

It also includes a few fantastic, easy-to-use resources to know what to do next and where else you can look for more information on the subject.



Helpful information you will find in this section:

1. Cornell Notes
2. Academic Terminology (keywords)
3. Academic Writing Style
4. Referencing
5. How to Evaluate Your Sources
6. Subject Guidance
7. University Guidance

Psst! Learning these tips to improve your school skills could help you do better in exams and make assignments easier!

You can use the tips and web links in this section throughout your pack!



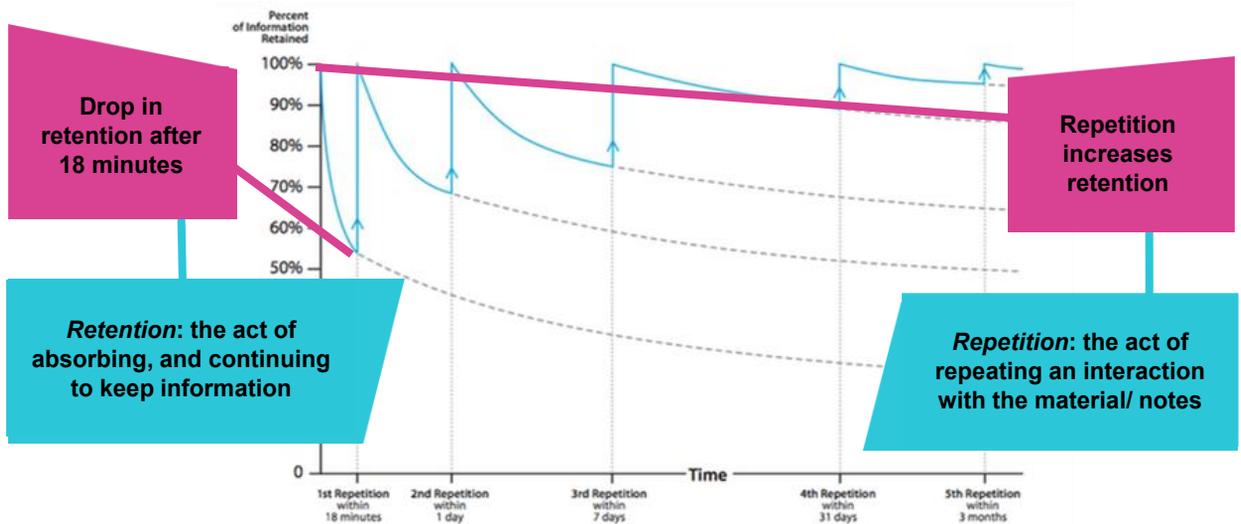
Academic Study Skills

Cornell Notes

Why is good note-taking important?

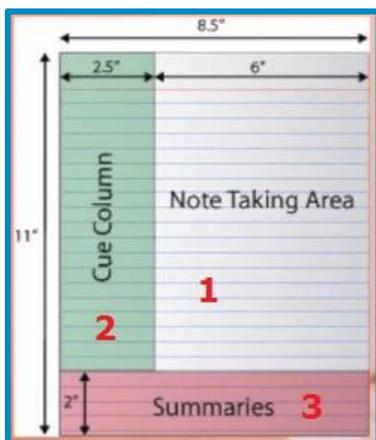
If you forget new information almost as quickly as you hear it, even if you write it down, you tend to lose nearly 40% of new information within 24 hours of first reading or hearing it.

However, if we take notes effectively, we can retain and retrieve almost 100% of the information we receive. Consider this graph on the rate of forgetting with study/ repetition:



Learning a new system

The Cornell Note System was developed in the 1950s at the University of Cornell in the USA. The system includes interacting with your notes and is suitable for all subjects. There are three steps to the Cornell Note System.



Step 1: Note-Taking

- 1. Create Format:** Notes are set up in the Cornell Way. This means creating three boxes like the ones on the left. You should put your name, date, and topic at the top of the page.
- 2. Write and Organise:** You then take your notes in the 'note taking' area on the right side of the page. It would be best if you organised these notes by keeping a line or a space between 'chunks'/ main ideas of information. You can also use bullet points for lists of information to help organise your notes.

Academic Study Skills

Cornell Notes

Step 2: Note-Making

- Revise and Edit Notes:** Go back to box 1, the note-taking area and spend some time revising and editing. You can do this by highlighting 'chunks' of information with a number or a colour; circling all keywords in a different colour; highlighting main ideas; adding new information in another colour.
- Note Key Idea:** Go to box two on the left-hand side of the page and develop some questions about the main ideas in your notes. The questions should be 'high level'. This means they should encourage you to think deeper about the ideas. Example 'high level' questions would be:
 - Which is the most important/ significant reason for...
 - To what extent...
 - How does the (data/ text/ ideas) support the viewpoint?
 - How do we know that...

Here is an example of steps 1 and 2 for notes on the story of Cinderella

Questions:	Notes:
How does C's mother die?	<ul style="list-style-type: none"> Cinderella is an only child Cinderella's dad might <u>spoil</u> her Cinderella's step-mother is <u>jealous of her beauty</u>
Why does C make the Step-M so angry?	<ul style="list-style-type: none"> Maybe Cinderella becomes the <u>woman of the house</u>
↓ what language shows this?	<ul style="list-style-type: none"> ↳ BUT then the Step-Mother wants that <u>position</u>.
* What is the moral of 'C'?	<ul style="list-style-type: none"> ↳ <u>Key point</u> → fairy takes teach w/ <u>morals</u>
How do I know?	<ul style="list-style-type: none"> Cinderella is <u>kind</u> → her Step-M is not

Step 3: Note-Interacting

- Summary:** Go to box three at the bottom of the page, summarise the main ideas in box one, and answer the essential questions in box 2.

Summary:
Because C is an only child, she takes over as 'woman of the house' when her M die. Her Step-M is jealous and angry. We get C's side of the story so it is difficult to know whether C is really badly treated reason.

Give the Cornell Note-Taking System a try and see if it works for you!

Academic Study Skills

Key Words

Below is a series of key terms you will come across from teachers and tutors as you go through school, especially as you enter upper secondary.

Knowing these will help you understand what you are being asked to do!

- **Analyse:** When you analyse something, consider it carefully and in detail to understand and explain it. To analyse, identify the main parts or ideas of a subject and examine or interpret the connections between them.
- **Comment on:** When you comment on a subject or the ideas in a subject, you say something that gives your opinion or an explanation.
- **Compare:** To compare things means to point out their differences or similarities. A comparison essay would involve examining the qualities/ characteristics of a subject and emphasising the similarities and differences.
- **Contrast:** When you contrast two subjects, you show how they differ when compared with each other. A contrast essay should emphasise striking differences between two elements.
- **Compare and contrast:** To write a compare and contrast essay, you would examine the similarities and differences between two subjects.
- **Criticise:** When you criticise, you make judgments about a subject after thinking about it carefully and deeply. Express your judgement concerning the correctness or merit of the factors under consideration. Give the results of your analysis and discuss the limitations and contributions of the factors in question. Support your judgement with evidence.
- **Define:** When you define something, you show, describe, or state clearly what it is and what it is like; you can also say its limits. Do not include details but do include what distinguishes it from the other related things, sometimes by giving examples.
- **Describe:** To describe in an essay requires you to give a detailed account of a subject's characteristics, properties or qualities.
- **Discuss:** To discuss in an essay, consider your subject from different points of view. Examine, analyse and present considerations for and against the problem or statement.

Academic Study Skills

Key Words

- **Evaluate:** When you evaluate in an essay, decide on your subject's significance, value, or quality after carefully studying its good and bad features. Similar to assess. Use authoritative (e.g. from established authors or theorists in the field) and, to some extent, personal appraisal of both contributions and limitations of the subject.
- **Illustrate:** If asked to illustrate in an essay, explain the points that you are making clearly by using examples, diagrams, statistics, etc.
- **Interpret:** In an essay that requires you to interpret, you should translate, solve, give examples, or comment upon the subject and evaluate it in terms of your judgement or reaction. Explain what your subject means. Similar to explain.
- **Justify:** When asked to justify a statement in an essay, you should provide the reasons and grounds for the conclusions you draw from the statement. Present your evidence in a form that will convince your reader.
- **Outline:** Outlining requires that you explain ideas, plans, or theories in a general way, without giving all the details. Organise and systematically describe the main points or general principles. Use essential supplementary material, but omit minor details.
- **Prove:** When proving a statement, experiment or theory in an essay, you must confirm or verify it. You must evaluate the material and present experimental evidence and/ or logical argument.
- **Relate:** To relate two things, you should state or claim the connection or link between them. Show the relationship by emphasising these connections and associations.
- **Review:** When you review, critically examine, analyse and comment on the major points of a subject in an organised manner.

Write any other keywords you come across below. Ask your teacher to explain their meaning or use a dictionary to find out.

Academic Study Skills

Academic Writing Style

What is academic writing?

'Academic writing' is a specific way of writing when communicating research or discussing a point of view. You will most often do this in essays and reports.

Academic writing has a logical structure and uses formal language. Unlike creative or narrative writing, academic writing uses different sources of information to support what is being said (see next page about various sources).

Top Academic Writing Tips

Do's

- Do use words you know the meaning of and are confident using.
- Remember, words don't have to be complicated to be clear!
- Do write words out fully, e.g., do not, cannot, does not, it would.
- Use the third person point of view
- Minimise the use of informal adjectives, such as cool, amazing and wonderful.

Don'ts

- Do not use contractions, e.g., don't, can't, doesn't, it'd.
- Do not use public speaking phrases like "We can all agree that..." and "As I previously mentioned...".
- Do not use conversational phrases, such as 'literally' or 'basically' too often.
- Do not use slang or jargon, for example, 'awks', 'lit', 'woke'.
- Do not use words that express value judgements, e.g., crazy, ridiculous, terrible. Suitable synonyms are surprising, unjustified or distressing.



Academic Study Skills

Academic Writing Style

Expressing your opinion in academic writing

In academic writing, it is best practice to express an opinion without writing in the first person.

Rather than saying, 'In my opinion, this proves that you can express your opinion by saying:

- 'Based on (insert fact/ theory/ finding) it shows that....';
- 'The graph here indicates that...';
- 'The aforementioned problems in Smith's argument reveal that...';
- 'Such weaknesses ultimately mean that...'; and so on.

Signposting

Signposting guides your reader through different sections of your writing. It lets those who read your writing know what is being discussed and why and when your piece is shifting from one part to another. This is crucial for clear communication with your audience.

Signposting stems for a paragraph which expands upon a previous idea	Signposting stems for a paragraph which offers a contrasting view
Building on from the idea that ... (mention the previous idea), this section illustrates that ... (introduce your new idea).	However, another angle on this debate suggests that ... (introduce your contrasting idea)
To further understand the role of ...(your topic or your previous idea), this section explores the idea that ... (introduce your new idea)	In contrast to evidence which presents the view that ... (mention your previous idea), an alternative perspective illustrates that ...
Another line of thought on ... (your topic or your previous idea) demonstrates that ...	However, not all research shows that ... (mention your previous idea). Some evidence agrees that ...

Academic Study Skills

Referencing

What is a reference or referencing?

A reference is just a note in your assignment that tells your reader where particular ideas, information or opinions that you have used from another source have come from. It can be done through 'citations' or a 'bibliography'.

You must include references in your writing assignments when you get to university. As well as being academic good practice, referencing is very important because it will help you to avoid plagiarism.

Plagiarism is when you take someone else's work or ideas and pass them off as your own. Whether plagiarism is deliberate or accidental, the consequences can be severe. You must be careful to reference your sources correctly.

Why should I reference?

Referencing is essential in your work for the following reasons:

- It gives credit to the authors of any sources you have referred to or been influenced by.
- It supports the arguments you make in your assignments.
- It demonstrates the variety of sources you have used.
- It helps prevent you from losing marks or failing due to plagiarism.

When should I use a reference?

- You should use a reference when you:
 - Quote directly from another source.
 - Summarise or rephrase another piece of work.
 - Include a specific statistic or fact from a source.



Academic Study Skills

Referencing

How do I reference?

There are several different ways of referencing, but most universities use the Harvard Referencing Style. Please speak with your teacher about which style they want you to use because the most important thing is that you remain consistent!

The two main aspects of referencing you need to be aware of are:

1. In-text citations

These are used when directly quoting a source. They are in the body of the work after you have referred to your source in your writing. They contain the surname of the source's author and the year it was published in brackets.

- E.g. *Daisy describes her hopes for her infant daughter, stating, "I hope she'll be a fool—that's the best thing a girl can be in this world, a beautiful little fool."* (Fitzgerald, 2004).

2. Bibliography

This is a list of all the sources you have referenced in your assignment. In the bibliography, you list your references by the numbers you have used and include as much information as possible about the reference. The list below gives what should be included for different sources.

- **Websites:** Author (if possible), *title of the web page*, 'Available at:' website address, [Accessed: date you accessed it].
 - E.g. 'How did so many soldiers survive the trenches?', Available at: <http://www.bbc.co.uk/guides/z3kgjxs#zg2dtfr> [Accessed: 11 July 2019].
- **Books:** Author surname, author first initial, (year published), *title of book*, publisher
 - E.g. Dubner S. and Levitt, S., (2007) *Freakonomics: A Rogue Economist Explores the Hidden Side of Everything*, Penguin Books
- **Articles:** Author, '*title of the article*', where the article comes from (newspaper, journal, etc.), date of the article.
 - E.g. Maev Kennedy, 'The lights to go out across the UK to mark First World War's centenary', The Guardian Newspaper, 10 July 2014.

Academic Study Skills

Referencing

Is it a source worth citing? Use these tips to question your sources before referencing them.

- **Currency – the timelines of the information:** When was it published or posted? Has it been revised or updated? Does your topic require current information, or will older sources also work?
- **Relevancy – the importance of the information for your needs:** Does the information relate to your topic or answer your question? Have you looked at a variety of sources? Who is the intended audience?
- **Authority - the source of the information:** Who is the author/ publisher/ source/ sponsor? What are the author's credentials? Is the author qualified to write on the topic?
- **Accuracy – the reliability and correctness of the source:** Does evidence support the information? Has the information been reviewed or refereed? Can you verify whether it is a personal or professional source? Are there errors?
- **Purpose – the reason the information exists:** Does the author clarify the intentions/ purpose? Is the information fact opinion or propaganda? Are there biases? Does the viewpoint appear objective?



Academic Study Skills

Evaluating Your Sources

What is a source?

When you learn new things, you might get information from different places. These places are called sources. Some sources are more reliable than others. For example, information in a textbook written by an expert is more reliable than the information in a non-expert's social media post.

How do you decide which source to use? From newspaper articles to books to tweets, this provides a brief description of each source type and breaks down the factors to consider when selecting a source.

Twitter



A platform for millions of concise messages on a variety of topics.

Blog



Blogs (e.g. WordPress) are an avenue for sharing both developed and unpublished ideas and interests with a niche community.

Youtube



A collection of millions of educational, inspirational, eye-opening and entertaining videos.

Newspaper



A reporting and recording of cultural and political happenings that keeps the general public informed. Opinions and public commentaries can also be included.

Journal



A collection of analytics reports that outline the objectives, background, methods, results and limitations of new research written for and by scholars in a niche field.

Academic book



The information presented is supported by clearly identified sources. Sometimes each chapter has a different author.

Encyclopaedia



Books or online – giving information on many different subjects. Some are intended as an entry point into research; some provide detailed information and onwards references.

Popular magazine



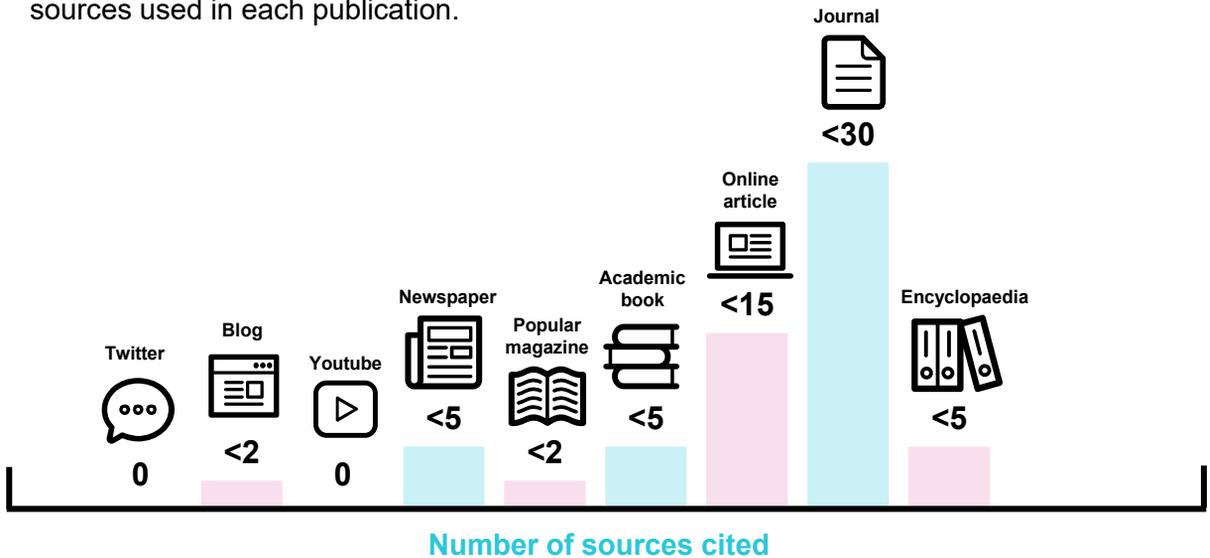
A glossy compilation of stories with unique themes intended for specific interests.

Academic Study Skills

Evaluating Your Sources

Number of outside sources

When an author used many outside sources in their writing, they demonstrate familiarity with ideas beyond their own. As more unique viewpoints are pulled into a source, it becomes more comprehensive and reliable. This shows the typical number of outside sources used in each publication.



Degree of review before a source is published

Two factors contribute to the amount of inspection a source receives before it might be published: the number of reviewers fact-checking the written ideas and the total time spent by reviewers as they fact-check. The more people involved in the review process and the longer the review process takes, the more credible the source is likely to be.

Number of reviewers



Time in review

0 reviewers



seconds



minutes



minutes

1-2 reviewers



hours



days



days

3-4 reviewers



2-3 months



6-2 months



3-5 years

What's next?

Where can this subject take me?

Pathways

A degree in Psychology opens doors to a wide range of career options. While many graduates choose to continue their studies with a master's or doctoral degree, others pursue careers in counselling, clinical psychology, organisational psychology, or educational settings. Psychology graduates are also highly sought after in fields such as human resources, research, market analysis, and mental health advocacy. Additionally, the analytical, communication, and interpersonal skills gained through a psychology degree are valuable in consulting and broader roles across scientific and technical industries.

Psychology

- Developing empathy and a strong interest in people allows for better understanding and connection with others.
- Enhancing analytical research skills enables the critical evaluation of information and evidence-based decision-making.
- Strengthening problem-solving abilities helps identify challenges and develop practical, effective solutions.
- Collaborating effectively within teams contributes to achieving shared goals.
- Improving written and verbal communication skills supports clear and effective report writing and presentations.
- Advancing information technology proficiency facilitates research, communication, and collaboration.
- Gaining expertise in handling data and statistics ensures accurate analysis and interpretation of findings.

Read more about subject selection and career pathways

- <https://targetjobs.co.uk>
- <https://www.prospects.ac.uk>
- <https://thinkuni.org/>

What's next?

University Guidance

Different people go to university for different reasons. You might have a particular job in mind or want to study a subject you are passionate about.

Whatever your motivations, going to university can help improve your career prospects and develop your confidence, independence and academic skills.

Choosing a course and university

Choosing the right course to study is important, so research the options available to you. Here are some top tips:

- You don't have to choose a course you have already studied; many courses don't require prior knowledge of the subject. You can apply skills gained from school studies to a new field.
- The same subject can be taught differently depending on your chosen course and university. Search university websites to learn more about the course content, teaching styles and assessment types.
- When choosing a university, think about what other factors are important to you. Do you want to study at a campus university or be based in a city center? What accommodation options are there? Does the university have facilities for any extracurricular activities you're involved in?
- To research your options, look at university prospectuses and websites and see if there are opportunities to speak to current students who can give you a real insight into what life is like there.



What's next?

University Guidance

Exploring careers and subject options

- Find job descriptions, salaries and hours, routes into different careers, and more at <https://www.startprofile.com/>
- Research career and study choices, and see videos of those who have pursued various routes at <http://www.careerpilot.org.uk/>
- See videos about what it's like to work in different jobs and for different organisations at <https://www.careersbox.co.uk/>
- Find out what different degrees could lead to, how to choose the right course for you, and how to apply for courses and student finance at <https://www.prospects.ac.uk/>
- Explore job descriptions and career options, and contact careers advisers at <https://nationalcareersservice.direct.gov.uk/>
- Discover which subjects and qualifications (not just A levels) lead to different degrees and what careers these degrees can lead to at <http://www.russellgroup.ac.uk/media/5457/informed-choices-2016.pdf>

Other useful resources

- <https://www.ucas.com/>
- <https://www.whatuni.com/>
- <https://www.opendays.com/>
- <https://www.thecompleteuniversityguide.co.uk/>



You may or may not have thought about studying at university.

Don't worry – you have plenty of time to think about this and explore your options if you would like to go!

What's next?

University Guidance

UCAS and the university application process

All applications for UK degree programmes are made through **UCAS**. There is lots of information on the UCAS website to guide you through the process and what you need to do at each stage.

Apply

- Applications **open in September** the year before you plan to start university.
- You can apply for up to **five courses**.
- The deadline for most courses is **15 January**, though there is an earlier deadline of **15 October** for Oxford and Cambridge, medicine, veterinary medicine/science and dentistry.

Decisions

- Some courses may require an interview, portfolio or admissions test in addition to a UCAS application. Check individual university website details.
- Check UCAS Track which will be updated with decisions from the universities you have applied for, and to see your deadline for replying to any offers.
- You should choose a firm (or first) choice university and an insurance choice. If you already have your exam results or a university thinks your application is particularly strong, you might receive an **unconditional offer**.

Results

- If you're holding a conditional offer, then you will need to wait until you receive your exam results to have your place confirmed.
- Clearing & Adjustment allows you to apply to courses which still have vacancies if you didn't meet the conditions of your offer, have changed your mind about what or where you want to study, or have met and exceeded the conditions of your offer and would like to look at alternate options.

Personal statements

An important part of your application is the personal statement. The personal statement allows you to tell universities why they should offer you a place.

Here are a few top tips for making your personal statement stand out:

- You can only submit one personal statement, so it's important that you are consistent in your course choices. Make sure you have done your research to show your understanding of the subject area and your passion for it.

What's next?

University Guidance

Personal Statement (cont.)

- Start by brainstorming all your skills, experience and attributes. Once you have everything written down, you can begin to be selective – you only have 47 lines so won't be able to include everything.
- The ABC method: action, benefit and course can be a useful way to help demonstrate your relevant experience and how it applies to the course you're applying for.

Personal Statement do's and don'ts

Read the tips below from real life professors and admissions staff in university Science departments, on the 'do's' and 'don'ts' of what to include in your personal statement.

Science

- Tell us why you want to study Science.
- What area of Science fascinates you?
- Demonstrate your interest by telling us what you have recently read, watched or listened to and how they helped your understanding of Science.
- Describe how your school or individual work has equipped you with the necessary knowledge and ability to be a successful Science student.

Other useful resources

- An easy template to start practising your personal statement:
<https://www.ucas.com/sites/default/files/ucas-personal-statement-worksheet.pdf>
- Untangle UCAS terminology at <https://www.ucas.com/corporate/about-us/who-we-are/ucas-terms-explained>
- Discover more about the application process including when to apply and how to fill in your application on the [UCAS website](#).
- Read more useful advice about what to include in your personal statement on [UCAS, the Complete University Guide](#) and [The UniGuide](#).

Insight into the University of Cambridge

The University of Cambridge and its Colleges are committed to widening participation to higher education. Hundreds of outreach initiatives and events are run each year both in Cambridge and in schools and colleges across the UK.

Outreach Projects

neaco

The Network for East Anglian Collaborative Outreach (neaco) delivers activities across East Anglia to help students in Years 9-13, with little or no experience of university, to explore the world of higher education. [Find out more.](#)

(Pre-16 Team Projects)

Insight Discover

Insight Discover is a programme that students follow from Year 7 to Year 8, which aims to develop key academic skills to support them in their academic work. In addition, the programme introduces students to university and the options which are available to them in the future. [Find out more.](#)

Insight Explore

Insight Explore is an academic programme which aims to develop participants interests and tackle the barriers many students face when applying to university. [Find out more.](#)

Realise

The Realise project's aim is to encourage more young people in care to consider higher education. We run a large number of events ranging from science days to theatre days to give a taste of life as a student at Cambridge. [Find out more.](#)



Insight into the University of Cambridge

Post-16 Team Projects)

HE+

HE+ is a collaboration between the University of Cambridge's Admissions Office and Colleges, and state schools/colleges across the UK. The University and schools across 20 regions collaborate to form regional consortia to support high-achieving students from underrepresented areas and backgrounds, involving approximately 4,000 Year 12 students each year. [Find out more.](#)

Sutton Trust Summer Schools

Sutton Trust Summer Schools are free, subject-specific residential courses for Year 12 students studying at state-maintained schools in the UK. The five-day summer schools in July and August allow students to explore their interest in one of 26 subjects and gain an insight into what it is like to live and study as a first-year undergraduate student at Cambridge. [Find out more.](#)

Think Cambridge

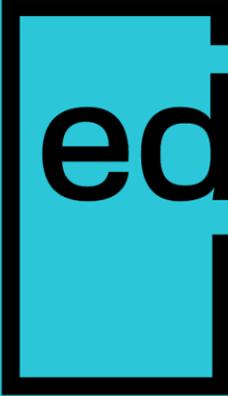
Think Cambridge is a series of webinars aimed at inspiring Year 10, 11, and 12 students, as well as international and mature students, to consider applying to the University of Cambridge. [Find out more.](#)

Apply Cambridge

Apply Cambridge is a specialist, free programme designed to support highly able students from underrepresented backgrounds and areas in making successful applications to the University of Cambridge. We work with students every step of the way over a 6-month period, helping them navigate the process and effectively prepare for the Cambridge application. [Find out more.](#)

STEM SMART

STEM SMART is a free, 17-month programme to support students in raising their attainment at school and developing their confidence to apply to study physical sciences and engineering at top universities. [Find out more.](#)

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