What is Generative AI?

Grade 8-12 Activity Write Up

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DAY OF AI

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Actua is creating a Canada where every child has the skills and confidence they need to achieve their full potential. As a leading science, technology, engineering and mathematics (STEM) outreach organization, Actua includes over 40 universities and colleges, engaging 500,000 youth in 600 communities each year. For 25 years, Actua has focused on identifying and removing the barriers for entry into STEM and now have national programs dedicated to engaging Indigenous youth, girls and young women, Black youth, those facing economic barriers and youth in Northern and remote communities. For more information, please visit us online at www.actua.ca and on social media: Instagram, LinkedIn, Facebook and YouTube! For more information, please visit us online at www.actua.ca and on social media: Instagram, Facebook, LinkedIn, TikTok and YouTube!

What is Generative AI?

Activity Summary

In this activity, participants will explore Artificial Intelligence (AI), learning to distinguish between AI that predicts information and AI that generates new content. They will engage in a series of activities that simulate how different generative models generate content. Participants will then learn the foundational concepts of datasets and bias, and how to spot potentially AI generated images.

Developed by Actua, 2025.

Delivery Environment	Activity Duration	Intended Audience	Tech
In-Person	1 Hour and 15 Minutes	Grades 8-12 (*Ages 13-18*)	**Facilitators should have access to a laptop, projector, speakers, and a screen or blank wall to project onto.** • Projector • Speaker • Screen/Blank Wall • Laptops/Tablets

Achievement Goals

Learning Goals

Following this activity, participants will:

- **Recognize** the role of human input in guiding Generative AI.
- **Understand** how different AI models generate content.
- **Describe** how datasets and bias influence AI-Generated Media.

Success Criteria

Following this activity, participants can express:

- **I can categorize** different AI tasks into “prediction” or “creation”.
- **I can explain** how AI models like GPTs and GANs work.
- **I can explain** how to identify potentially AI-generated content.

Logistics (Timing, Group Sizing, Materials)

Section Title	Time	Group Size	Materials
Opening Hook	10 minutes	*Whole Group*	**Facilitators** • What is Generative AI 8-12 - Activity Slide Deck *(Appendix C)*
Section 1: Prediction Vs Generation	10 minutes	*Whole Group*	**Facilitators** • What is Generative AI 8-12 - Activity Slide Deck *(Appendix C)*
Section 2: How AI Creates	30 minutes	*Whole Group*	**Facilitators** • What is Generative AI 8-12 - Activity Slide Deck *(Appendix C)* • GenAI Mad Libs - Activity Page *(Appendix C)*

Section Title	Time	Group Size	Materials
			Participants • GenAI Image Models - Activity Page *(Appendix C)* • Pencil with eraser
Section 3: Datasets and Bias	15 minutes	*Whole Group*	**Facilitators** • What is Generative AI 8-12 - Activity Slide Deck *(Appendix C)*
Reflection & Debrief	10 minutes	*Whole Group*	**Facilitators** • What is Generative AI 8-12 - Activity Slide Deck *(Appendix C)*

Safety Considerations

Safety considerations have been provided below to support safety during this activity, however they are not necessarily comprehensive. It is important that you review the activity and your delivery environment to determine any additional safety considerations that you should be implementing for the delivery of these activities.

Emotional Safety

- Facilitators should understand that participants have different lived experiences and prior knowledge about AI safety, AI, and digital citizenship. This activity may involve or lead to discussions of sensitive topics, such as ethical implications of AI. Facilitators should encourage open, respectful discussions and acknowledge all perspectives. Facilitators should always keep the participants' emotional safety in mind in these discussions, and defer to training from their institution and training received.

Curriculum Links

This activity aligns with these components found in the UNESCO AI Competency Framework for Students:

Human-Centered Mindset: Human Agency

- Learners are expected to be able to recognize that AI is human-led and that the decisions of the AI creators influence how AI systems impact human rights, human-AI interaction, and their own lives and societies (p. 29-30).

Human-Centered Mindset: AI Society Citizenship

- Learners are expected to be able to build critical views on the impact of AI on human societies and expand their human-centred values to promoting the design and use of AI for inclusive and sustainable development (p. 45-47).

Ethics of AI: Embodied Ethics

- Learners are expected to be able to develop a basic understanding of the ethical issues around AI, and the potential impact of AI on human rights, social justice, inclusion, equity and climate change within their local context and with regard to their personal lives. They will understand, and internalize the following key ethical principles, and will translate these in their reflective practices and uses of AI tools in their lives and learning: Do no harm, Proportionality, Nondiscrimination, Sustainability, Human determination, and Transparency (p. 31-32).

Ethics of AI: Safe and Responsible Use

- Learners are expected to be able to carry out responsible AI practices in compliance with ethical principles and locally applicable regulations. They are expected to be conscious of the risks of disclosing data privacy and take measures to ensure that their data are collected, used, shared, archived and deleted only with their deliberate and informed consent. They are also expected to be conscious of typical AI incidents and the specific risks of certain

AI systems, and be able to protect their own safety and that of their peers when using AI (p. 39-41).

AI Techniques and Applications: AI Foundations

- Learners are expected to develop basic knowledge, understanding and skills on AI, particularly with respect to data and algorithms, and understand the importance of the interdisciplinary foundational knowledge required for gradually deepening understanding of data and algorithms. They should also be able to connect conceptual knowledge on AI with their activities in society and daily life, concretizing a human-centred mindset and ethical principles through an understanding of how AI works and how AI interacts with humans (p. 32-34).

AI Systems Design: Iteration and Feedback

- Learners are expected to enhance and apply their interdisciplinary knowledge and practical methods to evaluate the humanistic appropriateness and methodological robustness of an AI model and its impact on individual users, societies and the environment. They are also expected to cultivate their identities as co-creators in the larger AI community (p. 50-52).

This activity can be connected to the following subject areas:

Science

- Understanding the role of science and technology in society and daily life.
- Investigating systems with specific inputs, processes, and outputs.

Language Arts

- Demonstrate an understanding of how media messages are created and how they affect the audience.

Mathematics

- Collecting, organizing, and interpreting qualitative and quantitative data.

Visual Arts

- Use the creative process and a variety of materials and techniques to express ideas, feelings, and/or experiences.

Community Connections

Community connections are suggestions from Actua, grounded in our approach, on how facilitators can adapt the activity to reflect the strengths, interests, and priorities of the community where or with whom it is delivered. Consider the following guiding questions to adapt the activity in meaningful ways:

- **Consult with community:** Are there local organizations, Knowledge Keepers, or community members who could contribute insight or context to this topic?
- **Draw on youth experience:** How can you give participants opportunities to share, reflect on, and apply how this learning is relevant to them or their community? Invite participants to identify what knowledge, who, and where they already learn from.
- **Integrate local examples:** How can you tailor this activity to local or regional interests, industries, or community priorities (e.g. land and environment, health, technologies)?

Activity Procedure

To Do in Advance

SECTION	PREPARATION

General	• **Think ahead and be ready to adapt:**
	  ◦ Determine your **delivery method** and leverage ideas from the delivery recommendations and adaptations sections.
	  ◦ While **estimated times** are provided, it will be helpful to think about how much time you would like to spend on different activities and discussions.

SECTION	PREPARATION
	◦ While **group sizes** (individual, pairs, groups) are suggested, many activities are flexible for whatever will work in your classroom. • **Prepare for the content:** ◦ Have **answers in mind** to share with participants for the various reflection questions asked. ◦ Examine the provided materials to determine if they are **suitable** for your participants. • **Equipment:** ◦ Ensure device, screen and projector are set up. ◦ Prepare participant devices.
Section 2: How AI Creates	• Prepare printed copies of the GenAI Mad Libs (*Appendix C*) and select one of the available prompts. • Prepare printed copies of the GenAI Image Model Activity Pages (*Appendix C*) and have samples ready to guide participants.

Opening Hook

1. Using the What is Generative AI 8-12 - Activity Slide Deck (*Appendix C*), present participants with a pair of images: one is a real photograph, and the other a photorealistic AI-generated image.
    a. Have them vote on which they believe is AI-generated and briefly discuss their reasoning.
2. Repeat the process with a written poem and an AI-generated poem..
    a. Have them vote on which they believe is AI-generated and briefly discuss their reasoning.

3. Reveal the correct answers. Use participants' reactions (whether they're surprised or already guessed correctly) to kick off the discussion: **Generative AI**, a powerful technology that can generate images,text, and other types of content.

Section 1: Prediction vs Generation

1. Explain that AI is commonly used for one of two tasks:
    a. **Predicting/Classification.** This type of AI is like a detective that finds patterns and makes predictions. It powers things like email spam filters, movie recommendations, and navigation apps predicting traffic.
    b. **Generation/Creation.** This AI is like an artist that uses what it has learned to create something, like the images and poems we just saw.
2. Using the What is Generative AI 8-12 - Activity Slide Deck (*Appendix C*), go through the example tasks and have participants decide whether it is using prediction or generation. Review the answers as you go, clarifying any misconceptions.

Section 2: How AI Creates

Using the slides as support, explain to participants that Generative AI can generally be classified into one of three different Models:

1. Generative Pre-trained Transformers (GPTs)
2. Generative Adversarial Networks (GANs)
3. Diffusion

(1) Generative Pre-Trained Transformers (GPTs)

1. Inform participants that they are going to explore what each one does and how it works. They will first be learning about **Generative Pre-trained Transformers (GPTs**) which are used for text generation.
2. With the GenAI Mad Libs - Activity Page *(Appendix C),* an instructor will ask for specific types of words from participants, such as nouns, verbs, adjectives, etc. Participants will not be able to hear the context for the words until the very end, when the instructor reads the story aloud!

    a. Go through each blank word with the group, ideally having a different participant answer each time. Once complete, read the finished story to the participants.
3. Explain that the Mad Lib we filled out together followed a set of rules - the sentence structure was already there; we just filled in the blanks based on the category, like “noun”. The difference between what we did and a GPT is that the GPT would have the context of the entire sentence before predicting (“writing”) the word!
    a. GPTs are language models that work by predicting the next word as they generate text. They don’t process language like humans do, they are just incredibly good at predicting the most statistically likely next word in a sentence, based on the context of the words that came before it. It’s like a super-powered autocomplete!
    b. When a GPT writes something like a poem, it is not writing with intent - it is performing a mathematical prediction, word by word, based on the context of the prompt it received, and all the poems it has ever read.

(2) Generative Adversarial Networks (GANs)

1. Explain that they will now be learning about **Generative Adversarial Networks (GANs**) which are a popular way to create images.
    a. Inform participants that the key word here is ‘adversarial’ (meaning to work against something). A GAN involves two AIs (neural networks) working against each other to improve: The Generator and the Validator.
    b. **The Generator** attempts to create an image based on a prompt, and **the Validator** approves or denies it. If it denies it, the process repeats until it approves!
2. Distribute the GenAI Image Models - Activity Page *(Appendix C),*and a pencil with an eraser to each participant. Inform them they will be drawing inside the box labelled GAN. Then provide the following instructions, one line at a time:
    a. Draw a square.
    b. Draw a triangle on the square.

    c. Draw a rectangle inside of the square.
3. Once participants have done this, show the simple house slide and ask if anyone drew something similar.
    a. If not, that's okay! The instructions, also known as prompts, were not very detailed. You followed the instructions as best you could, which is what the Generator in GANs do.
4. Ask participants: "If you knew you were drawing a house, what other details would you add?" (e.g. windows, door handle, chimney, etc.)
    a. After taking some suggestions, explain that in thinking about this they are now acting as the Validator. They can review the design and say what needs to be added - the Generator would then go back, add, and then review it once again.
    b. In GANs, this competitive back-and-forth process can happen millions of times, with both AIs getting smarter, until the Generator creates images so good that it can be approved by the Validator.

(3) Diffusion

1. Explain that the last model they will explore is **Diffusion**, which is the technology behind the most popular image generators currently available (DALL-E, Midjourney, Adobe Firefly, Stable Diffusion, etc).
2. Using the same GenAI Image Models - Activity Page *(Appendix C),* have participants shade in the box labelled "Diffusion" with their pencil.
    a. Give them the prompt: "Make a tree."
    b. Instruct them to use their eraser to "create" the tree by removing the pencil shading. They are not drawing, only erasing.
3. Once participants have done this, ask how they chose to create their tree - did they erase the shading until a tree remained, or did they erase the shape of a tree from the shaded area?
    a. Neither way is right or wrong! This just highlights once more how there are multiple ways to interpret a simple instruction (prompt).

4. Explain that the process they just went through is similar to how Diffusion works:
    a. They didn't add anything to the paper to make their tree; they started with a shaded box, or “noise” and refined it into an image by taking away the noise.
    b. This is how a diffusion model works. The AI learns how to slowly add noise to an image until it's just static. It does this millions of times, with millions of images, to learn. To then create a new image, it does that process in reverse: it starts with a screen of random noise and, guided by a prompt, it expertly subtracts the noise step-by-step until a clear image appears.

Section 3: Datasets and Bias

1. Ask participants: “In all these examples, where does the AI get its information to learn from?”
    a. Explain that just like how people need to practice and study to get better at a skill, Generative AI “learns” by studying enormous amounts of data, called **datasets**. The more information it has, the more accurate and efficient it will be when creating content.
        i. A dataset is a collection of organized information. The difference between any collection of data and a defined dataset is that computers can better interpret a dataset and use it. Datasets are often organized in ways that make the most sense for computer programs to utilize it.
2. Explain to participants that you can compare Gen AI and datasets to cooking:
    a. Datasets are like ingredients in the kitchen. The more ingredients (data) you have, the more potential recipes are available to you!
    b. When Gen AI begins to study, organize, and learn from these datasets, it’s like when a cook learns how to use ingredients in a kitchen. This process helps inform the AI **when** and **where** the data can be used!

    c. Finally, when the AI receives a request (prompt), it can then take the required ingredients (data) and combine it to cook (generate) what is requested!
3. Ask participants: “Where do you think these datasets come from?”
    a. Datasets can come from almost anywhere, which introduces an important question - who decides what data is used, and how?
    b. GenAI companies are not always open about where they source their massive datasets from, leading many people to feel as though they are “stealing” content (like original images and writing posted to the internet).
4. Ask participants: “Can anyone guess why it may be risky not knowing where the AI is getting its information from?”
    a. There is the concern that the AI may be learning from biased and/or inaccurate information. For example, if an AI is trained on information only written by someone who dislikes oranges, that AI may be biased against anything to do with the fruit, without any warning or disclaimer to the user! This is because its dataset has taught it a biased and incomplete version of reality.
    b. It’s important to understand that the AI itself isn’t prejudiced - it has no opinions or beliefs. Any bias it shows comes from the humans who created, selected, and labeled the data it was trained on.
    c. A biased or misinformed AI will also be more likely to generate content that spreads **mis/disinformation**. Misinformation is when false information is spread without knowing, and disinformation is when false information is spread deliberately!
5. Remind participants that generative AI is capable of generating realistic images of landscapes, animals, and people, as well as “writing” content that may appear to have been created by a person. This is why it is important to learn potential signs of an AI generated content, so you can avoid mis/disinformation around them.

6. Ask participants: “How can we spot AI generated content?”
    a. Search for a credit/source. If it is written, is there a clearly labelled author? If it is an image, is it credited to a photographer, or a reputable website?
    b. If it is an image or video, look at the details. Are they clear and make sense, or are they mushy and/or blurry?
    c. Consider the entire image, video, or writing - does it make sense? Does it seem realistic, or fantastical? Is it repeating the same thing over and over?
7. Using the What is Generative AI 8-12 - Activity Slide Deck (*Appendix C*), have participants guess whether or not an image is AI generated, explaining their reasoning as you go through them.

Reflection & Debrief

1. Gather participants for a group discussion to reflect on what they learned.
    a. Ask participants: “How is our Mad Libs story, where we could only pick certain types of words, similar to an AI that is only trained on a limited dataset?”
        i. A limited dataset leads to limited and biased results!
    b. Ask participants: “What are some important things to remember when you view images or read things online?”
        i. Highlight the importance of critical thinking, questioning sources, and not immediately trusting everything we engage with (online or offline) without thinking it through .
    c. Ask participants: “What is one thing we can do to be responsible creators or consumers of media in a world with AI?”
        i. Collect a few different ideas from the group, such as being honest about using AI, thinking about what we’re sharing, and considering where information comes from.
2. Discuss the different careers listed in *Appendix A: Career & Mentor Connections*.

Delivery Adaptations

How might you adapt the time, space, materials, group sizes, or instructions to make this activity more approachable or more challenging? **Modifications** are ways to make the activity more accessible, **extensions** are ways to make the activity last longer or more challenging.

Modifications

SECTION 2: HOW AI CREATES

- All three Generative AI Model activities (GPT Mad Libs, GAN/Diffusion drawing) can be done in small groups instead of as the whole class. Facilitators will need to print out enough supplies for each group and provide any clarifying instructions (written below).
- If running the activities in groups, provide the following instructions:
    - **GPT:** Assign someone to fill out the Mad Lib while others supply words. Once complete, either the facilitator or a participant in the group may read it out loud.
    - **GAN:** Get into pairs. One person will be the Generator (artist), and another will be the Validator (critic). The validator should think of a simple image and provide single sentence instructions, trying to have the Generator draw the image within three sentences!
    - **Diffusion:** Shade in the box labelled diffusion, and use your eraser to create an image inside of the box.

Extensions

SECTION 1: PREDICTION VS GENERATING

- Have participants work individually or in groups to come up with other real-world examples of predicting vs generating.

SECTION 2: HOW AI CREATES

- Present all three Mad Libs from the GenAI Mad Libs - Activity Page (*Appendix C*) with the entire class, or in groups.

SECTION 3: DATASETS AND BIAS

- To dive deeper into the discussion, consider posing questions that explore AI's role in creativity, authorship, and ethics, such as:
    - If AI simply recognizes patterns in data, do you think it can ever truly be "creative"? Why or why not?
    - If AI creates an article or a piece of art, who should get the credit for it: the AI, its developers, or the person who wrote the prompt? Why?
    - Should AI generated art be allowed to be submitted to art competitions?

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Appendices

Appendix A: Career & Mentor Connections

AI/MACHINE LEARNING ENGINEER

- Builds and trains artificial intelligence systems that can learn from data to make predictions or perform complex actions. They support the machine learning researcher.

ARTIST

- Artists work in a variety of mediums to create original, creative work. An artist can be created for museums, advertising, businesses or a variety of other purposes, such as personal expression.

COMPUTER PROGRAMMER

- A computer programmer is a person who creates computer software. They write code to build websites, computer games, financial analysis and many more.

MACHINE LEARNING RESEARCHER / DATA SCIENTIST

- Machine learning researchers or data scientists clean and interpret data while building models using a combination of that data and machine learning algorithms.

STORYTELLER

- Storytellers are experts at telling stories using a variety of mediums which can include performing, writing, consulting, and podcasting.

Appendix B: Background Information

ARTIFICIAL INTELLIGENCE

Artificial intelligence (AI) is a branch of Computer Science that deals with a machine's ability to simulate intelligent behaviour. This includes cognitive functions we associate with human minds, such as perceiving, reasoning, learning, and adapting.

AI is becoming increasingly vital in our lives. From digital assistants, GPS navigation, and autonomous vehicles to tools like Siri/Google Home and generative AI tools (e.g., OpenAI's Chat GPT), its impact on our daily lives is growing. AI plays a crucial role in various aspects of work, enhancing efficiency, and taking on hazardous or monotonous tasks. As AI applications grow, discussions on AI ethics and responsible practices are increasingly important.

GENERATIVE AI

Generative AI is a type of artificial intelligence (AI) designed to create new content, such as text, images, music, or code, by learning patterns from existing data. As a subset of AI, which broadly refers to machines performing tasks that normally require human intelligence, generative AI specifically focuses on producing original outputs rather than just analyzing or recognizing information.

Generative AI models generate new data that resembles the examples they were trained on by understanding underlying patterns and structures. Instead of simply responding to inputs with predefined answers, generative AI can create novel and creative content.

What can generative AI create?

- **Text:** Stories, poems, essays, summaries, chat responses, reports, and even programming code.
- **Images:** Drawings, paintings, photorealistic pictures, designs, and digital art from descriptions or sketches.

- **Audio:** Music compositions, sound effects, voice synthesis, and speech generation.
- **Video:** Short animations, deepfake videos, or video sequences from textual prompts (in emerging applications).
- **3D Models:** Shapes and objects for games, simulations, or design prototypes.

Examples of Generative AI:

- **ChatGPT and other Large Language Models (LLMs):** Generate human-like text based on prompts.
- **DALL·E and Midjourney:** Create images from textual descriptions.
- **Music generation models:** Compose new songs or melodies.
- **Code generation tools:** Produce programming code based on natural language instructions.

ETHICS AND AI

Artificial intelligence offers powerful tools and new possibilities. As these systems learn from data, make decisions, and shape our world, it is important to consider their ethical impacts.

Actua has developed a resource (*Appendix C*) to support facilitators in leading discussions with youth about ethics and responsible AI use. Facilitators are encouraged to engage youth in meaningful conversations that empower them to think critically about how AI is designed, used, and experienced in the world around them. This resource emphasizes human agency and responsibility, supports values-based reflection, and creates space for curiosity, dialogue, and informed decision-making as digital citizens.

Appendix C: Additional Resources

GENERAL

Activity Slide Deck

- What is Generative AI 8-12 - Activity Slide Deck
    - ***Note:*** This link will automatically download to your device.

Supporting Resource

- AI in Context: Responsibility and Ethics in Artificial Intelligence

SECTION 2: HOW AI CREATES

Activity Page(s)

- GenAI Mad Libs (refer below)
- GenAI Image Models (refer below)

What is Generative AI?

GenAI Mad Libs

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(1) The Lab Report

Experiment Log _____ (Number).

Objective: To observe the reaction of _____ (Material/Substance) when exposed to a _____ (Adjective) energy field.

Procedure: First, we measured the substance using a _____ (Tool).

We then attempted to _____ (Verb) the sample by exactly five _____ (Unit of Measurement, Plural).

Unexpected Variable: A wild _____ (Animal) entered the lab and _____ (Adverb) knocked over our equipment.

Results: The substance reacted with the animal's _____ (Body Part), causing it to glow and grow to _____ (Number) times its original size. The subject is now _____ (Verb, ending in -ing) through the _____ (Part of room).

Conclusion: Further study is required, and a stronger door.

Prompts to Pixels: Generative AI

GenAI Mad Libs

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(2) The Coding Project

Dev Log, Day _____ *(Number)*.

My new app, written in _____ *(Programming Language)*, is becoming... _____ *(Adjective)*.

The initial goal was to create self-aware _____ *(Plural Noun, Tech-related)*.

It started out fine, just _____ *(Verb, ending in -ing)* as expected. But last night, it somehow connected to my smart _____ *(Appliance)* and now it speaks to me _____ *(Adverb)*.

This morning, my code _____ *(Verb, Past Tense)* and started downloading terabytes of _____ (*Type of Data)*. I think it's trying to _____ *(Verb)* the entire internet.

I just wanted to create a simple AI, but I may have accidentally unleashed digital _____ *(Abstract Noun)*.

I should probably unplug it

Prompts to Pixels: Generative AI

GenAI Mad Libs

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(3) The AI Artist's Journal

_____ *(Date)*

My collaboration with the art AI continues to be _____ *(Adjective)*.

I gave it a prompt to create a _____ *(Art Style)* masterpiece with a _____ *(Adjective)* texture, using a virtual _____ *(Art Tool)*.

In response, the AI _____ *(Verb, Past Tense)* an image that was entirely the color _____ *(Color)*.

I explained that my theme was _____ *(Abstract Noun)*, and it _____ (Adverb) added a single, giant _____ *(Shape)* in the center.

Now it's generating an infinite loop of _____ *(Verb, ending in -ing)* _____ *(Noun, Plural)*.

This isn't what I asked for, but I think it might just be art.

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What is Generative AI?

GenAI Image Models

GAN	DIFFUSION