

Science and Society High School Symposium

Navigating a World with AI

Educator Guide: Content Kickoff – Introducing Artificial Intelligence

Overview

In Part 1, students consider their current knowledge about and feelings toward the use of artificial intelligence. They work in small groups to discuss their prior knowledge and then summarize these conversations for the class.

In Part 2, students watch a video that provides background information about artificial intelligence and its impact on society. Individually or in small groups, students complete a worksheet about the strengths and drawbacks of artificial intelligence (AI) technologies.

In Part 3, students explore a digital interactive that reveals the many ways they already interact with AI. Individually or in small groups, students complete a worksheet documenting some capacities and limitations of artificial intelligence.

In Part 4, students are encouraged to submit questions to the Museum of Science before the live panel, *AI and You: Rewards, Risks, and Potential*. During the panel, students will hear a conversation among experts in various specialties within the field of AI. The panel will cover a wide range of topics, but the central question is, *What, if any, restrictions or guidelines should there be on the use of artificial intelligence?*

Together, these activities are designed to prepare students for the live panel, *AI and You: Rewards, Risks, and Potential*. Students will get the most out of this panel if they have constructed a basic understanding of what artificial intelligence is and how ubiquitous it is in their daily lives.

Guiding Questions

- **Part 1:** What do I know and how do I feel about artificial intelligence?
- **Part 2:** What is artificial intelligence and how does it influence my life?
- **Part 3:** When do I encounter artificial intelligence in my daily life?
- **Part 4 (optional):** What questions do I have about artificial intelligence technologies or careers?



Objectives

- **Part 1:** Students will be able to share their current knowledge and perceptions of artificial intelligence.
- **Part 2:** Students will be able to define artificial intelligence and explain how AI impacts them or their community.
- **Part 3:** Students will be able to share examples of where they interact with AI in their daily lives.
- **Part 4 (optional):** Students will be able to ask questions about AI technologies and STEM career pathways related to AI.

Artificial Intelligence Glossary

An AI Glossary is included on page 10 of this guide. The glossary defines key terms and offers background information for teachers. You can also distribute it to students as a reference they can use throughout the Symposium.

Background

AI, or artificial intelligence, is all around us, whether we know we're interacting with it or not. AI is a collection of technologies that allow computers to sense, learn, reason, and act. But a far cry from the sci-fi promise of a humanoid robot that thinks like us, AI is currently capable of only specific, individual tasks. AI powers the algorithms—the instructions encoded in computer programs — that rank search results on the web, tag friends in photos online, let a smart assistant understand our spoken words, and recommend which movie to watch next. AI can also help detect diseases, identify fraudulent credit card purchases, and monitor threatened ecosystems and wildlife.

How does AI work? One way is called machine learning: equipped with algorithms and vast amounts of data called datasets, AI developers train computer programs to recognize patterns and tackle complex problems. Once a program has been trained on a dataset, it can encounter new scenarios and start making predictions. For example, if the training dataset is a collection of labeled images of cats, and the algorithm instructs the program to identify a cat, a successful image recognition program can correctly classify a new image as either a cat or not a cat. If a language generator were successfully trained on all text in a library's digital books, newspapers, and articles, it could then complete an unfinished sentence while obeying the rules of grammar. This process is not transparent. The program cannot tell us exactly what makes it so sure it "sees"



a cat, or how exactly it “knows” that whom is correct, not who. It is just applying its training after being shown a huge number of examples.

AI is impressive but not perfect. Its flaws reflect the data we choose to train AI algorithms, as well as other choices made by the humans who develop these technologies and send them out into the world. Some of these flaws—such as those in tools that determine credit scores, evaluate access to healthcare, and even attempt to predict crime—greatly affect human lives. That essential training dataset is a key point of weakness where misconceptions and biases can (and do) routinely sneak in. A self-driving car might not be able to identify a person using a wheelchair in a crosswalk if wheelchair users were not included in the data when it was trained. Facial recognition programs trained on images that disproportionately show pale faces exclude people with darker skin tones.

We have the power to reduce this embedded bias by creating AI training datasets that truly represent the real world and by building a diverse workforce of AI developers and decision-makers. We must also consider social, economic, and ethical priorities when deciding which problems to tackle with AI in the first place. Each of us lives in a world filled with AI. The more we all know about where and how these technologies influence our lives, the better we can advocate for ourselves and others and reach for a more equitable world.

Preparation—Part 1:

For this activity, the educator will need the following:

- Whiteboard or chart paper
- Markers for whiteboard or chart paper

For this activity, students will need the following:

- *In What Ways Is AI Intelligent?* infographic in [English](#) or in [Spanish](#)

Preparation—Part 2:

For this activity, the educator will need the following:

- Video: *What Is AI?* (4:00) ([English](#) | [Spanish](#))
- Internet access



- A way to show the video to students
- *What Is AI?* Answer Key (refer to page 14)

For this activity, students will need the following:

- *What Kind of Problems Is AI Good at Solving?* infographic in [English](#) or in [Spanish](#)
- *What Is AI?* (refer to page 15)

Preparation—Part 3:

For this activity, the educator will need the following:

- Digital Interactive: *AI Is All Around Us* ([English](#) | [Spanish](#))

For this activity, students will need the following:

- *When Do I Encounter AI?* infographic in [English](#) or in [Spanish](#)
- Internet access
- Access to a desktop computer, laptop or tablet
- *AI Is All Around Us* (refer to page 15)

Preparation—Part 4:

For this activity, students will need the following:

- Internet access
- Access to a smart phone, laptop, or tablet
- **11 AM Slido Event Code:** #234956 or **1 PM Slido Event Code:** #596414

Part 1: AI Warm-Up Questions

Estimated Time: 30 minutes

Activity Instructions

Part 1 encourages students to think about their current knowledge and perceptions of artificial intelligence. Students will work in small groups to answer the warm-up questions below.



1. Explain to students that they will be participating in a multi-week virtual learning experience with the Museum of Science, Boston, about the personal, societal, and ethical dimensions of artificial intelligence, or AI. The central question for Symposium is *What, if any, restrictions or guidelines should there be on the use of artificial intelligence?* Tell them that the first part of this experience involves learning what artificial intelligence is and the many ways we all encounter AI in daily life.
2. If you have established a set of rules for active listening and respectful dialogue, you may want to remind students of those rules prior to beginning the activity. If not, consider discussing the following guidelines:
 - Listen to understand rather than to respond.** Show the speaker you are engaged by being attentive and avoiding interruptions.
 - Be open to new perspectives.** Everyone comes to the conversation with different life experiences.
 - Be willing to change your mind.** Try out new ideas and consider multiple points of view.
3. Divide the class into small groups of up to four students. Read the warm-up questions aloud. Then write or project them at the front of the room so that groups can refer to them during their discussions.
4. Give one copy of the *In What Ways Is AI Intelligent?* infographic to each student. Tell students that they may find this resource helpful in answering the warm-up questions.
5. Instruct students to work in their small groups to share answers to each warm-up question. Encourage them to document their conversations and prepare to summarize and share their responses with the class.

Warm-Up Questions

Q: What words, emotions, experiences, or examples come to mind when you think of artificial intelligence?

A: Accept all reasonable responses. Encourage students to consider both positive and negative reactions and to listen carefully and respectfully to the other members of their group. Students may mention robots, smart assistants (such as Alexa or Siri), or surveillance. Students may express a range of emotions, including excitement, distrust, and fear.



Q: What does it mean for a computer or machine to be intelligent?

A: Accept all reasonable responses. Students may reference the In What Ways Is AI Intelligent? infographic to answer the question. Students may consider and debate what it means to be intelligent. While AI can learn from experience and perform specific tasks on its own, remind students that machines cannot yet fully reason like humans.

Q: What makes you excited or nervous about the use of artificial intelligence?

A: Accept all reasonable responses. At this point, students may not yet know how AI is used in their daily lives or across all aspects of society. Encourage students to think about the algorithms behind their social media accounts, streaming services, or targeted advertisements.

6. After groups have had time to consider all the warm-up questions, ask each group to summarize their thoughts on each question for the class. Acknowledge common themes across groups and affirm understanding by repeating back what they shared.

Part 2: Introductory Video: What is AI?

Estimated Time: 30 minutes

Activity Instructions

This short, animated video will introduce students to artificial intelligence, explain where they can find it in their daily lives, and describe how it affects people and their communities. Students may watch this video together as a class, on their own devices, or outside of class time.

1. Tell students they will be watching a short, animated video, *What Is AI?* This video will introduce artificial intelligence with a focus on how it works, where it can be found, and how AI influences our lives.



2. Give one copy of the *What Kinds of Problems Is Artificial Intelligence Good at Solving?* infographic to each student. Tell students that they may find this resource helpful in filling out the *What Is AI? Worksheet* questions.
3. After students watch the video, distribute the *What Is AI? Worksheet*. Ask students to work independently or in pairs to answer the questions. Encourage students to refer to the infographics and introductory video to help them answer the questions.

Part 3: Digital Interactive: AI Is All Around Us

Estimated Time: 30 minutes

Activity Instructions

In this part, students learn about the many ways they already interact with artificial intelligence. Students will explore the digital interactive on their own or in pairs. It is best viewed on a desktop computer, laptop, or tablet. A mobile device, such as a smart phone, is not recommended.

1. Explain to students that they are going to explore the many ways we interact with artificial intelligence every day.
2. Give one copy of *When Do I Encounter AI?* infographic to each student. Tell students that they may find this resource helpful while answering the warm-up question.
3. Ask students to work in pairs to answer the warm-up question. Encourage them to document their conversations and prepare to share their responses.

Warm-Up Question

Q: When do you encounter artificial intelligence in your daily life?

A: Student responses will vary. Examples may include smart phones, smart assistants (like Alexa or Siri), streaming service recommendations (like Netflix or Spotify), and targeted advertisements. Students may express their opinions on whether their daily interactions with artificial intelligence are positive or negative.

4. After student pairs have had time to consider the warm-up question, ask each pair to find another pair to compare their thoughts. If time allows, ask the small groups to share their answers with the class. Acknowledge common themes across groups and affirm understanding by repeating back what they shared.



5. Distribute the worksheet *AI Is All Around Us*. Tell the students they will work on their own or in pairs to explore the digital interactive *AI Is All Around Us* and complete the worksheet. If you have a way for students or pairs to access desktops, laptops, or tablets, students may explore the interactive and complete the worksheet during class time. Alternatively, students can explore the interactive and complete the worksheet outside of class time.
6. Encourage the class to discuss the impact this interactive had on their own awareness of how they interact with artificial intelligence. Ask:

Q: Think back to the warm-up question. Did you find any of the examples you brainstormed in the digital interactive? Did you find examples you did not consider?

A: Accept all reasonable answers. More recognizable examples of interacting with AI may include smart phones, smart assistants, facial recognition, face filters, and recommendation algorithms. Examples they may not have seen before could include DeepText, surveillance tools, AI-generated voices, and online testing. Students may express their viewpoints on whether they feel positively or negatively about these applications of artificial intelligence.

Q: Did any of the viewpoints on the capacity and limitations of AI surprise or intrigue you? How did those affect your viewpoint on the applications of AI?

A: Answers will vary. Encourage students to discuss the different perspectives that were shared and how they may have changed or reinforced their opinion on the presence of artificial intelligence in their daily lives.



Part 4: Preparing for the Live Panel

Estimated Time: 10 minutes

Activity Instructions

Week 2 of the Symposium will feature a live panel, *AI and You: Rewards, Risks, and Potential*. The live panel will include three AI experts as they share their experience working with artificial intelligence and their perspectives on whether there should be restrictions or guidelines on the use of AI. The Museum of Science invites students to submit questions before and during the panel by using Slido. Students should use a smart phone, tablet, or laptop to go to Slido.com. They can enter the event code and submit their question before the live panel. A link to view the live panel will be provided to registered educators via email.

The Navigating a World with AI Symposium is provided free of charge for students and teachers through the generosity of BNY Mellon, with additional support from the Lowell Foundation.



Artificial Intelligence Glossary

Artificial Intelligence (AI) refers to a collection of technologies that allow computers to use sets of instructions called algorithms to sense, learn, reason, and act.

An **Algorithm** is a set of step-by-step instructions to complete a task.

Data is information that computers store and process.

A **Dataset** is an organized group of data.

Big Data refers to very large data sets that can include billions or trillions of entries.

A **Training Dataset** is a dataset processed by machines to help them learn. If some people, time periods, or regions are left out of the training dataset, the AI model will have flaws that may affect people's lives unequally.

A **Model** refers to an algorithm that has been trained on a dataset to recognize certain types of patterns and make predictions. A model is designed to make a computer behave like a real-world system.

A **Program** is a set of instructions for a computer to follow, given in a language that the computer can understand. A program can tell a computer how to use an algorithm.

Machine Learning is a type of AI that learns by example to recognize patterns and solve problems.

Data Science is a broad field that uses huge amounts of available information to provide meaningful insights. It can, but does not always, use AI tools for analysis.

Weak AI, or narrow artificial intelligence, includes applications of AI algorithms to perform specific tasks. Weak AI is what we have now.



Strong AI, or artificial general intelligence (AGI), is when a machine can fully reason like a human. Strong AI is yet to be achieved.

Supervised Learning is a training method that uses labeled datasets where an algorithm is given examples of input-output pairs. A set of images that are identified as "cat" or "not cat" is an example of a labeled dataset.

Unsupervised Learning is a training method that doesn't use labels or correct outputs. The algorithm discovers the structure of the data for itself.

Adaptivity is the ability to improve performance by learning from experience.

Autonomy is the ability to perform tasks in complex environments without constant guidance by a user.

A **Neural Network** is a system inspired by human biology that uses a network of algorithms to understand input data and translate it to an output. Neural networks rely on training datasets to learn and improve over time.

Deep Learning is a subset of machine learning that uses neural networks with at least three layers.

A **Layer** is a data processing step.

A **Deepfake** is an altered or completely fabricated image, video, or audio clip created with the use of artificial intelligence tools.

Robotics is the building and programming of robots so they can operate in complex, real-world scenarios.

Computer Vision is a field of AI that allows computers to use data to recognize images, videos, and other visual inputs.

An **Image Recognition Program** can identify whether people and certain objects appear in images or videos using trained algorithms and a camera system.



Facial Recognition is an image recognition program that is trained to verify or confirm the identity of an individual using their face.

Bias is a tendency, known or unknown, to prefer one person or object over another, which can influence understanding or outcomes.

Ethics is a system of rules or principles that affects the way people think or behave.



What is AI?

1. What kinds of problems do you think AI would be good at solving?
2. What could be done to prevent embedded bias or misconceptions in artificial intelligence?
3. Do you think there should be restrictions or guidelines on the use of artificial intelligence? Why or why not?



What is AI? Answer Key

1. What kinds of problems do you think AI would be good at solving?

Answers will vary. AI algorithms are narrowly suited to specific tasks. These tasks could include but are not limited to classifying objects, analyzing language and generating speech, planning solutions to complex scheduling or routing challenges, predicting future scenarios, and helping robots sense their environment and plan actions.

2. What could be done to prevent embedded bias or misconceptions in artificial intelligence?

We have the power to reduce embedded bias or misconceptions in artificial intelligence by creating AI datasets that represent the real world. To do this, we must build a diverse workforce of AI developers and decision makers. We also need to bring social, economic, and ethical considerations to the forefront when deciding which problems to tackle using AI in the first place.

3. Do you think there should be restrictions or guidelines on the use of artificial intelligence? Why or why not?

There is no right or wrong answer to this question. Student answers will be based on their new understanding of AI technology and on their personal life experiences. This question will help lead to the Symposium's central question: What, if any, restrictions or guidelines should there be on the use of artificial intelligence?



AI Is All Around Us

1. Visit virtualexhibits.mos.org/ai-all-around to explore the AI Is All Around Us digital interactive, which reveals competing opinions about living a life embedded with AI.
2. Select four items in the digital scene (a dorm room). Watch the videos sharing different viewpoints on the use of artificial intelligence related to each item. Use the table below to take notes and to share your own perspective.

Item	Perspective #1	Perspective #2	What do you think about this use of AI?

3. Artificial Intelligence is used in GPS apps to predict traffic and suggest the fastest route to your destination. What do you think are some capacities and limitations of this use of AI?