

AI and Ethics: A Mini-Unit for High School

Lesson Set One

Activity Overview: This activity set is a week-long unit designed for 90-minute class periods utilizing curriculum and materials from the DAILY Workshop, aimed at introducing students to AI, how it works, and ethical considerations/impacts. If the class period is shorter than 90 minutes, the lessons will likely need to be broken up into two chunks.

- Day One: Students will learn about what AI is, how it works, and identify areas of their life where they use AI.
- Day Two: Students will be introduced to supervised machine learning, including classifying and generating. Students will then build their own teachable machine and examine how data sets influence results.
- Day Three: Students will learn about algorithmic bias and begin considering ethics as they related to artificial intelligence.
- Day Four: Students will learn about socio-technical systems and examine the goals of these systems by examining the recommender algorithm on YouTube.
- Day Five: Students will continue their learning about socio-technical systems, algorithms, and ethics as they redesign the recommender algorithm for a stakeholder group they select in order to make it less bias and more ethical.
- Day Six: Students will look at how they use AI in their own lives and devise a plan to use it ethically.

Extension Options: Any activities from the DAILY Workshop curriculum can be integrated into this mini unit to extend learning and/or challenge students as needed.

Target Grade Levels: 9 - 12

Target Subject: Computer science, technology, engineering (Note: Lesson is suitable for various content areas)

Notes for Educators: These lessons were originally taught in a 9th grade ELA class, but can be modified to fit any secondary classroom. Basic lesson structure and materials were taken from the DAILY Workshop and the MIT AI Ethics Education Curriculum. Links to both sites, as well as links to additional resources, can be found at the end of this unit plan.

Materials: Students will need access to a device with internet access (iPad or laptop/computer). Teacher will need access to an interactive board, such as a SmartBoard or Newline. The lessons work best if the teacher and students have access to Google Chrome and Google education suite (Slides, Drawing, Docs, etc.).

Day One – Intro to Artificial Intelligence

Lesson Resources:

- What is AI? Main Script and Slides, AI tools slides from Explore AI Journal, AI or Not activity:
 - Script:
<https://docs.google.com/document/d/1FfNUyYeAhQ4JBhz4xRZC1t6oZHay6585BD0QTt4Lt6M/copy>
 - Slides:
https://docs.google.com/presentation/d/1mMBoyjMDC0imjDgclXFGpvuCIL3iTp12HI2UcZf2_-M/copy

- AI or Not? Activity:
https://docs.google.com/drawings/d/1Z4DiMjmd4aUDFXaXCC1NApJn_Vl084CgaaeErkJZXmU/copy
- AI Journal Slide Deck:
<https://docs.google.com/presentation/u/0/d/1zELK7rfmcoJrpzWAaczJCo2NKbrSlnahrguQfu-Qdl0/copy>

Guiding Questions:

- What is artificial intelligence?
- How does artificial intelligence work?
- Where do I encounter artificial intelligence in my everyday life?

Objectives:

- Understand that artificial intelligence is the science of making machines that can think like humans and have intellectual processes similar to a human – reasoning, discovering meaning, generalizing, learning from past experiences.
- Know that artificial intelligence is a specific type of algorithm and has three specific parts: dataset, learning algorithm, and prediction.
- Recognize AI systems in everyday life and be able to reason about the prediction an AI system makes and the potential datasets the AI system uses.

Catch/Hook: Students complete the “AI or Not” sorting activity.

Activity Instructions:

1. After students have completed the “AI or Not” sorting activity, have them share out as to why they put certain technologies into each category. Ask if anyone has a definition for AI that they are willing to share with the group. Using the student given definition, build upon their understanding by going over the Introduction to AI slide deck that covers algorithms, datasets, learning, and prediction.
2. Showcase the various AI tools from the Explore AI Journal slide deck. Have each student pick one they would like to check out. Allow time for students to play with their chosen AI tool, then in their groups, have them talk about what data the machine was given, how it learned, and what it predicted.
3. Have one person from each group share out about what tool they used, what the tool did, and what data/learning/prediction they think it might have used.

Review: Review the definition of AI, what an algorithm is and why it is important, and the data, learning, prediction cycle.

Assessment: Students fill out an exit ticket (see Printable Lesson Resources at the end of this document) with three things they learned and one AI tool that they use in their daily life. Bonus if they can write what they think the dataset and prediction is for that tool.

Standards:

- L1.AP.A.02 Describe how artificial intelligence algorithms drive many software and physical systems.

Day Two – Cats or Dogs? Intro to Supervised Machine Learning

Lesson Resources:

- AI Bingo (printable on page 15)
(<https://docs.google.com/document/d/1e9wx9oBg7CR0s5O7YnYHVmX7H7pnITfoDxNdrSGkp60/edit>).
- Introduction to Supervised Machine Learning

- Script: https://docs.google.com/document/d/12qbJx6p5vHkkUqa775gU_4gPrQgWADEPR2DIm65U4/copy
- Slides: <https://docs.google.com/presentation/d/1CbV4ziok2h1LvoM-PN6P1GtVwafq67MG4GOgFPU9PV8/copy>

Guiding Questions:

- What is supervised machine learning?
- What is a classification problem?
- How do data sets influence machine learning predictions/outcomes?

Objectives:

- Be able to define and explain supervised machine learning.
- Know what a classification problem is and how AI models work with it.
- Understand potential issues with classification in the supervised machine learning context.
 - Understand how the quantity of training data affects the accuracy and robustness of a supervised machine learning model.

Catch/Hook: To review the data/prediction sequence, students will participate in AI Bingo.

Activity Instructions:

1. After the students have participated in AI Bingo, review the concepts of machine learning, data set, and prediction after the activity. Tell the students that today you are going to learn more about supervised machine learning and go over the Introduction to Supervised Machine Learning slide deck through slide 23. Be sure to use version 1 of the Teachable Machine for the student activity (<https://teachablemachine.withgoogle.com/v1>). Debrief with students utilizing the questions from MIT AI Ethics Education Curriculum (linked above).
2. Let students know that in order to experience how a machine learns to classify, they are going to work with a partner to build a model that will classify dogs and cats. Work through the Dog/Cat classifier section of the MIT AI Ethics Education Curriculum, making sure to ask the questions dealing with AI bias in data.
3. Depending on the ability level of the students and the time available, do either the Musical Instrument Classification activity from the MIT curriculum or the Teachable Machine Project from the DAILY Workshop.

Review: Review the definition of a classification problem, how a machine learning model can solve it, and touch on bias in data sets.

Assessment: Students will fill out an exit ticket (see Printable Lesson Resources) where they answer the following questions about their experience with the musical instrument model or their own classification model: What did their model classify? Was their model successful in classification? What did they learn about the type of data their model needed to perform successfully? Where was their model biased?

Standards:

- L1.AP.A.01 Create a prototype that uses algorithms (e.g., searching, sorting, finding shortest distance) to provide a possible solution for a real-world problem relevant to the student.
- L1.IC.C.02 Test and refine computational artifacts to reduce bias and equity deficits.

Day Three - Algorithmic Bias

Lesson Resources:

- Investigating Bias and Exploring AI Bias activity from the DAILY Workshop
 - Script: <https://docs.google.com/document/d/1LAtyHyqnQ6bYHTvfv8xlgpavaNrtSgYcsd1gjAavZ5g/copy>
 - Slides: https://docs.google.com/presentation/d/1Eal-m7aWBP7_JX4r0eDCy_FUuocishfpPjYWwBtgzFc/copy
 - Handouts:
 - https://docs.google.com/document/d/1axNaHnXQJ54ywHB3uPVo3iqh_i2EWq_d9sAQHSm871E/copy
 - <https://docs.google.com/document/d/1MiArHt8O-zeW6ZyLYLTTCNm3egluTu70mNNHMAKIEg/copy>
 - <https://docs.google.com/document/d/1N1DylUBfPC4-F406clFP-AgRGmnE6vjulRVLTm0KASo/copy>
 - https://docs.google.com/document/d/1qcH9daB9ZioyEeCc7XCr2J1GSQILsldrq5g3_32wT7c/copy
- Top four ethical principles for artificial intelligence from AI Club
 - <https://www.corp.aiclub.world/post/teaching-ai-ethics-to-high-school-students>

Guiding Questions:

- What is algorithmic bias?
- What is the difference between fair and bias?
- How can artificial intelligence be biased?
- How do we prevent bias in AI?

Objectives:

- Know the term “algorithmic bias” in the classification context.
 - Understand the effect training data has on the accuracy of a machine learning system.
 - Recognize that humans have agency in curating training datasets.
 - Understand how the composition of training data affects the outcome of a supervised machine learning system.
- Know the term “ethics” in the context of artificial intelligence/machine learning.
 - Understand how bias relates to ethics in machine learning.
 - Identify how data sets can impact the predictions of machine learning systems allowing them to make unethical predictions.
 - Recognize why ethics in relation to AI are important.
 - Explain the top four principles of ethical artificial intelligence (fairness, transparency, privacy, human centeredness) and why they are important.

Catch/Hook: Have students watch this short clip on AI, humans, and bias (<https://youtu.be/AUVcF7ehZ28>). Ask students to think of one time they have encountered AI bias in their life and write it down. If they can't think of a specific example of AI bias, they can write about a time they have experienced bias themselves. Invite a few students to share their experiences.

Activity Instructions:

1. Remind students that last time you met, the group worked on building classification models that sorted a piece of data into one group or the other. You also talked a little bit about how AI models can be biased.

Today you are going to take a deeper look at bias in machine learning. Go through the slide deck for Investigating Bias through slide 15.

2. Next, tell students that the class is going to look at different real-world examples of bias and complete the Exploring AI Bias activity utilizing slides 16 – 35 and handouts 1-4.
3. Tell students that you are going to build on their understanding of bias in machine learning by looking at the concept of ethics. Ask the student to define the word ethical, then build on their decision and give examples of situations where an ethical choice was made versus a choice that was not ethical. How do the real-world examples looked at on Google align with ethics? Discuss the top four ethical principles of artificial intelligence (from AI Club link above). How did students see those reflected in the Google search results? Where else have they encountered these principles?

Review: Review the terms algorithmic bias and ethics. Review how AI models can be biased and how that can render models that are not ethical.

Assessment: Have students complete the exit ticket where they answer the question “What is one way an algorithm can be biased?” and then write 2-3 sentences discussing a time when they utilized technology in an ethical way (see Printable Lesson Resources).

Standards:

- L1.AP.A.02 Describe how artificial intelligence algorithms drive many software and physical systems.
- L1.IC.C.01 Evaluate the ways computing impacts personal, ethical, social, economic, and cultural practices.

Resources and Acknowledgements:

The DAILY Curriculum for Middle School Students was created by the MIT Media Lab Personal Robots Group and the MIT STEP Lab. More information, including links to the full curriculum, can be found at <https://raise.mit.edu/daily/>.

The MIT AI Ethics Education Curriculum is from the Ethics of Artificial Intelligence Curriculum for Middle School Students and was created by Blakeley H. Payne with support from the MIT Media Lab Personal Robots Group, directed by Cynthia Breazeal. The full curriculum can be found at <https://docs.google.com/document/d/1e9wx9oBg7CR0s5O7YnYHVmX7H7pnITfoDxNdrSGkp60/edit>.

Additional resources can be found on the AI4K12 website at <https://ai4k12.org/> and Everyday AI at [Resources | Everyday AI \(everyday-ai.org\)](#)

The Wyoming Computer Science Content and Performance Standards can be found here <https://edu.wyoming.gov/wp-content/uploads/2021/04/2020-CS-WYCPS-with-all-PLDs-effective-04.07.21.pdf>.

Printable Lesson Resources

- Exit ticket for Day One – Intro to Artificial Intelligence
- Exit ticket for Day Two – Cats or Dogs? Intro to Supervised Machine Learning
- Exit ticket for Day Three - Algorithmic Bias

EXIT TICKET

WHAT I LEARNED

Here are three things I learned today:

1. _____

2. _____

3. _____

AI TOOL

An AI tool that is use in my daily life is

_____.

Bonus: I think the dataset and prediction for this tool are:

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CLASSIFICATION MODELS

What did your model classify?

Was your model successful with its classifications?

What did you learn about the type of data your model needed to perform successfully?

Was your model biased? If so, how?

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What is one way that an algorithm can exhibit bias?

Write 2-3 sentences about a time when you used AI in an ethical way.

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