WeTeach_AI

Behind the Numbers: How Data Shapes AI Decisions

Grade Level: **6-8** | Duration: **70 minutes** | Subject Area: **Tech Applications**

LESSON TABLE OF CONTENTS

This lesson was designed under the WeTeach_AI **Advancing AI Literacy Project**. The project supports the development of standards-aligned AI literacy lessons designed for teachers by teachers. Additional lesson plan material, such as rubrics, answer keys, activity guides, and instructional considerations can be found here on our website.

The contents of this digital lesson were developed by the Texas Advanced Computing Center (TACC) with the support of Google.org. However, the contents do not necessarily represent the policies of Google.

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"I am a STEAM educator with over six years of experience teaching computer science and digital literacy to middle and high school girls in Houston, Texas. My work centers on helping students make real-world connections between technology, problem-solving, and ethics. I designed this lesson to empower students to critically analyze data, visualize patterns, and recognize how bias in datasets can affect artificial intelligence systems. My goal is to ensure that students not only develop technical skills but also acquire the awareness necessary to use technology responsibly and equitably."

Lesson Description

In this hands-on lesson, students will explore how artificial intelligence systems rely on data to make decisions—and how that data can reflect real-world biases. Through collaborative activities, students will input and visualize a dataset using spreadsheet tools, then analyze patterns to uncover disparities in AI accuracy across demographic groups. This lesson builds foundational skills in data literacy and visualization while prompting students to question the fairness of AI systems.

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Lesson Objectives

(formatted as "Students will be able to..." statements)

- Recognize how bias can appear in AI systems, particularly in facial recognition technologies.
- Interpret a simple dataset and identify disparities in AI accuracy across demographic groups.
- Construct basic data visualizations (bar and pie charts) using spreadsheet tools to represent patterns in AI performance.
- Analyze visualized data to draw conclusions about fairness and representation in AI systems.
- Reflect on the ethical implications of biased data in real-world AI applications.

Essential Questions

1. *How can data used by AI be unfair?*
2. *What patterns in data might reveal bias in AI systems?*
3. *Why is it important to visualize data when studying AI?*
4. *Who might be impacted when AI systems make mistakes?*
5. *What can we do to make AI systems more fair?*

TEKS Alignment (Texas Standards Alignment)

Technology Applications (126.33) (6, 7, 8)

(.1)(.A): decompose real-world problems into structured parts by using visual representation

(.1)(.B): analyze the patterns and sequences found in visual representations such as learning maps, concept maps, or other representations of data

(.1)(.C): define abstraction and distinguish between generalized information and specific information in the context of solving a problem or completing a task

Technology Applications (126.33) (6, 7, 8)

(.1)(.D): design a plan collaboratively using visual representation to document a problem, possible solutions, and an expected timeline for the development of a coded solution

(.6): uses digital tools to transform data, make inferences, and predictions

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CSTA/ISTE Alignment (National Standards Alignment)	
CSTA **2-DA-07:** Represent data using multiple encoding schemes. **2-DA-08:** Collect data using computational tools and transform the data to make it more useful and reliable. **2-DA-09:** Refine computational models based on the data they have generated.	**ISTE** **1.1.c:** Use technology to seek feedback that informs and improves their practice and to demonstrate their learning in a variety of ways. **1.3.d:** Build knowledge by exploring real-world issues and gain experience in applying their learning in authentic settings. **1.7.b:** Use collaborative technologies to work with others, including peers, experts or community members, to examine issues and problems from multiple viewpoints.

Inclusive Computing Considerations

(based on Guiding Principles for Inclusive CS Teaching)

1.1. The instructor deliberately cultivates an inclusive and accessible classroom community that recognizes, respects, and includes the voices, ideas, needs, and perspectives of all students. **1.3.** The instructor deliberately cultivates an inclusive and accessible classroom community that recognizes, respects, and includes the voices, ideas, needs, and perspectives of all students.	**1.1.** The instructor deliberately cultivates an inclusive and accessible classroom community that recognizes, respects, and includes the voices, ideas, needs, and perspectives of all students. **1.3.** The instructor deliberately cultivates an inclusive and accessible classroom community that recognizes, respects, and includes the voices, ideas, needs, and perspectives of all students.	**1.1.** The instructor deliberately cultivates an inclusive and accessible classroom community that recognizes, respects, and includes the voices, ideas, needs, and perspectives of all students. **1.3.** The instructor deliberately cultivates an inclusive and accessible classroom community that recognizes, respects, and includes the voices, ideas, needs, and perspectives of all students.	**1.1.** The instructor deliberately cultivates an inclusive and accessible classroom community that recognizes, respects, and includes the voices, ideas, needs, and perspectives of all students. **1.3.** The instructor deliberately cultivates an inclusive and accessible classroom community that recognizes, respects, and includes the voices, ideas, needs, and perspectives of all students.

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AI Literacy Competencies

(based on TeachAI Framework)

Engaging with AI: 1. Recognize AI's role and influence in different contexts. **Engaging with AI: 2.** Evaluate whether AI outputs should be accepted, revised, or rejected. **Engaging with AI: 3.** Examine how predictive AI systems provide recommendations that can inform and limit perspectives. **Engaging with AI: 4.** Explain how AI could be used to amplify societal biases.	**Designing AI Competencies: 1.** Compare the capabilities and limitations of AI systems that follow algorithms created by humans with those that make predictions based on data. **Designing AI Competencies: 3.** Collect and curate data that could be used to train an AI model by considering relevance, representation, and potential impact.

Key Terms	
Term	**Definition**
Artificial Intelligence	A computer system that can perform tasks that normally require human intelligence, like learning and reasoning.
Dataset	A collection of information or data, usually organized in a table or spreadsheet, used for analysis.
Data Cleaning	The process of fixing or removing incorrect, incomplete, or messy information in a dataset.
Data Visualization	The use of charts, graphs, and other images helps people understand information and see patterns in data.
Bias	When a dataset or an AI system shows unfair or prejudiced results because of flaws in the data it was trained on.

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Launch

Engaging activity or prompt to introduce the lesson. **Estimated time: 15 minutes**

Objective: Students will explore how bias can appear in AI data systems and reflect on its real-world impact.

Materials: Index card, Post-it note, or whiteboard and marker for each student

Teacher Instructions	Sample Teacher Remarks
Warm-Up (2 min) Ask: "Have you ever used facial recognition—like to unlock a phone or tag friends in photos?" Invite a few students to share quick examples from their own experiences. Watch a Short Video (2-4 min) Play a clip from Dr. Joy Buolamwini's TED Talk (linked here): - Start at 0:26 ("What is algorithmic bias?") - Stop around 3:49 ("How to create diverse training sets") Class Discussion (5–7 min) Use these guiding questions. Students can jot down responses, discuss with a partner, then share out: - *What surprised or concerned you in the video?* - *Why do you think facial recognition systems might get it wrong for some people?* - *Where might biased AI show up in real life? (e.g., hiring, policing, healthcare)* Driving Question (2 min) Write or display: "Can data used by AI be unfair—and what can we do about it?" Explain that this question will guide their thinking throughout the lesson.	*"Today we're going to explore something that affects all of us, even if we don't always see it—how artificial intelligence makes decisions, and how the data it uses can sometimes be unfair. This isn't about right or wrong answers—it's about asking good questions and thinking critically.* ***(Pause to display the video clip)*** *That was a powerful example of how technology, which we often think of as neutral, can actually reflect the biases of the people who create it. What stood out to you? What questions do you have?* ***(Pause for student responses. If students are hesitant, offer a few examples to get them thinking, such as AI being used in job applications or determining who gets access to healthcare.)*** *This question—'Can data used by AI be unfair?'—is going to guide us today. We'll look at how AI systems are trained, what kinds of data they use, and how that can affect real people in the real world."* Sample Student Responses • *"I didn't know facial recognition worked better on some people than others."* • *"Maybe the AI didn't have enough pictures of people with darker skin."* • *"That's scary—what if someone gets arrested because the AI got it wrong?"* • *"I've seen ads that don't make sense for me—maybe that's bias too."*

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Exploration

Step-by-step student tasks, experiments, or investigations. **Estimated time: 35 minutes**

Objective: Students will visualize a dataset and identify patterns that reveal potential bias in AI systems.

Materials: Devices with access to Google Sheets or Excel, a display of the sentence stems for discussion, and a chart template (optional)

Teacher Instructions	Sample Teacher Remarks

Data Exploration Activity
Share a Google Sheet or Excel file with the dataset preloaded (or have students input it themselves).
 	
Option A: Provide the short "How to Make a Chart" video or slide infographic.
 	
Option B: Set up a projector or Smartboard to model the charting process.
 	
Place students into pairs or trios, and assign them roles such as data entry, chart creator, or discussion leader.
 	
Students should:
- Input the dataset.
- Create a bar chart comparing accuracy across groups.
- (Optional) Create a pie chart showing total error (100% - accuracy).
- Discuss the following questions:
  - *What do your visuals reveal that the table didn't?*
  - *Who might be impacted by this kind of error?*
 	
Circulate to support students with chart creation and interpretation.
	"Today, we're going to explore how data can reveal patterns of bias in AI systems. You'll work with a small dataset that shows how accurate an AI system is at recognizing faces across different groups.
	
	Your job is to turn this table into two charts—a bar chart and a pie chart—and then talk with your group about what you see. Don't worry if you're not a chart expert—I'll walk you through it.
	
	Once your charts are done, I'll ask you to share what you notice. We'll use your observations to think about how data can help us understand fairness in technology."
	
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	Anticipated Student Outcomes
	• *"The AI is more accurate for light-skinned males."*
	• *"Dark-skinned females have the lowest accuracy."*
	• *"The bar chart makes the differences easier to see."*
	• *"Even a 10–20% difference could be a big deal."*
	• *"The pie chart shows how much error each group gets."*

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Whole Class Discussion

Discussion questions, teacher prompts, and expected student responses. **Estimated time: 15 minutes**

Objective: Help students engage in collaborative dialogue to explore the real-world implications of algorithmic bias.

Teacher Instructions	Sample Teacher Remarks

Facilitate discussion with the students about the lesson.
- Display a sample bar chart (student-created or pre-made).
- Use live annotation to highlight key ideas.
- Encourage students to cite evidence from their visuals. Display the following sentence stems for students to help scaffold responses:
  - "I noticed ___ in our graph, which might mean ___."
  - "This makes me think about ___."
  - "If this AI made a mistake on me, it could ___."
	"Let's zoom out from our charts and think about what they really mean—not just the numbers, but the people they affect.
	
	We'll look at one chart together and talk about what it shows, what might be missing, and how this kind of data could impact real people."

Sample Discussion Questions	Sample Student Responses
1. What patterns do you notice?	*"The AI is most accurate for light-skinned males and a big drop in accuracy for dark-skinned females."*
2. Why do you think accuracy is lower for some groups?	*"Maybe the AI didn't have enough examples and the data used to train it wasn't diverse."*
3. How might these errors affect real people?	*"Someone could be misidentified or denied access to something. It could be dangerous if used in law enforcement."*
4. What if a system like this was used in school or law enforcement?	*"It might unfairly punish or exclude certain students. People could be wrongly accused or not recognized."*
5. Did the chart help you see something the table didn't?	*"Yes, the chart made the differences more obvious. It was easier to compare the groups visually."*
6. Can data ever be biased?	*"Yes, if it doesn't include everyone equally. Bias can come from who collects the data or what's left out."*

7. How could this system be improved?	*"Use more diverse training data. Test it more before using it in real life."*

Assessment

Formative or summative assessment tasks and criteria. **Estimated time: 5 minutes**

Objectives: Assess students' ability to articulate a key takeaway about bias in AI based on their data analysis and class discussion.

Assessment Opportunities	Facilitation Tips
Exit Ticket Provide the following prompts and ask students to select one to answer: • "One thing I learned about data and AI is..." • "I didn't realize AI could ___ until I saw the data." • "A system is only as fair as ___." Teacher Prompt: *"Before we wrap up, I want you to take a moment to reflect on what you've learned today. This isn't about getting the 'right' answer—it's about capturing your thinking."* Use a Google Form, sticky notes, or a shared doc to collect responses. Skim for common themes or misconceptions to address in Lesson #2. Please see the "Misconceptions to Watch For" resource provided within this lesson's resources.	Offer Choice Let students choose from 2–3 prompts to encourage ownership and voice. Consider allowing audio or video responses for students who prefer speaking over writing. Model a Response Share a sample response aloud or on the board: *"One thing I learned about data and AI is that even small differences in accuracy can have a big impact on people's lives."* Use Sentence Starters Provide sentence stems on the board or slide: • "I used to think ___, but now I think ___." • "This lesson made me realize that ___." • "If I were designing an AI system, I would ___." Optional Extension Invite students to turn their exit ticket into a short video or journal entry for homework. Use responses to group students for the next lesson's ethical debate or case study.