6.CSY.3 Computing Systems

> *The student will identify and describe Artificial Intelligence (AI). (a) Define artificial intelligence and identify the characteristics of artificial intelligence. (b) Describe how AI technologies generate information or automate decisions and how people interact with AI technologies. (c) Define algorithmic bias and explain its consequences on AI technologies and systems.*

Understanding the Standard

"Artificial intelligence" is a broad category of technologies which are designed to imitate human work through statistical analysis. There are many examples of these technologies that students interact with on a daily basis—Google search, ChatGPT and similar chatbots, and home assistants like Siri and Alexa all use these "machine learning" technologies. Today, these systems work by ingesting a huge amount of data, finding patterns in that data, and using those patterns to make predictions. Because bias exists in the data these "machine learning" systems use, their predictions are biased as well. This kind of "algorithmic bias" often leads to bad outcomes—for example, imagine the historical data of home loan awards in the US. For a century and a half, some Americans were excluded from home ownership and denied loans for unfair or divisive reasons. This leads to a historical dataset that contains prejudicial home loan patterns which AI technologies will replicate. There are many examples of algorithmic bias to explore, and students may have firsthand experience with algorithmic bias.

This standard is very closely related to 6.DA.4, which covers these exact same concepts specifically with regard to the relationship between training data and the predictions AI technologies make.

Term	Definition
Artificial intelligence	A technology intended to imitate human work; today, these often use machine learning for this
Machine learning	The process by which a computing technology ingests data, analyzes it, and makes predictions
Algorithmic bias	Bias that arises within computing systems due to bias present in data or in analytical processes used to make predictions based on it

Prerequisite Knowledge

Students should have a basic understanding of "bias" in broad terms.

Integration Opportunities

Visual Arts 6.3 Analyze artwork that was created with AI.

Music 6.10 Analyze music that was created with AI.

Physical Education 6.3b,e Identify health-related AI technology and discuss how it can assist in goal-setting, problem-solving, and decision-making to improve fitness.

English 6.RI.3b Compare and contrast ideas between multiple texts regarding AI to define and describe the process, characteristics, and consequences.

Summary of a Lesson

Have students list technologies they think might be "artificial intelligence". Then, introduce the main characteristics of AI: collecting data, analyzing data, and making predictions. Have students edit their list to add other technologies that might meet these criteria and remove technologies that don't. Facilitate a discussion where students identify what data the AI technologies use to make predictions.

You can address this standard in a hands-on way by having students create simple machine learning models using tools like Teachable Machine, which do not require any coding. Check out this lesson plan for an example of how you might facilitate a lesson like this.