

How does a computer learn?

12½ minutes, for grades 2 to 5

Scan to watch
Free on YouTube
youtu.be/8GOBpQbYBJ0

An introduction to machine learning through a photo search that mistakes a muffin for a dog. Kids see why some problems can't be solved with rules a programmer writes, how a model learns from labeled examples instead, and two real ways it goes wrong. It ends with how the video itself was made with AI.

The ideas behind it

Time	In the video	What it really is
2:09	**Writing rules for a dog**	Ordinary programs follow rules a person writes. Recognizing a dog can't be written down that way, which is why **machine learning** exists.
2:45	**The labeled pile**	**Labeled training data.** People gathered and labeled every photo. The learning rests on a lot of human work, and the video says so.
4:43	**The knobs**	**Parameters** (or weights): the numbers inside a neural network, the video's "box." An image classifier has millions; a chatbot has billions.
4:43	**Scores that share 100**	The model's outputs turned into probabilities that add up to 100%. The highest one is its answer.
5:48	**Guess, check, nudge**	**Training.** The check is a number for how wrong the guess was. The "math shortcut" is backpropagation, which finds the direction to move every parameter at once. Moving each a little that way is gradient descent.
6:58	**The test**	A **held-out test set**: photos kept out of practice, to see whether the model works on new ones or only the ones it saw.
7:21	**The cat on a lawn**	**Shortcut learning.** Grass went with "dog" in the examples, so the model used it. The test photos came from the same pile and had the same flaw. Real models pick up bias from their data the same way.
8:13	**The toaster**	An input unlike anything in training. A model with a fixed set of answers has to pick one, and a high score doesn't mean it's right.
8:48	**Locked knobs**	Using a finished model doesn't change it. Improvements come as a new version, trained and tested again.
11:43	**The AI you talk to**	Chatbots start by practicing to predict the next word in huge amounts of text. The text holds its own answers, so nobody labels it. Episode 2 picks up here.

Ideas kids may bring

- **"It knows what a dog is."** It matches patterns that go with the word "dog." It has never petted one (8:48).
- **"It learns from me while I use it."** Its knobs are locked once practice ends (8:48).
- **"If it sounds sure, it's right."** The toaster gets called a muffin just as confidently (8:13).
- **"The computer figured it out by itself."** People built the box, wrote the practice steps and labeled every photo (2:45).

Fits: AI4K12 Big Idea 3, Learning: "Computers can learn from data."

For class time: turn over

Places to pause and ask

2:45 Try writing a rule for "dog." What else fits your rule?

Listen for: every rule (fur, four legs, floppy ears) lets in something that isn't a dog.

4:43 What have you gotten better at by missing and trying again? How did you know which way to change?

Listen for: the miss told them which way to go.

8:13 Why did it call the cat a dog? What photos would you add to fix it?

Listen for: grass was a clue in its examples. Dogs on snow or couches, and cats on lawns.

8:48 Why can't it say "I don't know"?

Listen for: it only has three answers, and one of them always wins.

11:43 What did the person do, and what did the AI do? Did the AI learn anything from making the video?

Listen for: the person decided and checked, the AI made and changed. Its knobs didn't move.

Try it: guess, check, nudge

Put a bin across the room. One student tosses a paper ball while the class calls out "too far" or "too short." After each throw, the thrower changes how hard they throw: a big change after a big miss, a small one after a small miss. Count the throws it takes.

Then ask: What told the thrower which way to change? Why not change a lot every time? That's how the robot finds its number, and how a dog-finder sets its knobs.

Words kids will hear

machine learning: a computer learning from examples instead of from rules

parameters: the knobs inside. Each one is just a number.

training: the practice that sets the knobs

model: the finished box, with its knobs locked

supervised learning: learning from examples that have the answers attached

Where the video simplifies

- Real training works through photos in batches and goes over the whole pile many times.
- "No one knob means ears" is true of single numbers. Researchers do find groups of them that respond to things like ears.
- Chatbots get more training after the next-word stage, including from people rating answers. The video covers only the start.

Chapters

0:00 Meet Bip and Bok
1:13 How does a photo search find dogs?
1:49 Computers follow steps
2:09 Can you write the rules for a dog?
2:45 Learning from examples (machine learning)
3:32 Guess, check, nudge
4:43 Millions of knobs (parameters)
5:48 Practice (training)
6:58 The test
7:21 Why it called a cat a dog
8:13 Why it called a toaster a muffin
8:48 Why the knobs get locked
10:00 How this video was made
11:43 How the AI that talks to you learned

Next time: how guessing one word at a time turns into a whole story.

Made by a person with the help of AI.
See 10:00 for who did what.

© 2026 Bip & Bok. Free to print and share for classroom use.
Not for sale or for use in paid products without permission.
Questions or ideas: **bipandbok@gmail.com**