# Should we fear robots ?

## Will robots take our jobs?

What makes a job more likely to be done by robots? Is it if a job involves…

a) manipulating small objects?

b) working in open spaces?

c) social and emotional skills?

Source: <http://www.bbc.co.uk/learningenglish/thai/features/6-minute-english/ep-151015>

**Vocabulary:**

**automation** the use of machines to do work that people do or used to do

**susceptible to** likely to be affected by

**manual dexterity** good with your hands

**cognitive labour** using your mind to perform a task

**noggin** head (informal)

**white collar** a job you do at an office rather than a factory

**artificial intelligence (AI)** a computer’s ability to copy intelligent human behaviour

**keeping your fingers crossed** hoping that things are going to turn out

### Mechanical mentors try to find their place as teacher’s helper

By [Maria Temming](https://www.sciencenews.org/author/maria-temming)

FEBRUARY 12, 2019 AT 7:00 AM

Pondering a tablet screen displaying a town scene, a pre-K student tilts her head to the side and taps her lip thoughtfully.

“What are we trying to find?” asks the plush, red and blue robot called Tega that’s perched on the desk beside the girl. The bot resembles a teddy bear–sized Furby.

“We are trying to find lavender-colored stuff,” the girl explains. Lavender is a new vocabulary word. “OK!” Tega chirps.

The girl uses her forefinger to pan around the scene. She eventually selects an image of a girl — not wearing purple. The game puts a red mark through her choice: wrong.

The girl slumps down in her chair, head dropped to her chest as Tega says, “I’m sure you will do better next time. I believe in you.”

The robot, which MIT researchers are testing with students in a Boston-area public school, tilts toward the girl, who leans in close so that her cheek is right next to Tega’s.

Now it’s the robot’s turn. “Time to perform!” it says. The scene on-screen shifts, as though the bot is telepathically controlling the tablet. “Hmm …”

Tega looks up at its partner, as though seeking confirmation that it’s doing this right, and the girl cups the bot’s cheeks encouragingly. The robot looks back at the screen. The girl rests her hand in the robot’s soft fur and murmurs, “I believe in you.”

This kind of tight connection is typical of child-robot interactions, says MIT social robotics and human-robot interaction researcher Cynthia Breazeal. Her team is investigating how this turn-taking robot can help students learn. Kids have a “special kind of affinity” with robots, she says.

Although adults might quickly become disenchanted with machines that aren’t very perceptive or don’t speak more than scripted sentences, children are liable to chat with, listen to and otherwise treat even basic robots as sentient, social beings, says Tony Belpaeme, a social roboticist at Ghent University in Belgium. Researchers like Breazeal and Belpaeme are trying to leverage that connection to create robots that engage with kids as tutors and peer learners.

These robots aren’t meant to replace human teachers, says Paul Vogt, a social robotics and language development researcher at Tilburg University in the Netherlands. But customizable, endlessly patient automatons could provide students with one-on-one attention in crowded classrooms. That extra support may be especially helpful for children with special needs or for students who are learning in a different language than they’re used to, says Belpaeme, who is studying how robots can help immigrant children in Europe pick up a second language.

Robots might also help homeschooled students, proponents say, or teach in areas where human experts are in short supply. English-speaking robots are slated to enter some 500 Japanese classrooms this year for exactly that purpose. Hundreds of Chinese kindergarten classes also have adopted educational robots. But in Western countries, these devices have yet to invade classrooms.

Just like any expensive educational technology, however, classroom robots may never make it to every classroom. Computer and cognitive scientist Brian Scassellati of Yale University and colleagues have had success with a device named Keepon that looks like two stacked yellow tennis balls with eyes and a nose. “When we produce them in the lab, they’re probably costing us about $200 total,” he says. But many researchers use the humanoid Nao robot, which costs several thousand dollars a pop, raising the question of how many schools will be able to afford the classroom helpers.

“There’s a lot of hype about robots,” says Goren Gordon, a natural and artificial curiosity researcher at Tel Aviv University. At this point, most testing has been short-term in small groups of children. So little is known about the potential risks involved when young kids keep close company with automatons. Yet early testing suggests that robots could help students learn new skills and promote good study habits and positive attitudes toward learning. Researchers still have a lot to figure out about best practices and potential impacts if educational robots are going to achieve tenure.

#### Here to help

Before grading robots on their teaching abilities, consider why automated educators might work better as physical rather than virtual entities. It turns out that a robot’s body may be just as important as its brain. A review of 33 studies that examined how adults and children respond to physically present robots, videos of the robots and animated versions of those same robots revealed that [people generally view physical](https://www.sciencedirect.com/science/article/pii/S107158191500004X) [robots more positively and find them more persuasive](https://www.sciencedirect.com/science/article/pii/S107158191500004X) than videotaped and animated robots. Jamy Li of the University of Twente in the Netherlands reported these results in 2015 in the International Journal of Human-Computer Studies.

“There’s something about robots that sets them apart from a computer,” Belpaeme says. “The exact same content delivered by a robot somehow makes our brains sit up and pay attention…. We don’t yet know why that is.” Still, roboticists have exploited that attention-grabbing edge to build machines that relay information on everything from math to nutrition and sign language.

Of course, a well-rounded education is about far more than learning facts. It’s also about developing good study habits and attitudes toward education that will make students lifelong learners. In this area, robots have proved useful.

On a very basic level, robots can make schoolwork more fun, proponents assert. “If kids enjoy learning, they’re going to learn more,” Belpaeme says. “It’s really as simple as that.” Researchers at the University of Wisconsin–Madison witnessed [robots’ power to make schoolwork fun](http://robotics.sciencemag.org/content/3/21/eaat5999) when they designed a bot named Minnie to support children’s reading at home. Minnie, described last August in Science Robotics, comments on a book as the child reads aloud, shows emotional responses to stories and summarizes plot points to support reading comprehension.

Roboticist Bilge Mutlu and learning researcher Joseph Michaelis randomly assigned 24 students ages 10 to 12 to either two weeks of reading aloud alone or with Minnie. Afterward, the solo readers gave the activity more mixed reviews, reporting, for example, “I didn’t not like it, but I didn’t, like, really enjoy it.” Only four said the activity motivated them to read more. Kids in the robot group said reading to Minnie was “fun” and “a cool experience.” Seven students said they felt more motivated to read.

Robots can also encourage specific reasoning strategies, such as thinking aloud, which is supposed to help students craft more deliberate, organized plans for multistep problem-solving. Computer scientist Chien-Ming Huang of Johns Hopkins University and colleagues programmed a Nao robot to nod along with a child’s speech and remind students who lapse into silence to keep going.

To test whether this supportive robot helped students learn, researchers randomly assigned 26 kids who were about 11 years old to solve math word problems while thinking aloud with or without the robot’s encouragement. From a pretest to a posttest taken about one week later,[the robot-trained children increased their own scores an average of 52 percent](https://dl.acm.org/citation.cfm?doid=3171221.3171250); solo students self-improved by an average of 39 percent, the researchers reported last March in Chicago at the International Conference on Human-Robot Interaction, or HRI 2018.

For a more deep-rooted effect on students’ educational experiences, robots can model certain beliefs about learning, like a growth mind-set: the idea that success comes from effort and perseverance, rather than inherent ability.

In one experiment, 33 children ages 5 to 9 solved geometric puzzles called tangrams with a Tega. Half the kids partnered with a robot that made growth mind-set comments, such as, “You are not afraid of a challenge. I like that!” Other students worked with a bot that stated facts only: “You solved the puzzle.”

Before and after working with the robot, each child completed an assessment that rated growth mind-set from 0 to 10. [The growth mind-set cohort’s scores, on average, increased a small amount](https://dl.acm.org/citation.cfm?id=3020213), 7.63 to 8.06, but the neutral bot group’s scores dropped from 6.94 to 6.59, Breazeal and colleagues reported in 2017.