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Enterprise

Internet of Things: Facilitator guide

This lesson is designed for students ages 16+ (grades 10 to 12 or adults)

In this lesson, students will learn how technology and devices are connected through the Internet of Things (IoT). Students will discover how their everyday technology and devices are all connected through sensors and networks.

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Lesson plan

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Lesson purpose

- Students will be introduced to the concept of the Internet of Things (IoT) and understand how computing devices within a network collect and send data over the Internet.

Lesson objectives

Students will be able to …

- Explain the components of IoT and how IoT devices work
- Identify examples of common smart devices that are connected to IoT
- Design an IoT device and consider benefits and implications of IoT

Agenda

- Introduction (5 minutes)
- Warmup & discussion (15 minutes)
- Activity – Design an IoT device (20 minutes)
- Share out (15 minutes)
- Wrap up (5 minutes)

Materials

(Print one of each material per student)

- Handout with two activities
- Pre- and post-session surveys (share pre-survey with teacher ahead of session)
- Video: What is the Internet of Things?

Vocabulary

- **Internet of Things (IoT) –** the growing network of smart "things" other than traditional computing devices that collect and send data and/or receive instructions over the Internet.
- **Sensors** – how an IoT device collects information about the physical environment; they are like a digital version of a human's sense of vision, hearing, and touch.
- **Network connectivity** – needed to move data to and from the device. There are a host of different options available, including Wi-Fi, cellular, Bluetooth, WAN, LAN, and many others.

Pre-visit prep

Preparation will take 30 minutes.

- Familiarize yourself with the basics of artificial intelligence. Read What is the Internet of Things? on HPE's website and watch the video in materials.
- Learn about the setting of your visit, how many students you will be working with, and ask the teacher if there is anything helpful to know in advance.
- Share the pre-session survey with the teacher and ask to have students complete it ahead of the session.
- Ask the teacher about the students' level of exposure and access to technology. This can provide insight on how well the students will relate to the examples and concepts. You may need to adjust the content if students have less exposure with IoT.
- Work with the teacher ahead of time to figure out a room arrangement where the students can gather into groups for the small-group activity. Knowing their students, the teacher may also want to pre-compose the groups in order to get the most out of the activity and minimize disruptions.
- Gather a few interesting stories about cybersecurity from the news or your personal experience that you can share with the students as quick real-world anecdotes (during the classroom discussion).
- Learn what technology will be available and use that to determine how the activity will be facilitated.
- Print necessary handouts and materials.

Teaching tip

Read the general characteristics of students in various grade/age groupings and be sure to ask the teacher what additional characteristics may be helpful for you to know about their students.

Students ages 16 and older (grades 9 to 12)

- Mature learners, especially by 12th grade
- Have more experience to help formulate questions and can visualize cause and effect presentations
- Beginning to plan for career choices and training beyond high school
- Higher degree of self-confidence
- Enjoy engaging in discussion

Lesson plan

Step 1: Introduction (5 minutes)

Share your ...

- Name
- What you do
- Why you enjoy working in tech
- Fun fact to help you connect to the students (hobbies, favorite subject, your connection to the school or city you are in)

Teaching tip

Build excitement and trust early on: Be friendly and enthusiastic! Feel free to build some rapport with students, such as asking them to raise their hands if they're interested in working in tech or sharing a story from school when you first learned about tech careers.

Step 2: Warm-up activity (15 minutes)

Video (5 minutes)

Ask students if they have heard of the Internet of Things (IoT) to gauge their knowledge of the topic. Then tell students they are going to watch a video explaining what the Internet of Things is and how our devices are connected through networks.

Share this video: What is the Internet of Things?

Discussion about the Internet of Things (5 minutes)

Ask: What are examples of devices or technologies that are connected to the Internet?
[**Ideal responses:** voice assistants (Google Home, Amazon Echo), smartwatches (Apple Watch/Fitbit), GPS inside your car, smart locks, doorbell cameras, universal remotes, connected security devices, smart light bulbs]

Ask: How does IoT work?
[**Ideal responses:** IoT is built off other technology concepts such as AI and the cloud. IoT technology uses sensor devices to collect data, then the cloud facilitates the network connection between the devices so that you can access the information on other devices]

Ask: What are the different components of IoT?
[**Ideal responses**: Sensors are part of your IoT device and collect data. Network connectivity makes sure the data can go from one device to another. Data processing processes and stores the information, and user interface makes the IoT devices easy to use!]

Ask: What are some benefits to the rise of IoT devices?
[**Ideal responses**: connection, accessibility, safety]

Ask: What are some risks of IoT?
[**Ideal responses**: security risks like data sharing, accessing cameras or microphones on devices]

Say: You probably use Internet of Things devices every day and didn't know what they were! There's an invisible network all around us that we can't see that helps us. Let's learn more about why that network of smart devices is so important.

Understanding why Internet of Things is important (5 minutes)

- **Explain:** The Internet of Things is driving advancement in many different markets, from smart homes and smart cities to manufacturing, telemedicine, and even precision agriculture. While the full potential of IoT has yet to be seen, it already has a number of practical, real-world applications.

Teaching tips

- **When asking a question:** "Count to seven" to wait for answers (students need time to think!) or pair students up.
- **Think-Pair-Share:** Give time for students to brainstorm their ideas independently, then ask them to share their ideas with the person next to them, then share to the larger group.

- **Ask:** Where is the future of IoT headed?
  [**Ideal responses**: technology to make manufacturing, medicine, and transportation safer; technology to make life more accessible for people with disabilities; technology to make it easier to communicate with people online; more wearable technology]

- **Dig in:** (If students don't hit all of the reasons, ask these questions)

  - What IoT technology do you think we will see in the next 10 to 100 years?
  - How will we see IoT affect cities/governments? Transportation? Healthcare? Education?
  - What problems exist right now that you think will eventually be solved by IoT?
  - Are there examples of IoT that make you nervous or fearful for the future?

- **Say:** In today's activity, you will have the opportunity to pitch your own idea for an IoT device.

Step 3: Activity (Design an IoT device) – Small group activity (20 minutes)

Overview: In groups, design an IoT device such as a "smart toaster" or "smart shoes" by filling out the handout. Afterwards, create a two-minute pitch to sell your product to your class.

Teaching tips

Check-in with students:

- Spend 2 to 3 minutes with each group to give ideas and suggestions or tell them more about what you do at HPE related to IoT.

Step 4: Share out (15 minutes)

> **Presentation:** Give each team two minutes to present their pitch with the rest of the class.

Step 5: Wrap up (5 minutes)

> **Say:** Now that we've learned more about the Internet of Things, why does it matter? [**HPE facilitator note**: Have students share answers. Examples could include "IoT devices are all around us."; "Technology will continue to get smarter and more connected."]

> **Say:** I'm going to have you fill out a short Exit Ticket survey. [**Pass it out or share link**] While you work on this, I'm going to tell you a little more about what happens at HPE around the Internet of Things. HPE uses IoT to protect data (your information) and to make things happen more quickly, like building a car faster in a factory. IoT can keep us, and our information, safe and secure.

> **Say:** Thank you for contributing and working with me! I'm impressed by your knowledge and ideas, your creative problem solving, and your teamwork. If you are interested in learning more about HPE, you can visit hpe.com/about. We offer Internet of Things solutions to our customers such as data security and improving the way things are made.

Step 6: Post visit follow-up checklist

- Thank the teacher/school/youth organization and the students.
- Share any resources HPE offers that may be helpful to the students.
- Ask for feedback.
- Offer to visit again with another topic in the series if the school is interested and can make time.

Activity:
Design an IoT device

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Directions: In groups, design an IoT device such as a “smart toaster” or “smart shoes” by filling out the handout. Afterwards, create a two-minute pitch to sell your product to your class.

What is the name of your device? _____

What does the device look like? Draw it.	What does the sensor look like? Draw it.
	What does the user interface look like? Draw it.

What problem is it solving?	What data is it collecting?
What are potential risks?	**Why should someone buy it?**

Surveys

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Pre-survey

A team member from Hewlett Packard Enterprise (HPE) will be joining your class today to talk about technology! Could you please answer a few quick questions before the session?

On a scale of 1 (not interested) to 5 (very interested), how interested are you in technology?

1	2	3	4	5

On a scale of 1 (not a lot) to 5 (a lot), how much do you know about the Internet of Things (IoT)?

1	2	3	4	5

Do you have any questions for the HPE team member about technology related to the Internet of Things (IoT)?

Surveys

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Exit survey

Thank you for participating in the session! Could you please answer a few quick questions to let us know how we did?

What did you enjoy most about today's session?

On a scale of 1 (not interesting) to 5 (very interesting), how interested are you in technology?

1	2	3	4	5

On a scale of 1 (not a lot) to 5 (a lot), how much do you know about the Internet of Things (IoT) after today's session?

1	2	3	4	5

Do you have any questions for the HPE team member about anything from today's session?

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