

Lesson 1

The Mind of a Robot (Part I)

Overview

In this course, students will be invited to an exploration of time travel to a future Robot Society. Yet, before starting their journey, they need to figure out what a robot is. This learning activity, therefore, will first introduce the “sensory system” that might help the robot communicate with a human. Students will explore the basic structure of the I/O System, and the concept of programming, as well as the difference between programming languages and human languages.

Objectives

By the end of class, students will be able to...

- Define the I/O System of a machine or a computer in association with the human sensory system;
- Demonstrate an understanding of how humans communicate with machines or computers;
- Understand that a programming language is a set of logically ordered and precise instructions that makes sense to a machine or a computer.

Materials

- mBlock
- Lesson 1 Activity Sheet
- Lesson 1 Slideshow

Content Standards

Type	Indicator	Standard
ISTE	1a	Students leverage technology to take an active role in choosing, achieving and demonstrating competency in their learning goals, informed by the learning sciences.
	3d	Students critically curate a variety of resources using digital tools to construct knowledge, produce creative artifacts and make meaningful learning experiences for themselves and others.
	6a, 6c	Students communicate clearly and express themselves creatively for a variety of purposes using the platforms, tools, styles, formats and digital media appropriate to their goals.
	7d	Students use digital tools to broaden their perspectives and enrich their learning by collaborating with others and working effectively in teams locally and globally.
CSTA	1B-CS-01	Describe how internal and external parts of computing devices function to form a system.
	1B-CS-02	Model how computer hardware and software work together as a system to accomplish tasks.
	1B-AP-11	Decompose (break down) problems into smaller, manageable subproblems to facilitate the program development process.
	1B-AP-12	Modify, remix, or incorporate portions of an existing program into one's own work, to develop something new or add more advanced features.



Vocabulary

Term	Definition
Input	Any information or data that is sent to a computer or device.
Output	Any data or display that is the result executed by a program.
Programming	Communicate with a computer or robot to perform certain tasks and solve problems.
Programming Language	The language that a computer or robot can understand.



Pre-lesson Checklist

- Print out and/or digitally distribute the Lesson 1 Activity Sheet.
 - If students will use paper versions of activity sheets, make sure the resources are easily available for students. This can be done by providing the links on your LMS, etc., or printing the resources out for each group to utilize during the class.
- Make sure any necessary computer equipment (installed with mBlock) is ready to go.
- Familiarize yourself with key points and notes detailed within this lesson plan and Lesson 1 slideshow.



Agenda (60 minutes)

Time Interval	Content
8 minutes	Warm Up • This phase aims to introduce the story context of this course and the learning tasks in this lesson.
22 minutes	Phase 1 • In this phase, students will have a mini-debate on two questions related to the robot “sensory system”. Foregrounded by the debate, students will then be introduced to the I/O system.
15 minutes	Phase 2 • In this phase, students will explore the concept of programming and the features of programming languages by completing a computing unplugged activity.
10 minutes	Practice • This phase aims to help revive the understanding of programming through an unplugged activity.
5 minutes	Wrap Up

Activities

Warm Up: Slides 2-5 [8 minutes]

Objectives:

- This phase aims to introduce the story context of this course and the learning tasks in this lesson.

Procedures:

Slide 2

- Show Slide 2 to inform the class about the agenda and tasks in this lesson.

Slides 4-5

- Introduce the theme and context of this course.
 - Announce that the class would time travel to a future robot society. During the “field trip”, they would explore what the future Robot Society would look like (perhaps in 2084).
 - Let students have a brief discussion with each other about what the robot citizens in the future would look like, and then report and share their opinions with the class.

Phase 1: Slides 6-10 [22 minutes]

Objectives:

- In this phase, students will have a mini-debate on two questions related to the robot “sensory system”. Foregrounded by the debate, students will then be introduced to the I/O system.

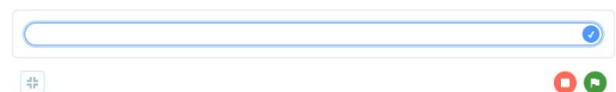
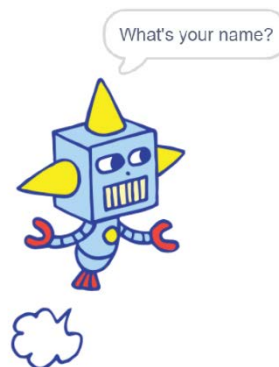
Procedures:

Slide 7

- Deliver the demo program to students and have them run it.
 - Instruct students to answer the robot’s questions.
 - Let students discuss the question shown in the slide (or in the activity sheet).

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when clicked
  switch costume to robot-a
  say Hello, pal! for 3 seconds
  switch costume to robot-b
  ask What's your name? and wait
  switch costume to robot-c
  ask join How are you, join answer ? and wait
  switch costume to robot-b
  ask Are you happy today? (Please answer "yes" or "no" and then tell me the reasons.) and wait
  if answer contains yes ? or answer contains happy ? then
    switch costume to robot-c
    say Me too! for 2 seconds
  else
    switch costume to robot-c
    say I'm sorry to hear that. for 2 seconds
  switch costume to robot-a
  ask Could we befriend? (Please answer "yes" or "no".) and wait
  if answer contains yes ? then
    switch costume to robot-c
    say Let's hang out somewhere!
  else
    switch costume to robot-d
    say I'm sooooo sad! for 2 seconds
  
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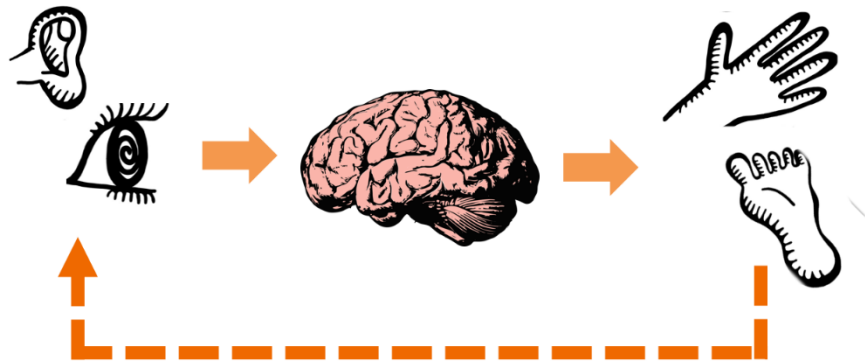


- Have the class debate on the first question:
 - *"Do you think you are chatting with a robot or a human?"*

Slide 8
- Have the class debate on the second question:
 - *"Do you think a robot could think and feel like a human?"*
 - Instruct students to think on their own and write down their opinion and arguments in the activity sheet.
 - During the debate, instruct the speaker to state clearly what his/her opinion is and then explain why he/she hold this opinion.
 - Please note that there is not a right or wrong answer of the above questions
- Summarize the common opinions and write down key points on the blackboard.

Slide 9
- Briefly explain how we are able to think and feel.
 - Invite students to give some real-life examples associated with the figure shown in the slide.

The Human Senses



Slide 10

- Show the Slide10 to explain the I/O System associated with the experience of the demo program.
 - When you answered the Robot's questions, the words and phrases you input would be stored in the computer to be "read" by the Robot;
 - The Robot analyzed your answers and output its feedback (e.g., "Me too!" or "I'm sorry to hear that." etc.).



- Encourage students to think of some real-life examples to explain the Input – Process – Output communication.
- For example, when you press a button to turn on the light – pressing the button can be viewed as an input, while the light is output.
- Indicate that to instruct your classmate to turn off the light, you need to speak to that person (as an input) through oral communication. Similarly, to instruct a robot or a machine to turn off the light, it is necessary to use the language that a robot can understand.

Phase 2: Slides 11-17

[15 minutes]

Objectives:

- In this phase, students will explore the concept of programming and the features of programming languages by completing a computing unplugged activity.

Procedures:

Slide 12

- Play the robot and ask volunteers to “program” you by telling you what to do step by step.
 - Have students first think of the matter and write down the actions in the activity sheet.
 - Read out the instructions and observe with the rest of the class to see whether teacher the robot did what was expected.

Slide 13

- Let students discuss the questions and share their opinions with the class.

Slide 14

- Explain the concept of programming associated with the “Do as I Say” task.

Slides 15-16

- Have students discuss the difference between programming languages and human languages.
 - A robot or a computer cannot understand human languages directly without translation.
 - Show Slide 16 to explain there are text- and block-based programming languages, and in this course, we will learn a kind of block-based programming language.
 - One of the features of programming languages is precise.
 - Ask students what is meant by being precise in their understanding, giving specific examples.

Slide 17

- Deliver the two sample programs to students. Have them run in the first place and have a close at the code to figure out the difference.
 - Have students discuss the difference they have found, and then explain what factor results in the different displays.
 - Encourage students to try to modify the sample program (b) to make it display like the sample program (a).

Practice: Slides 18-21

[10 minutes]

Objectives:

- This phase aims to help revive the understanding of programming through an unplugged activity.

Procedures:

Slide 19

- Instruct students to work in pairs and “program” each other.

- Have students think of an event and write down the instructions to carry out the event step by step in the activity sheet.
- Remind students that their “programs” should be precise and logically ordered.
- Let the pair comment on each other’s “program” and performance.

Slide 21

- Show Slide 21 to summarize this lesson.
 - Make a comparison between the human and the robot. You can also invite students to compare and summarize their own words and understanding.

Wrap Up
[5 minutes]