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**Excerpt from Innovation Lab @ Ross School
presentation
2017**

Problem

STEAM expertise is not enough!

Top characteristics of success at Google are all soft skills: effective coaching; communication skills; empathy (including others different values and points of view); critical thinking and problem solving; and being able to make connections across complex ideas.

— Project Oxygen

* 67% of HR professionals say they withheld a job offer from a talented IT candidate due to a lack of soft skills.

* 98% of HR leaders said that soft skills were important for candidates looking to land a technology job.

— West Monroe Partners, 2018

Problem

Jobs are changing!

- AI-Assisted Healthcare Technician
- Genomic Portfolio Director
- Data Detective
- Augmented Reality Journey Builder
- 21 Jobs for the Future (Center for the Future of Work)

85% of the jobs that today's learners will be doing in 2030 haven't been invented yet.

-

Institute for the Future

Mission

We seek to develop students into “full-stack” innovators with an emphasis on human experiences, so they can generate solutions that benefit individuals and communities.

Students will have the opportunity to grow as problem finders and solvers, discover their passions, and develop their identities as innovators while engaging in a dynamic fast-paced learning environment.

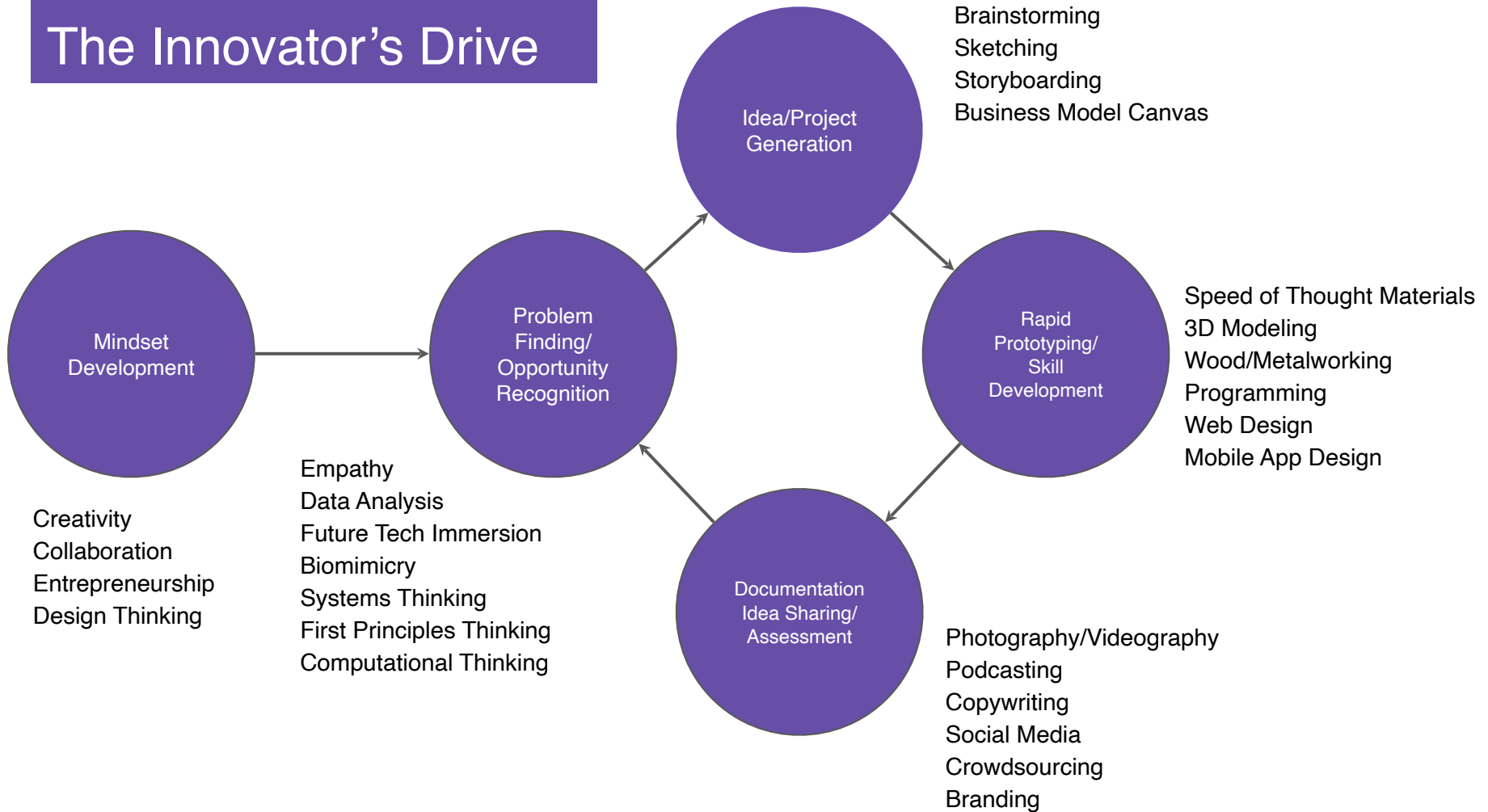
Developing “Full-Stack” Innovators

A depth of knowledge in one field of innovation while also maintaining a basic understanding of a variety of innovation skillsets and mindsets.

Students are immersed in subjects most associated with modern-day and future innovation including engineering, technology, media, math, science, art, design, and entrepreneurship.



The Innovator's Drive



Project-based Modules

Categorized as either disciplinary knowledge in science, technology, engineering, art, math, and media (STEAM) related fields or soft skills (collaboration, creativity, critical thinking, etc.)

Taught by disciplinary experts and focuses on creating a small project

The low student to instructor ratio fosters more individualized assistance.

Examples have included web design, project documentation, podcasting, and desk lamp design.



Excerpt from iCamp curriculum
2017

Future Tech and Media Immersion Experience

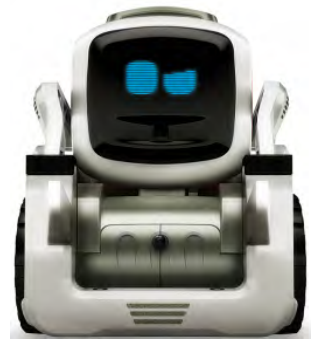
Future Tech and Media Immersion Experience

Robots and Artificial Intelligence	3
Augmented and virtual Reality	15
Electronics and Sensors	20
3D Modeling	27
Drones	31
Game and Mobile App Design (11-14)	39
Game and Mobile App Design (7-10)	50
Media and Graphic Design	57

Robots and Artificial Intelligence

Description

Learn the basics of programming and artificial intelligence using Cozmo, a kid-friendly robot. Students will use visual coding to interact with Cozmo by making it move in patterns, recognize faces, talk, and play games. They will develop an introductory understanding of computational thinking by developing steps and patterns for solving problems.



Materials

- Cozmo Robot
- 3 Cubes (each has a unique symbol; see image below)



- iPad (or phone) with Cozmo App
- Cardboard and tape/hot glue for maze
- Google Home Mini (for AI immersion)

1 robot, 3 cubes, and 1 iPad for every 2 students

Setup

- **Remember to charge the robots before each class.** This should take no more than 30 minutes. When Cozmo is charged, the three LED bars on its back will be green and solid.

- If a student has not downloaded the app, it can be found in the App Store by searching Anki or Cozmo.



Cozmo

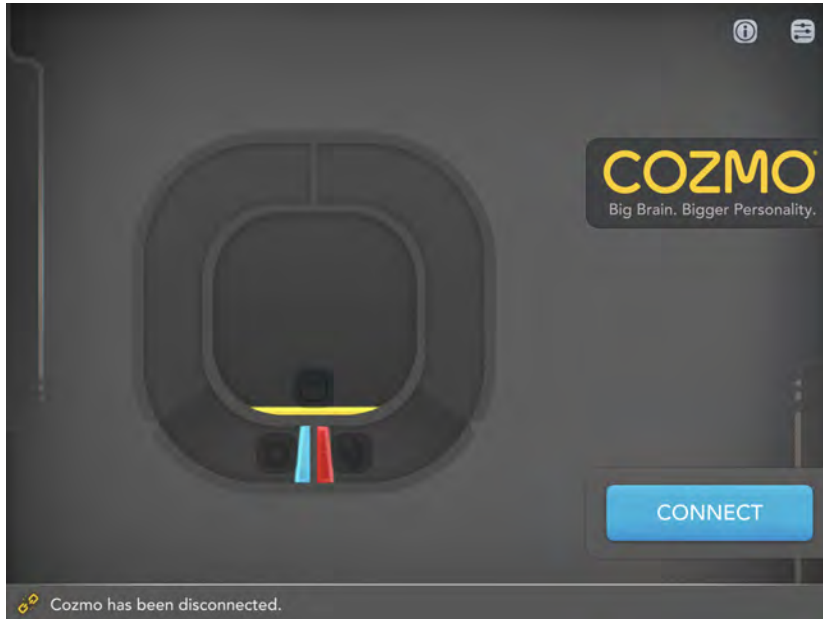
- Connect to Cozmo through WiFi (Go to Settings from the Home Screen)
- Find the Cozmo name in the list of WiFi access points and select it (your Cozmo name will be different)



- Lift and lower the arms of Cozmo to show the name of the Cozmo and password on the screen



- Verify that the names match and enter in the password
- You can now open the app and press Connect



Lesson Plan

Part 1: Introduction (~15 minutes)

- Start class by introducing the concept of robotics. Ask class: Who knows what a robot is? How do you feel about robots? What can robots do?
- Show a couple of short videos showing different robots in action

Suggestions:

1.) A robot performs eye surgery

(<https://www.youtube.com/watch?v=ldA92qpFsJ8>)

2.) Bina48 Robot

(<https://www.youtube.com/watch?v=4bqZp9TPYVk>)

3.) Robotic fish

(https://www.youtube.com/watch?v=BSA_zb1ajes)

4.) Robots helping each other

(<https://www.youtube.com/watch?v=fUyU3Ikzoio>)

- Introduce Cozmo to the students (talk about different features or show short video from website)
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Part 2: Exploration (~20 minutes)

- Make sure each iPad has the Cozmo app and is connected to Cozmo through WiFi (see “setup”)



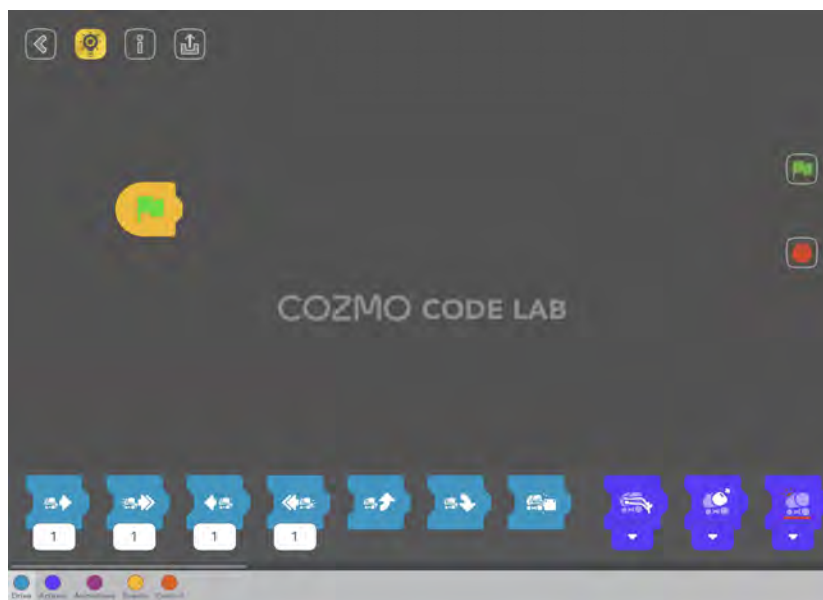
- Instruct the students to open the app and set up Cozmo (**Tune Up** and **Feed**). They can follow the instructions on the screen. Next, the students should play at least two games with Cozmo (**Play**)
 - Next, have the students instruct Cozmo to say their name when it sees their face (Go to **Discover** and then **Meet Cozmo**)
-

- Instruct the students to observe Cozmo for three minutes and make note of all the actions it does. Discuss students' observations as a group

Part 3: Coding (~30-45 minutes)

- Instruct the students to go to Sandbox Mode by selecting **Discover, Code Lab, Sandbox Mode**, and **New Sandbox Project**. Demo the Sandbox Mode by dragging one of the motion blocks into the play area, connecting it to the green flag block, and pressing the green flag button. Explain how the blocks are processed by the robot from left to right, starting with the first block after the green flag. Also, explain the block grouping (i.e., Drive, Actions, Animations, Events, and Control).

Block Groups	Tasks
Drive	Move Cozmo in various directions and speeds
Actions	Move Cozmo's head or arms, control the LED backpack, or make Cozmo speak
Animations	Program Cozmo to show various emotions
Events	Help Cozmo detect his surroundings including people or cubes
Control	Programming methods such as repeat, forever, and if statements



- Instruct the students to complete the following tasks using Sandbox Mode:
(*Note: for each task, give hints regarding the color of the blocks the students will need. Also, pressing and holding a motion block will reveal its function.)

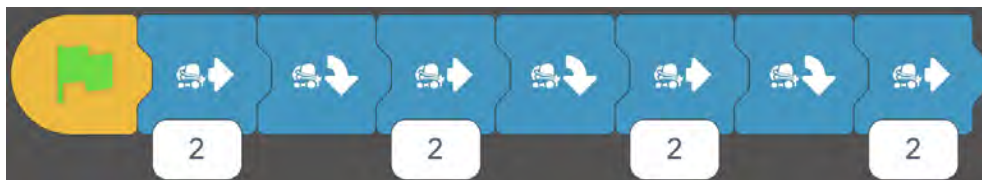
Task #1: When the green flag is tapped, drive Comzo 4 spaces and then sneeze. (*Note: To make Cozmo move 4 spaces, tap the number 1 attached to the motion block and enter 4 on the number pad.)

Solution



Task #2: When the green flag is tapped, move Cozmo in a square.

Solution



Task #3: Repeat Task #2 using fewer blocks. Give the students a hint by telling them to use a control block.

Solution



Task #4: Have Cozmo respond with a happy emotion and say "I see you" if it sees a person.

Solution



Task #5: Have Cozmo find a cube, drive to it, pick it up, and drive backwards three spaces.

Solution

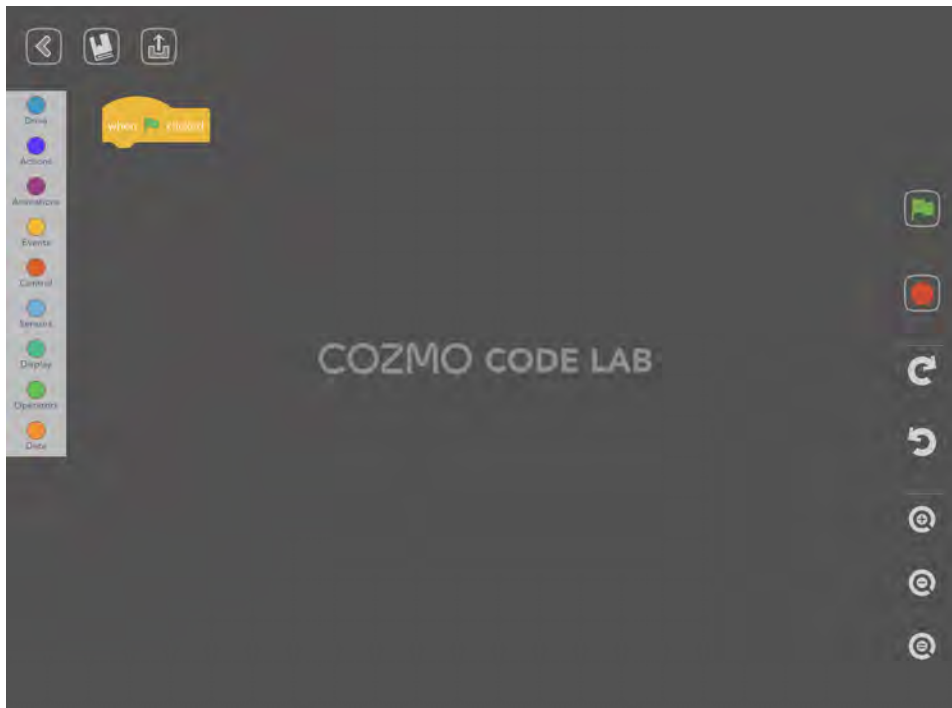


- Assess the students' ability to complete the tasks by checking off each box on the task list or having the students submit a video of Cozmo completing each task.

Part 4: Advanced Coding (~45 minutes -1 hour)

- Instruct the students to go to Constructor Mode by selecting **Discover, Code Lab, Constructor Mode**, and **New Constructor Project**. Demo the Constructor Mode by dragging one of the motion blocks into the play area and pressing the green button. Explain how the blocks are processed by the robot from top to bottom, starting with the first block after the green flag. Also, explain the extra block groupings (i.e., Sensors, Display, Operators).

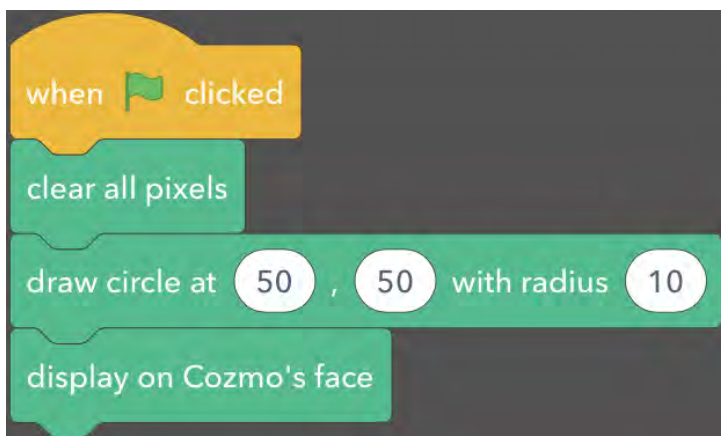
Block Groups	Tasks
Sensors	Replaces Actions group. Determine Cozmo's and cubes' orientation. Also control facial recognition.
Display	Display shapes and text on Cozmo's screen
Operators	Mathematical and logic commands



- Instruct the student groups to complete the following tasks using Constructor Mode:

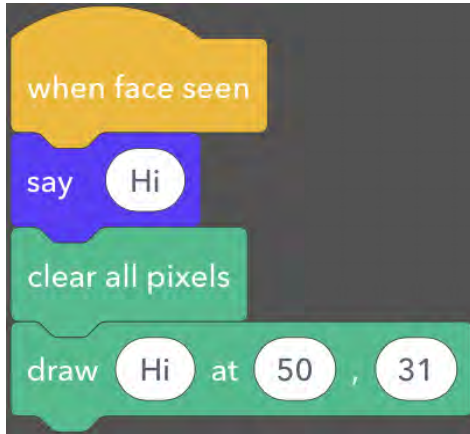
Task #1: When the green flag is tapped, a circle with a radius of 10 will appear on Cozmo's face at coordinate x:50,y:50.

Solution



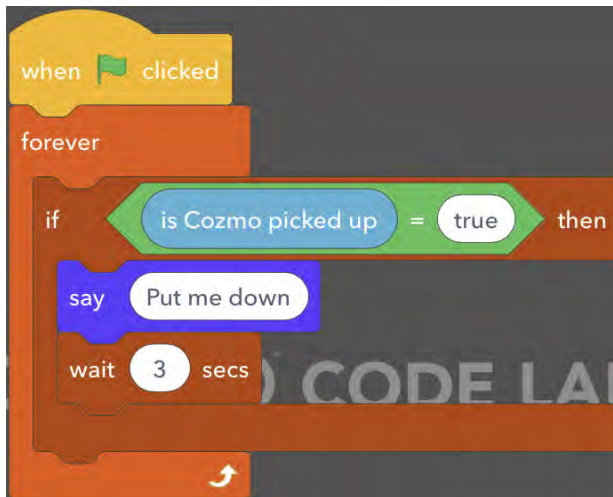
Task #2: When Cozmo sees a face, he will say “hi” and the word “hi” will appear on Cozmo's face at coordinate x:50, y:31.

Solution



Task #3: Anytime Cozmo is picked up, he becomes frustrated and says “Put me down!”, and then waits 3 seconds.

Solution

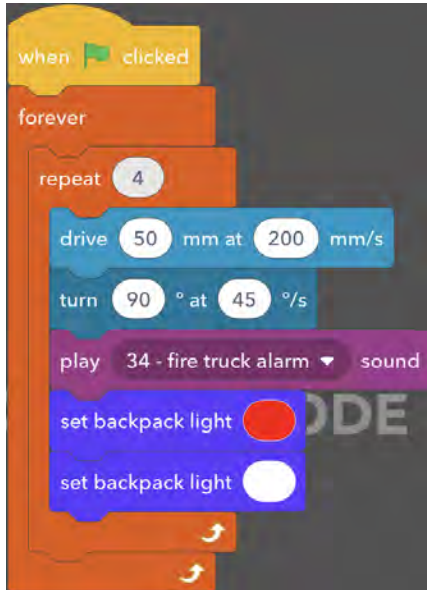


Task #4: When the green flag is tapped, Cozmo repeatedly does the following at the same time:

- a) drives fast in a square,
- b) plays the fire truck alarm, and

c) the backpack switches between red and white

Solution



- Assess the students' ability to complete the tasks by checking off each box on the task list or having the students submit a video of Cozmo completing each task.

Part 5: Challenges (~3-5 days)

Challenge #1: Instruct the students to create a maze and then go to **Discover, Explorer Mode** to drive Cozmo through the maze, pick up the cube, return to the starting point (via the maze) and drop the cube. Fastest time wins!

Example:



Challenge #2: Instruct the students to design and program a game someone can play with Cozmo. First, have the students go to **Discover, Code Lab**, pick a game, then select **See Inside**. Then, have the students write down how the game works. Next, have the students start creating their game by writing all the tasks and rules to their game, and then translating those tasks into code.

Part 6: Artificial Intelligence Immersion (~1-2 hours)

- Play the State of AI video (<https://www.youtube.com/watch?v=5J5bDQHQR1g>). Discuss students' reactions and ask them to make predictions on how AI will affect society in the future.
- Instruct the students to do the following activities:
 - On your laptop, go to <https://experiments.withgoogle.com/ai> and pick two AI experiments to experience (Choices: AutoDraw, Quick Draw, The Infinite Drum Machine, Handwriting with a neural net, and Teachable Machine)
 - Go to <https://lyrebird.ai/>, sign up for an account (create a generic account for students who don't have email addresses) and create a digital voice using one minute of audio.
 - Ask Siri (on the iPad) and Google Home Mini ("OK Google"), the same three questions. Examples include "Where is the nearest Mexican restaurant?", "What is the weather today?", "What is the meaning of

life?”. More examples of questions can be found here:

<https://pwk.republicwireless.com/ok-google-how-do-you-work/>

- Bonus #1: Try to see how long you can hold a conversation with Siri.
- Bonus #2: Ask Google Home the following question: “OK Google, what do you think of Siri?”
- Go to <https://www.captionbot.ai/> and upload a photo. Take a photo now if you don’t have one. Make note of the caption for the photo that is created.
- After the students have completed all the activities, engage in a group discussion to ask them about their experience. Which two AI experiments did you play? What was the experience like? What was your experience with creating a digital voice like? What sentence did you have the voice say? How realistic is it? What questions did you ask the assistants? How were the responses similar or different? How accurate was the caption created from CaptionBot? What types of problems can be solved with AI? What industries can greatly benefit from AI (e.g., education, entertainment, health, sports, etc.)?

Links to initiatives from The Spur 2017

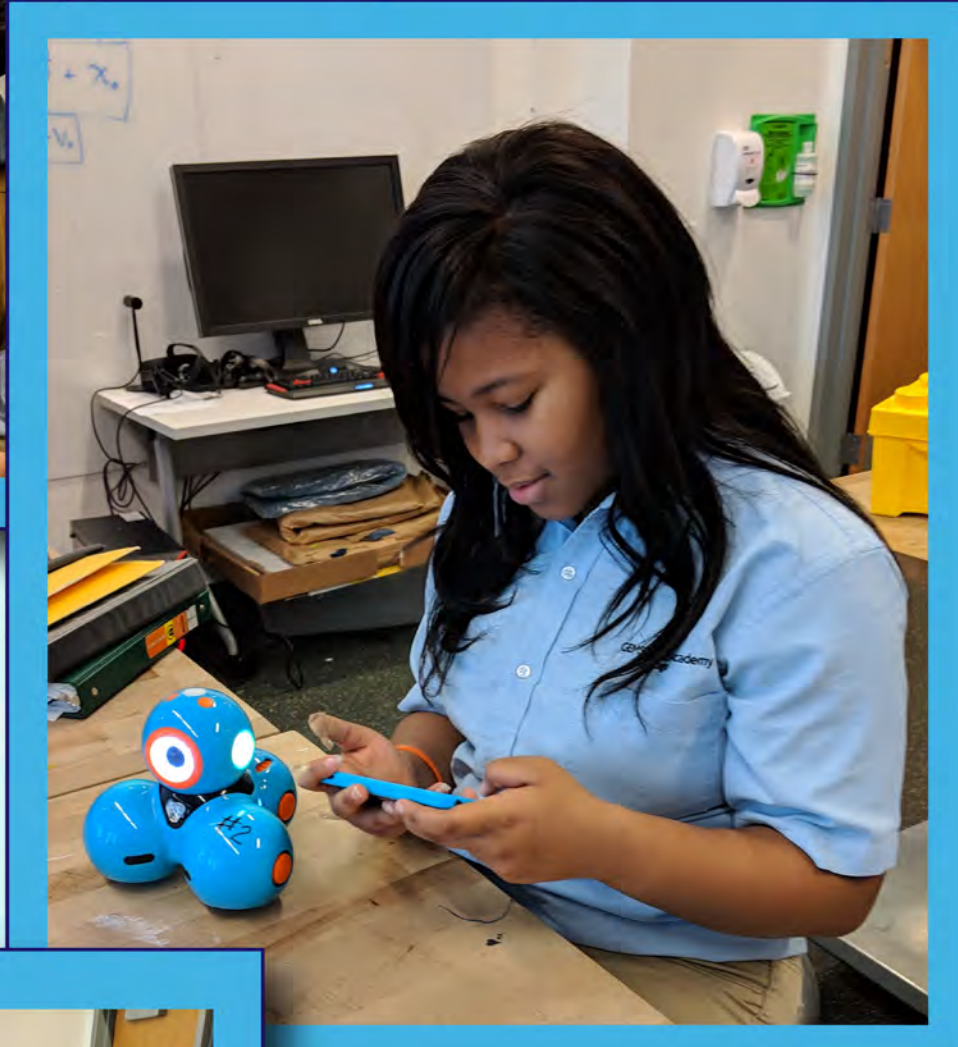
Tech Speaker Series
i-Kids

**Poster from GEMS World Academy showcasing
innovation initiatives
2019**

Design and Innovation

GEMS
World Academy
CHICAGO

Future Tech Immersion



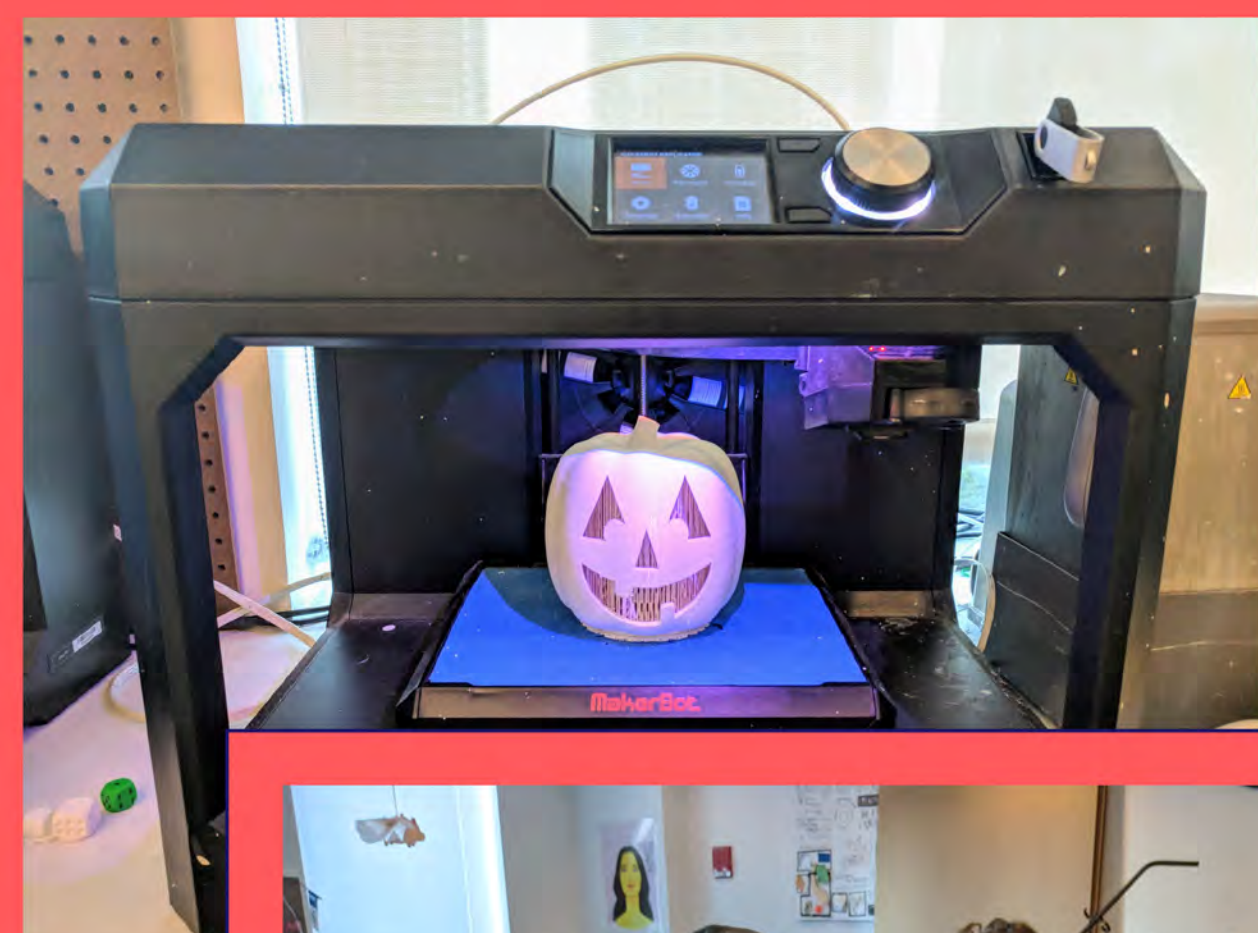
Students explore technologies such as virtual reality, artificial intelligence, microcomputers, and robots while reflecting on their impact on society.

Local and National Field Studies



Students visit design and innovation companies to make connections between what they learn in the classroom and how it is used in a real-world setting.

Product Design and Media Labs



Students use state of the art equipment and software to create new products and media. They also participate in gaming competitions and livestreaming on Twitch.

Esports



GEMS
ESPORTS