***CIS STEAM CAMP***

**Developing Creative Learning Skills with Scratch and Makey Makey**

**Goal:**

The goal of the Scratch sessions during the CIS CAMP are to build participants' interest and confidence in creating and coding their own projects using the Scratch coding environment. We are designing a series of experiences to gain comfort with exploring, problem-solving, and expressing their ideas creatively with coding. In addition, these activities give the students experience connecting their projects to the physical world using the Makey Makey to increase engagement, learning, and collaboration.

The sessions make use of Scratch support materials for students and educators that are available through <http://scratch.mit.edu/go>. ([bit.ly/scratchcamp](http://bit.ly/scratchcamp))

Here is the progression of four learning experiences with Scratch:

**Day 1: Make Music:** For the first day, they will begin experimenting with creating interactive sound and music projects using Scratch. This introduces basic coding ideas such as sequences and loops, as well as animation and interactivity. This activity makes use of supporting resources, including: an introductory video, an online tutorial, coding cards, and an educator guide.

Agenda: Use the one-hour schedule detailed in Make Music Educator guide: <http://scratch.mit.edu/music/guide>

The guide includes a link to the Make Music introductory video to show at the beginning. It also points to the the support materials for students to use during session:

* Music cards (will be available in print form) - <http://scratch.mit.edu/music/cards>
* Music online tutorial (the same ideas online) - <http://scratch.mit.edu/music/>

***Day 1 Agenda***

**Imagine**: 10 minutes - Introduce the activity and video

**Create**: 40 minutes - Pairs of students work together using the cards and/or online tutorial. For each pair, have one student act as director and the other as coder, then let them know to switch roles part way through to make sure each gets a chance to do both.

During the session, give student accounts to participants

**Share** 10minutes:Students share their projects with each other and online.

**Day 2: "Make It Fly" Projects**: Participants will learn to make an interactive flying animation project, which can be adapted into a game. This project introduces ideas about using conditionals, coordinates, and variables. This project is based on an existing video, tutorial, cards, and educator guide. We have seen young people inspired to create a wide variety of projects using these resources.

Agenda: Use one-hour schedule detailed in Make It Fly Educator guide:

<http://scratch.mit.edu/fly/guide>

The guide includes a link to the "Make It Fly" introductory video to show at the beginning (available through the tutorial page <http://scratch.mit.edu/fly/> and <http://vimeo.com/llk/fly> )

Support materials for students to use during session:

* Make It Fly cards (will be available in print form) - <http://scratch.mit.edu/fly/cards>
* Make It Fly online tutorial - <http://scratch.mit.edu/fly/>

***Day 2 Agenda***

**Imagine**: 10 minutes - Introduce the activity and video

**Create**: 40 minutes - Pairs of students work together using the cards and/or online tutorial

**Share 10:** Students share their projects with each other and online.

**Day 3: Adding Physical World Connections with Makey Makey**

On the fourth day participants will learn how to connect their musical projects to the physical world using the Makey Makey. They will experience ways to create a physical circuit and experiment with conductive materials to trigger keys using the Makey Makey connected to Scratch. They will then hook up the Makey Makey to their projects to make them respond to physical input.

***Day 3 Agenda:***

**Imagine (Introduce and inspire) - 10 Minutes**

* Show Makey Makey overview video: on <http://makeymakey.com> (first 1:25 minutes):
* (Option: show Makey Makey video of musical projects: <https://youtu.be/wkPt9MYqDW0>)
* Introduce Makey Makey using piano demo: <http://scratch.mit.edu/makeypiano>
* Also can demo with beatbox project: <https://scratch.mit.edu/projects/106102276/>
* [**Demo from Saturday.**](https://scratch.mit.edu/projects/170014249/)

**Create** - **40 minutes**

* Students work in pairs to add Makey Makey to their music projects
* Use materials to make interface to their projects

**Share** - **10 minutes** - Students share what they've worked on neighboring group

**Day 4: Making a Physical Controller for their Make It Fly Projects**

On the fourth day participants will build on their experience from the previous days to create a physical controller for their Make It Fly projects. They will consider which keys they want to use to interact with their project. They will then design and build a physical controller, such as making arrow keys out of aluminum or other conductive objects. They will then hook up the Makey Makey to their projects to make them respond to physical input.

***Day 4 Agenda:***

**Imagine (Introduce and inspire) - 10 Minutes**

* Show examples of physical game controllers with Makey Makey
* Can show this video for example (<https://youtu.be/0UGnBeCVGD4>) as well as physical examples in the room

**Create** - **40 minutes**

* Students work in pairs to add Makey Makey to their Make It Fly projects
* Use materials to make a controller

**Share** - **10 minutes** - Students share what they've worked on online and with neighboring group

Giving students the opportunity and confidence to create projects with Scratch and Makey Makey will be an ideal pathway into designing and building their own projects on the theme of energy.

These sessions and resources are designed to be appropriate the younger participants who are starting learning to code, as well as for older or more experienced students to extend and complexify their projects. We have found that students in the same age group vary greatly in experience and confidence in learning coding and problem solving.

**Teacher Professional Development**

We have designed the sessions to make it accessible for participating educators, including basing the modules on existing resources available free of charge, designed for use with a wide range of age levels, and designed to make it appropriate for educators with little or no experience with coding as well as extensible for those who do.

We plan to first introduce the idea of using Scratch to support creative learning, and to briefly explain how Scratch can support problem solving and collaborative learning across the curriculum. We will share with them the learning resources that we'll be using.

Before the camp starts, we would like to give educators the opportunity and encouragement to try using the Scratch coding cards to create a project, so they can gain some comfort and familiarity with the resources that are available to support students, and to better understand how these resources can make it easy to learn to code a wide range of projects. Most importantly, we would like to provide facilitation tips that encourage young people to learn Scratch through exploration and experimentation, as we find this process is what empowers and motivates young people to come up with ideas and to persist in problem solving when they encounter difficulties.

If possible, we recommend in the second week helping the educators reflect on how they might use these resources to support their students creating interactive projects. We also would suggest providing breakout sessions for educators throughout the second week for those interested in gaining more experience supporting student learning with Scratch and Makey Makey.