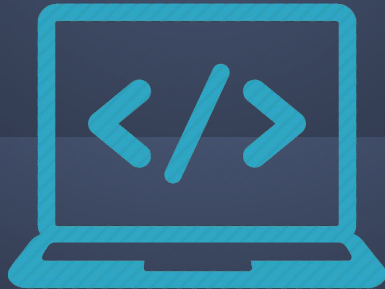


Coding & STEM K-5

Larry Fallon



Coders in action



Year 1 - 2014-15

Coders in action



Year 2 - 2015-16

What are the thought leaders saying

From

<http://www.edutopia.org/blog/add-coding-elementary-curriculum-now-matt-harrell>

“...while "cool" is nice, what really matters are the lasting benefits of building these skill sets:

- Logical thinking
- Problem solving
- Persistence
- Collaboration
- Communication.”

What is ISTE saying...

Pro & Con Presentation

Source: <https://www.iste.org/explore/articledetail?articleid=216>

From the **Pro** side:

“The rationale to teach CS to K-5 students goes well beyond career development. For kids just entering school, teaching CS is about giving them the thinking skills that will help them become proactive learners and citizens — as opposed to just consumers and denizens — in a world that’s increasingly influenced by the manipulation of the digital bit.”

What is ISTE saying... (cont)

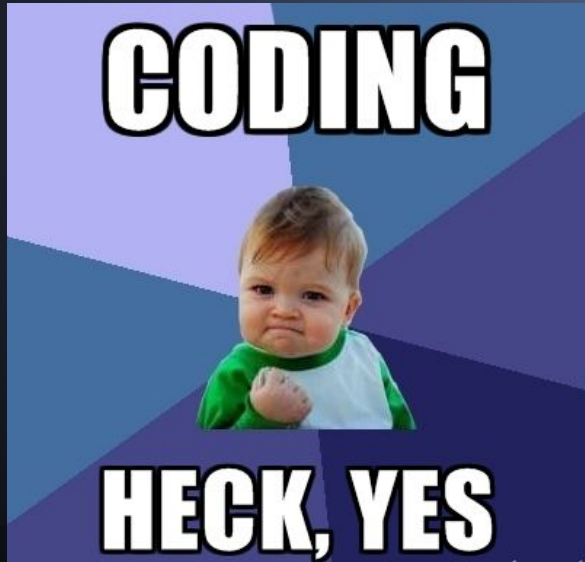
From the **Con** side:

“I agree that learning how to use many productivity, editing, collaborating, communicating and coding tools would be valuable across the curriculum. But early elementary students’ primary needs are literacy and numeracy. For middle elementary, introduction to other skills — particularly coding and other engineering applications — is age appropriate, but anything above introductory instruction goes beyond the *limits of the time we have*.”

So the only challenge is: How can we make time or integrate it with other required content?

Decisive Point

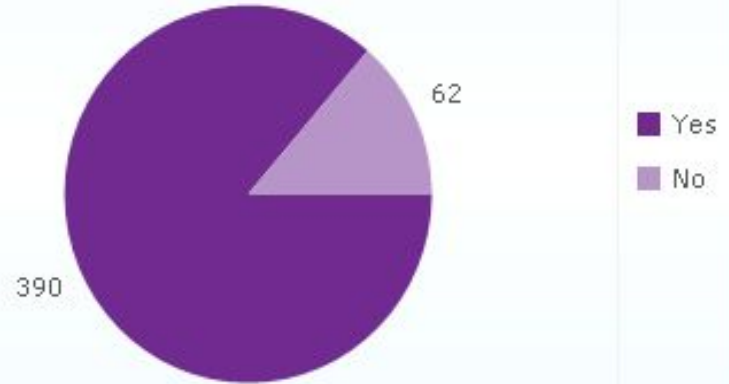
Poll numbers from
respondents.....



Readers Respond

Here's what other
ISTE members had to
say:

Should we teach computer science
in elementary school?



We have heard it many times...

Let's start with the Why

As discussed in Austin Buffin's PLC for RTI, "How do we teach our students knowledge that we've not yet discovered? ...they need to be able to analyze, synthesize, evaluate, compare and contrast, and manipulate and apply information. We will erode our children's and world's future by limiting our vision to teaching only the skills and knowledge presented in our state assessments."

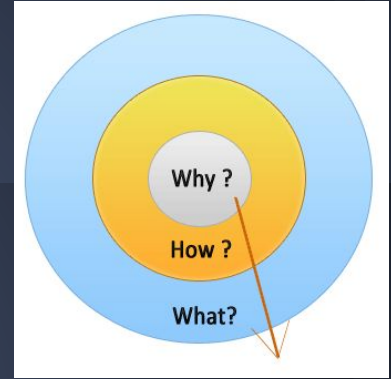
CODING

fosters and develops these higher cognitive skills.

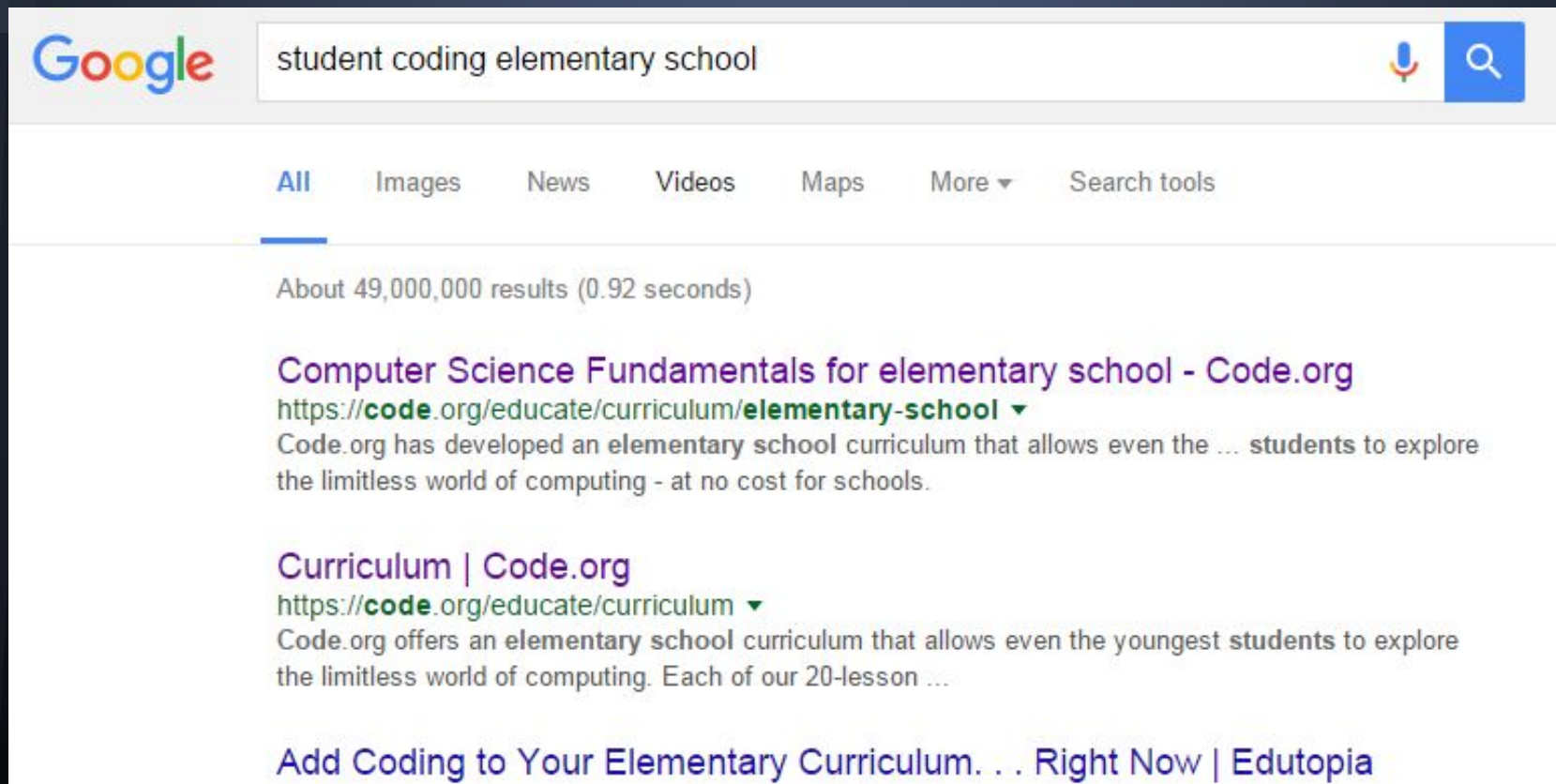
How to Start...

Edutopia offered a few steps to start coding now:

1. **Get connected!** Network online and offline.
2. **Don't worry about 1:1.** Pair students to collaborate. Work on offline activities.
3. **Trust the kids!** Allow students to become the drivers.
4. **Don't go at it alone.** Get volunteers, involve parents.
5. **Make it fun!** Choose age appropriate resources.



Links to get started 49 million



The image is a screenshot of a Google search results page. At the top, the Google logo is on the left, and a search bar contains the text 'student coding elementary school'. To the right of the search bar are icons for voice search and a magnifying glass. Below the search bar, there are tabs for 'All', 'Images', 'News', 'Videos', 'Maps', 'More', and 'Search tools'. The 'All' tab is selected and underlined. Below the tabs, the search results are displayed. The first result is 'Computer Science Fundamentals for elementary school - Code.org' with a URL 'https://code.org/educate/curriculum/elementary-school'. The second result is 'Curriculum | Code.org' with a URL 'https://code.org/educate/curriculum'. The third result is 'Add Coding to Your Elementary Curriculum. . . Right Now | Edutopia'.

Google

student coding elementary school

All Images News Videos Maps More Search tools

About 49,000,000 results (0.92 seconds)

Computer Science Fundamentals for elementary school - Code.org
<https://code.org/educate/curriculum/elementary-school> ▼
Code.org has developed an elementary school curriculum that allows even the ... students to explore the limitless world of computing - at no cost for schools.

Curriculum | Code.org
<https://code.org/educate/curriculum> ▼
Code.org offers an elementary school curriculum that allows even the youngest students to explore the limitless world of computing. Each of our 20-lesson ...

Add Coding to Your Elementary Curriculum. . . Right Now | Edutopia

Code.org

Code Studio

Course 2

Level 3

C O
D E
STUDIO

Stage 3: Maze: Sequence

6

MORE



Run

Step



Guide me to the green evilness! (Watch out for TNT)

English

Copyright | More

Blocks

Workspace: 12 / 12 blocks

move forward

turn left 90°

turn right 90°

when run

move forward

move forward

turn left 90°

move forward

move forward

turn right 90°

move forward

move forward

turn right 90°

move forward

move forward

<http://studio.code.org/sections/IXVQHL>

Login using these credentials and learn to code

Name = admin1 Secret Word please true	Name = admin2 Secret Word during below	Name = admin3 Secret Word leave earth	Name = admin4 Secret Word seen might
Name = admin5 Secret Word fell section	Name = admin6 Secret Word make pattern	Name = admin7 Secret Word sell shop	Name = admin8 Secret Word stone around
	Name = admin9 Secret Word bright stay	Name = admin10 Secret Word rise laughed	

The Alice interface and scaffolding

- Code.org provides an environment and characters that the coder must move through a given environment towards a goal. **Alice takes the next step.**
- In Alice, coders choose an environment, add objects within that environment, and choose characters to move through while manipulating light, viewpoint, actions, and adding interactions.

Meet Alice



(the coding
language)



Instructional Materials Home Page

Course
Materials

How To
Guide

Video
Tutorials

FBI / SOS

Permissions

Alice Home



Alice 3.x (c) 2008 - 2015 Carnegie Mellon
University. All rights reserved.

Description

About the Alice 3 Instructional Materials

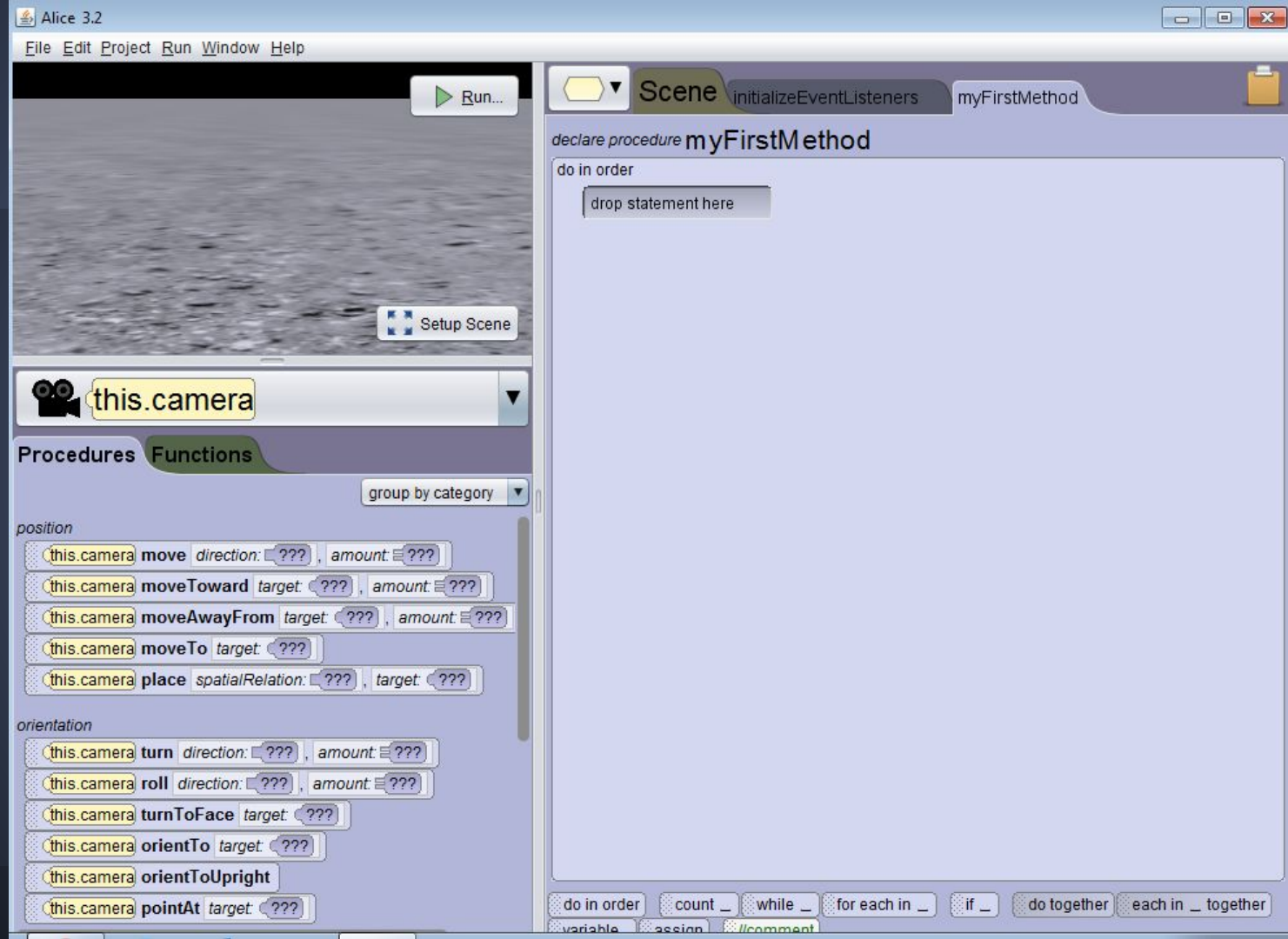
Welcome to the home repository of Alice 3 instructional materials. Here you will find links to the Alice 3 *How To Guide*, tutorial videos, and course materials including lecture notes, and assignments.

Some of these materials have been developed with support from the National Science Foundation *NSF ATE #090327*.

Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation

We are grateful for the financial support of our sponsors, including Oracle, Sun Microsystems, Darpa, Intel, Microsoft, NSF, and QNR.

Alice 3.2



Student worlds in Alice



World development - Stories

Alice 3.2 C:\Users\larry.fallon\Documents\StudentAlicefiles\ilaya 2016.a3p *

File Edit Project Run Window Help

this

this.groceries

this.camera

this.ancientTemplePiece

this.ancientTemplePiece2

this.ancientTemplePiece3

this.ancientTemplePiece4

this.hotTub

this.castleWall5

this.castleWall6

this.castleWall7

this.castleWall8

this.adultPerson1

this.adultPerson2

this.childPerson1

this.toddlerPerson

this.castleGate

this.castleWall5

this.loveSeat

this.adultPerson3

Starting Camera View

Run...

handle style: DEFAULT ROT

☐ use snap ▶ Snap details

this.ancient

one shots ▼

▼ this.ancient Te

AncientTemplePiece and

Paint = ☐ WHITE

Opacity = 1.0

Vehicle = this

Position = (x: -4.99, y: 0

Width: 9.87

Edit Code

Browse Gallery By Class Hierarchy Browse Gallery By Theme Browse Gallery By Group Search Gallery Shapes/Text My Classes

all classes ▼

World development - Stories

Alice 3.2 C:\Users\larry.fallon\Documents\StudentAlicefiles\ilaya 2016.a3p *

File Edit Project Run Window Help

this Starting Camera View Run...

undo redo handle style: DEFAULT ROTAT use snap Snap details

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Paint = WHITE

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Position = (x: -4.99, y: 0.00

Width: 9.87

Edit Code

Browse Gallery By Class Hierarchy Browse Gallery By Theme Browse Gallery By Group Search Gallery Shapes/Text My Classes

all classes

Biped classes 39

Flyer classes 12

Prop classes 223

Quadruped classes 30

Swimmer classes 2

Transport classes 3

STEM

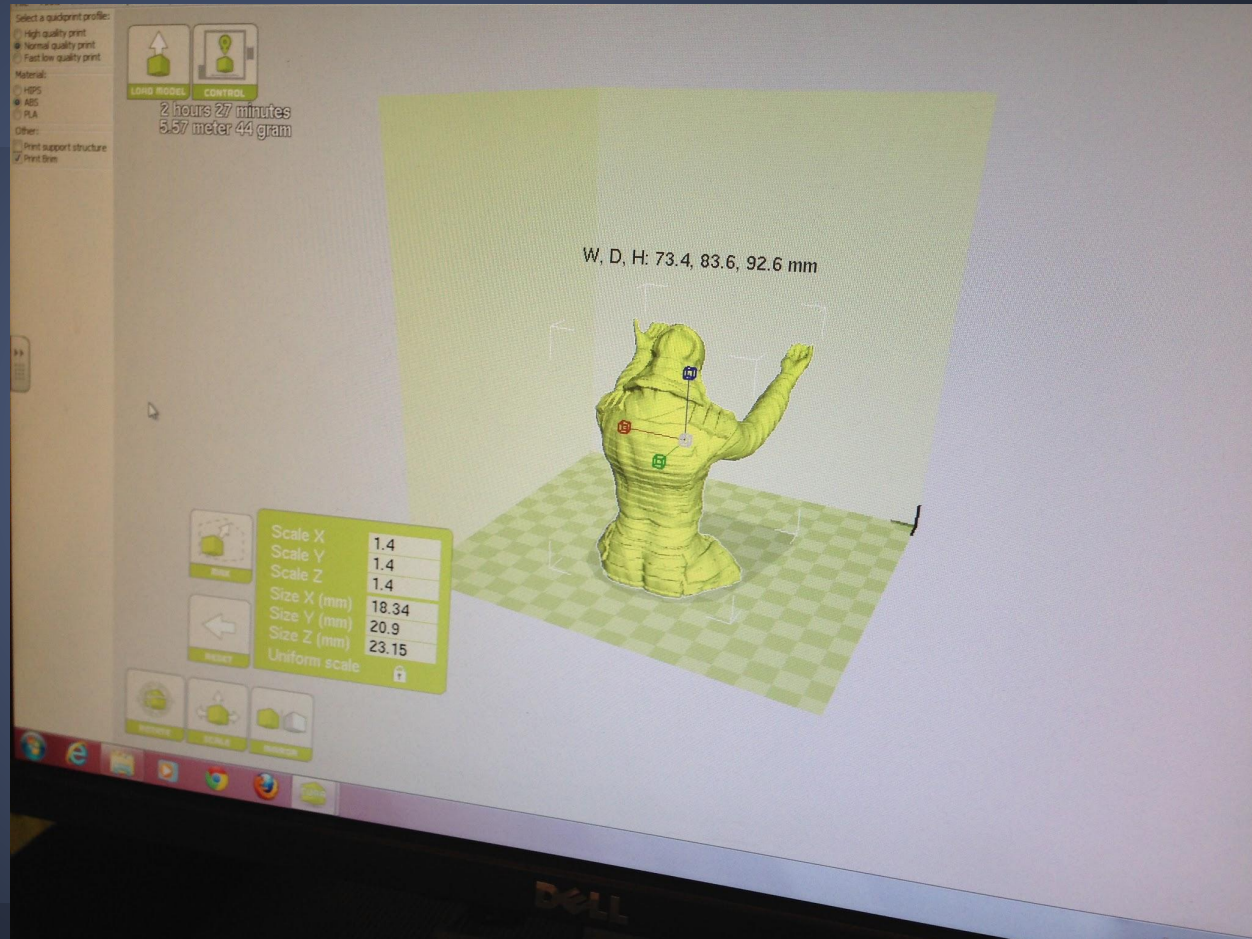
Science Technology Engineering Math

- 3D Printing - across all curriculum areas
- Robotics
- Raspberry Pi

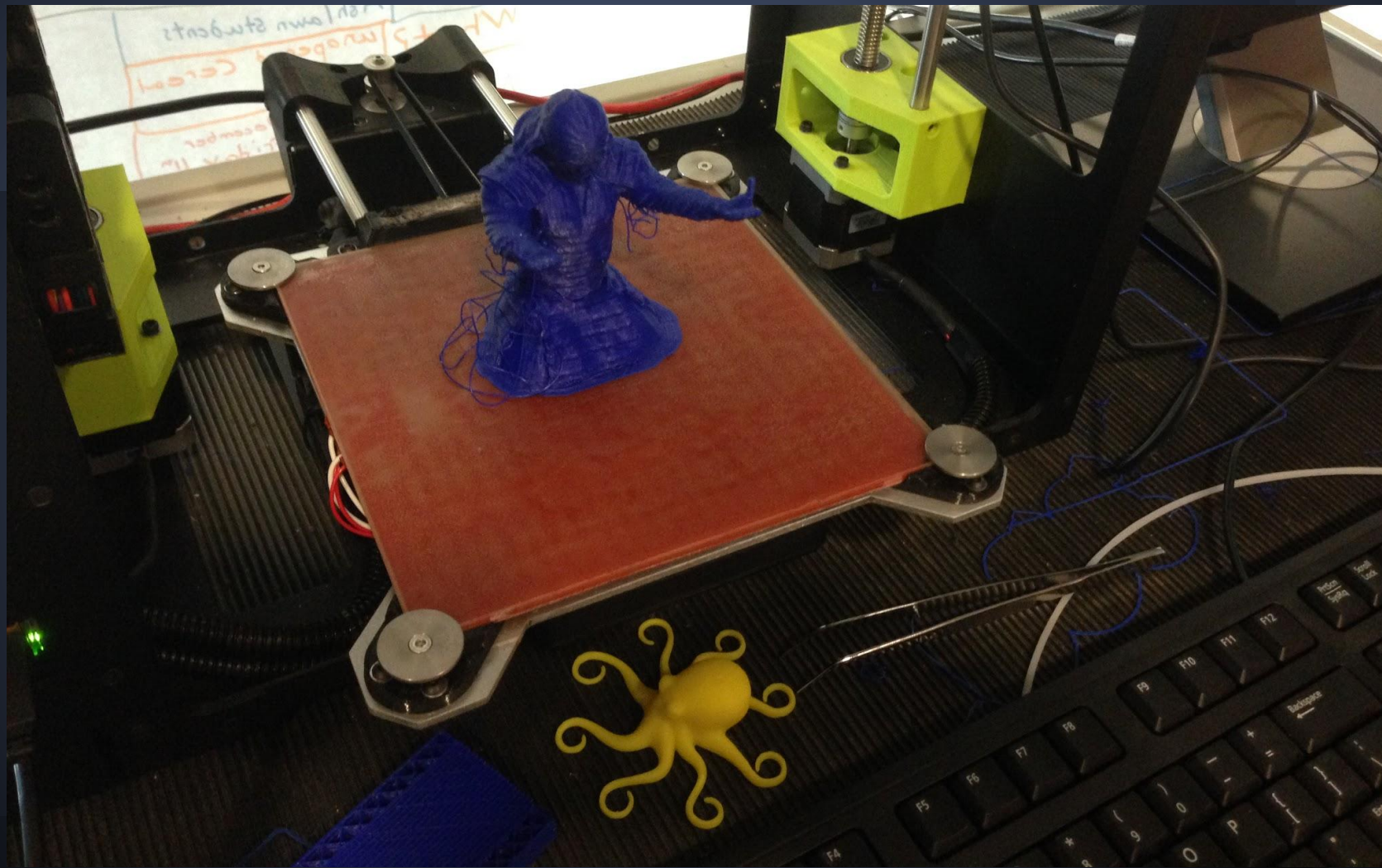
Rinse and Reiterate

3D Printer

See it in your mind -
model it on your
computer -
make it appear in your
hand



3D



3D Printer Raspberry Pi Mash-Up



Raspberry Pi

1st boot

<http://rasberrypi.org/booting-the-raspberry-pi-for-the-first-time/>

Projects (let me Google that for you)

<https://opensource.com/education/15/12/5-great-raspberry-pi-projects-classroom>

Parent comments

Hi Larry, I just wanted to say thank you so much for your amazing work with the kids -- Juliet has truly enjoyed her time with you and the group. She was delighted when the class transitioned from one afternoon a week to two, and she eagerly attended and looked forward to the next class - they were her best days of the week. From a technical perspective, the 3-D printing was a huge hit - I was really amazed by what you were able to do, and it made her feel like it was a truly cutting edge class (it made me feel that way too!). She also enjoyed the coding a lot and feels empowered to learn about coding or about new technologies - for example she is teaching herself Adobe Illustrator at home now and navigating an extremely complex piece of software. From a social perspective, it was so wonderful to have her feel like she had a group of female friends who all wanted to learn technology, be coders, and they could have fun learning together. They regularly talk about how they want to pursue technology careers, and they write birthday cards about algorithms and coding references in them. It has been a real gift to have this time to learn with you, and to be able to get into real depth that motivates her learning. Thank you so much!

Best wishes,

Justin

I second that opinion and to my gratitude for the capable teacher I will only add that witnessing Juliet's progress has inspired me to read -- and enjoy -- a book which I recently bought for her, called "Brave New Girls: Tales of Girls and Gadgets". Here is a brief summary:

"This collection of sci-fi stories features brainy young heroines who use their smarts to save the day. Girls who fix robots and construct superhero suits, hack interstellar corporations and build virtual reality platforms. Who experiment with alien chemicals and tinker with time machines. Who defy expectations and tap into their know-how—in the depths of space, or the bounds of dystopia, or the not-too-distant future—to solve despicable crimes, talk to extraterrestrials, and take down powerful villains. All revenues from sales of this anthology will be donated a scholarship fund through the Society of Women Engineers. Let's show the world that girls, too, can be tomorrow's inventors, programmers, scientists, and more."

<http://www.amazon.com/Brave-New-Girls-Tales-Gadgets/dp/1512325619>

Best wishes, -Mitko

Parent Comments

Larry,

Thank you so much. Zoe truly loved coding this year. It was often the high light of her week. I'm not always sure what she was working on, but each week she told me she was looking forward to it. Thank you also for letting her go on Thursdays when she couldn't make Tuesdays any longer.

Laurie

Dear Mr. Fallon:

Thank you for providing such an enriching opportunity for our daughter, Kathryn. Your coding group opened new avenues for her understanding of digital composition and communication.

Thank you very much,

Anne Michel and Win Boerckel

Thank you for participating!

Discussion - Questions - Comments

contact me at

larry.fallon@apsva.us

Links references

Reviewed links May 2016

<http://www.edutopia.org/blog/15-ways-teaching-students-coding-vicki-davis>

From code.org on the ES curriculum

<https://code.org/educate/curriculum/elementary-school>

At EdSurge a good getting started set of links

<https://www.edsurge.com/research/guides/teaching-kids-to-code>

South Fayette curriculum progression - good timeline infographic

<http://digitalpromise.org/2015/08/04/a-new-model-for-coding-in-schools/>

Ashlawn ES Web page links for coders

<http://apsva.us/Page/28470>