Coding in the K-8 Classroom

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Avondale Elementary School District

What’s the plan?

- Introduction
- How are we coding in Avondale?
  - Code.org
  - Scratch
  - Khan Academy
- How does it all work together?
- Some resources to get started
- Let’s talk

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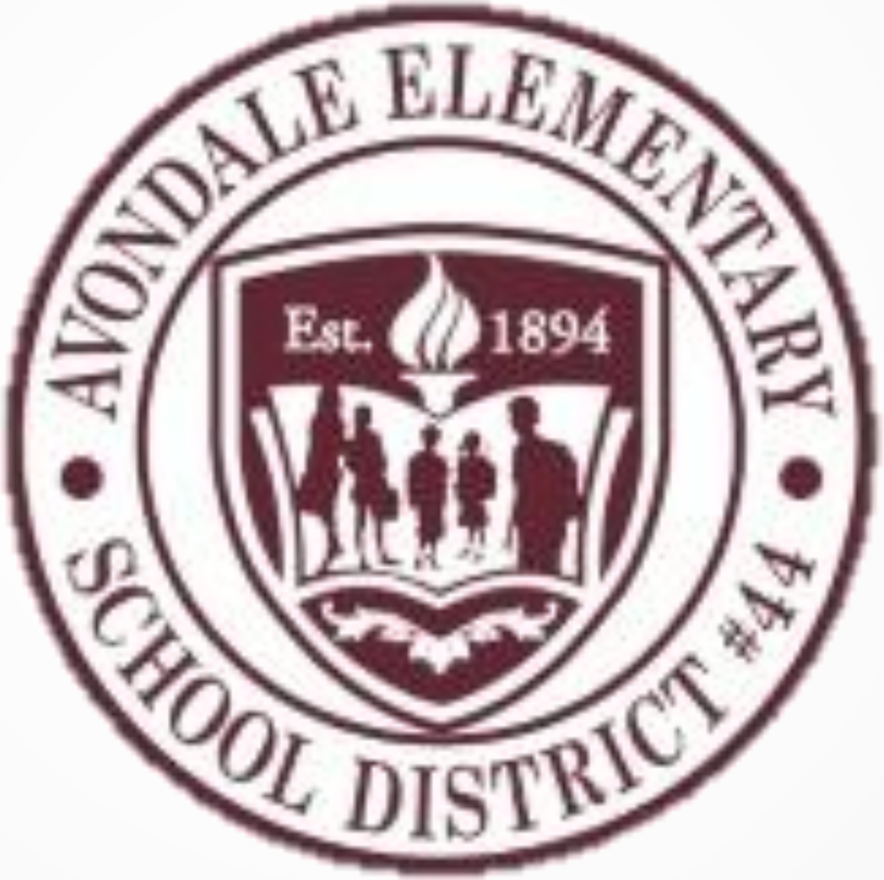
How to reach the resources

- www.JaredOLeary.com
  - Presentations
  - Coding in the K-8 classroom

Introduction

Our district’s coding vision



How are we coding in Avondale? Code.org

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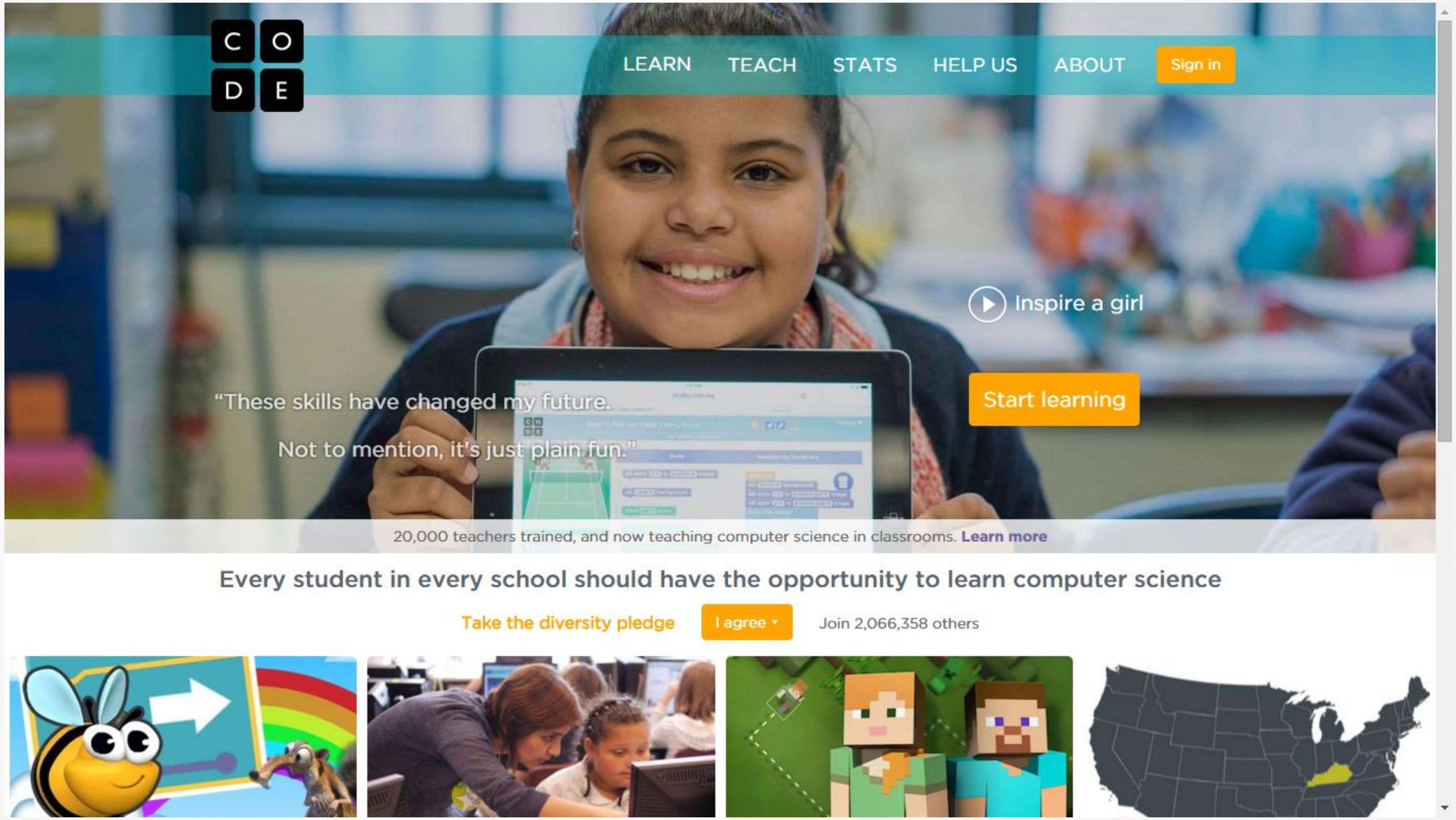
Coding through puzzles



"These skills have changed my future.

Not to mention, it's just plain fun."

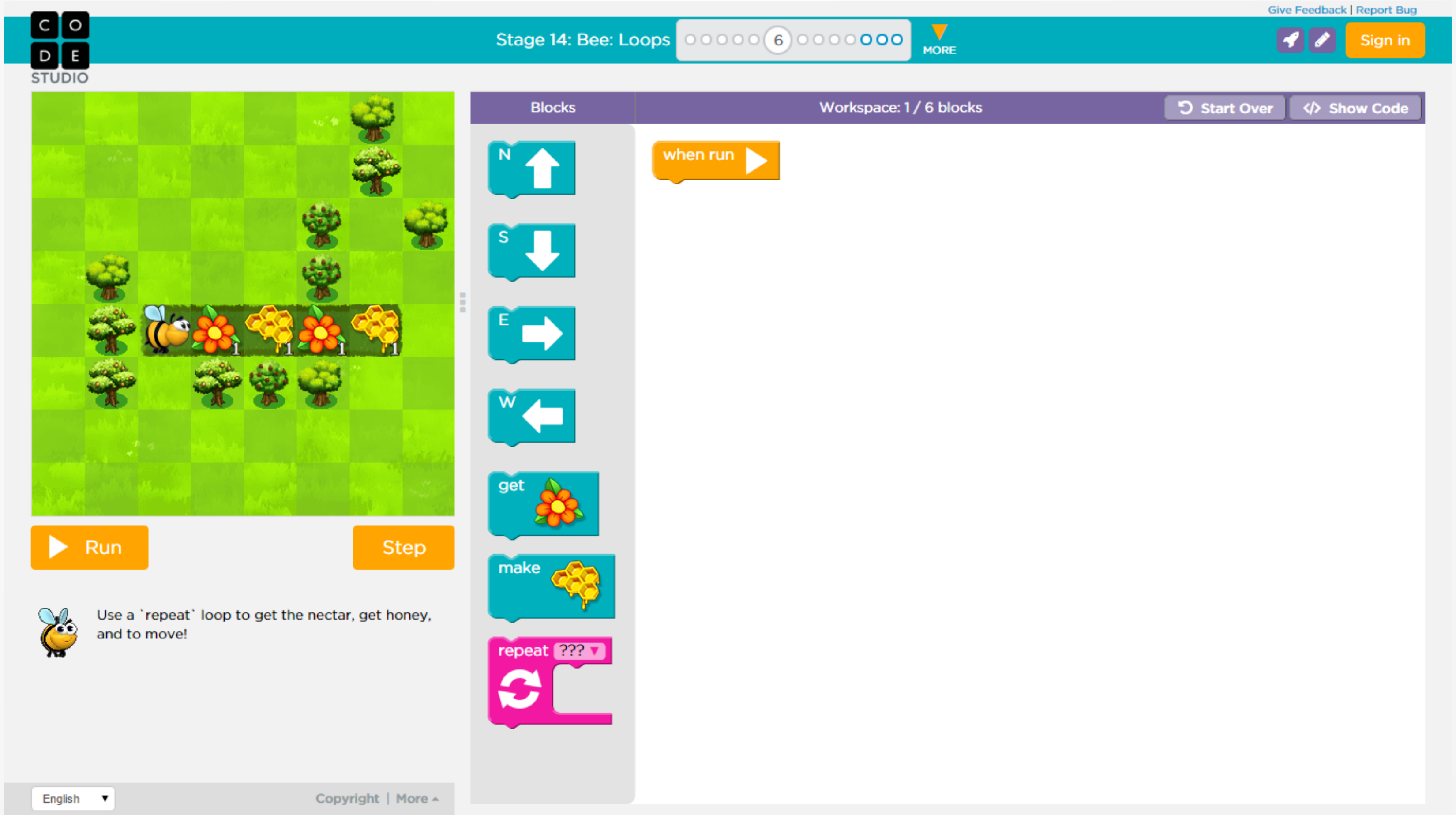
20,000 teachers trained, and now teaching computer science in classrooms. Learn more

Every student in every school should have the opportunity to learn computer science

Take the diversity pledge

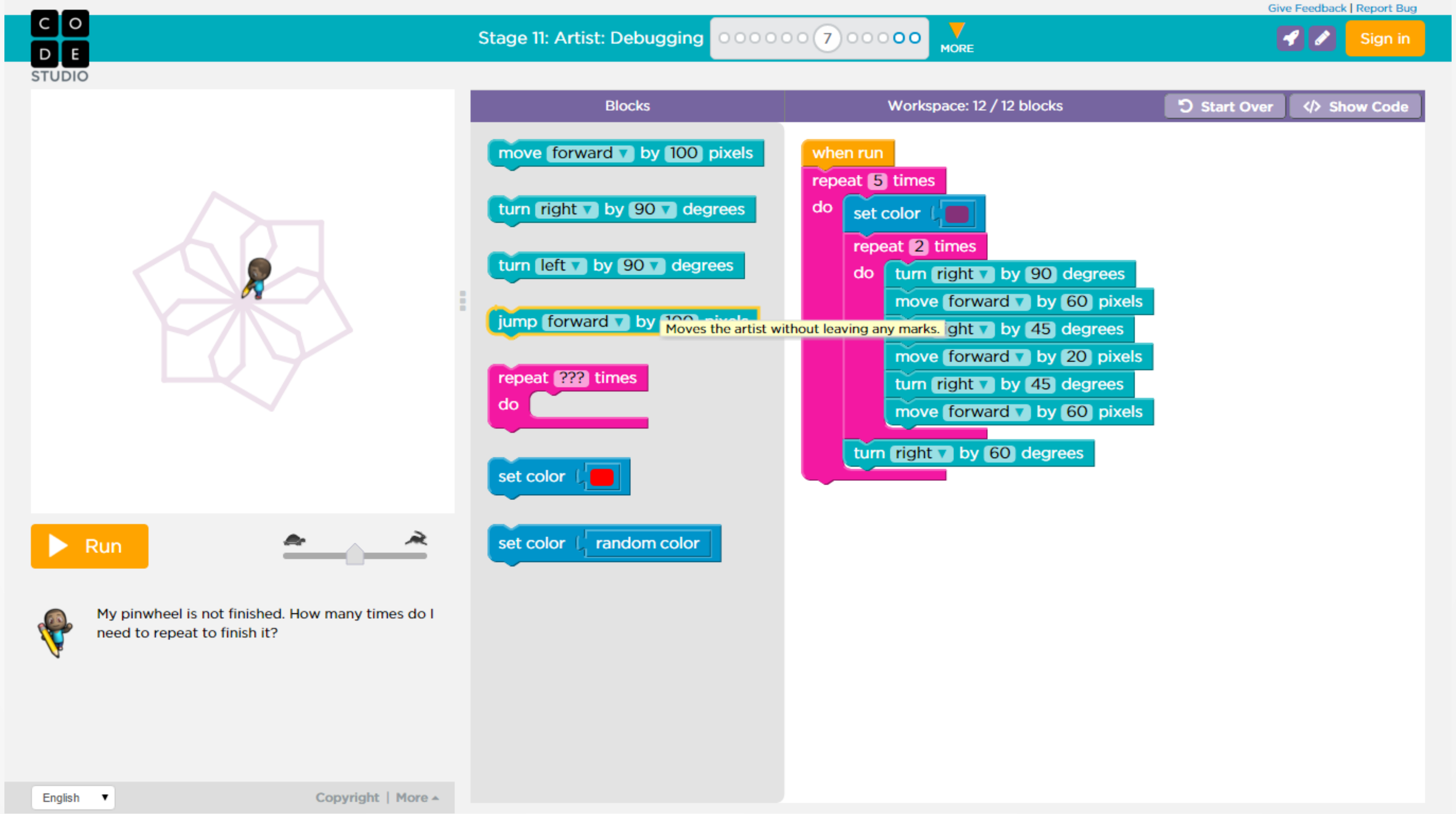
Join 2,066,358 others

Coding through puzzles



Use a `repeat` loop to get the nectar, get honey, and to move!

Coding through puzzles


Give Feedback | Report Bug
CODE STUDIO
Stage 11: Artist: Debugging
7
MORE
Sign in
Blocks
Workspace: 12 / 12 blocks
Start Over
Show Code
Run
English
Copyright | More

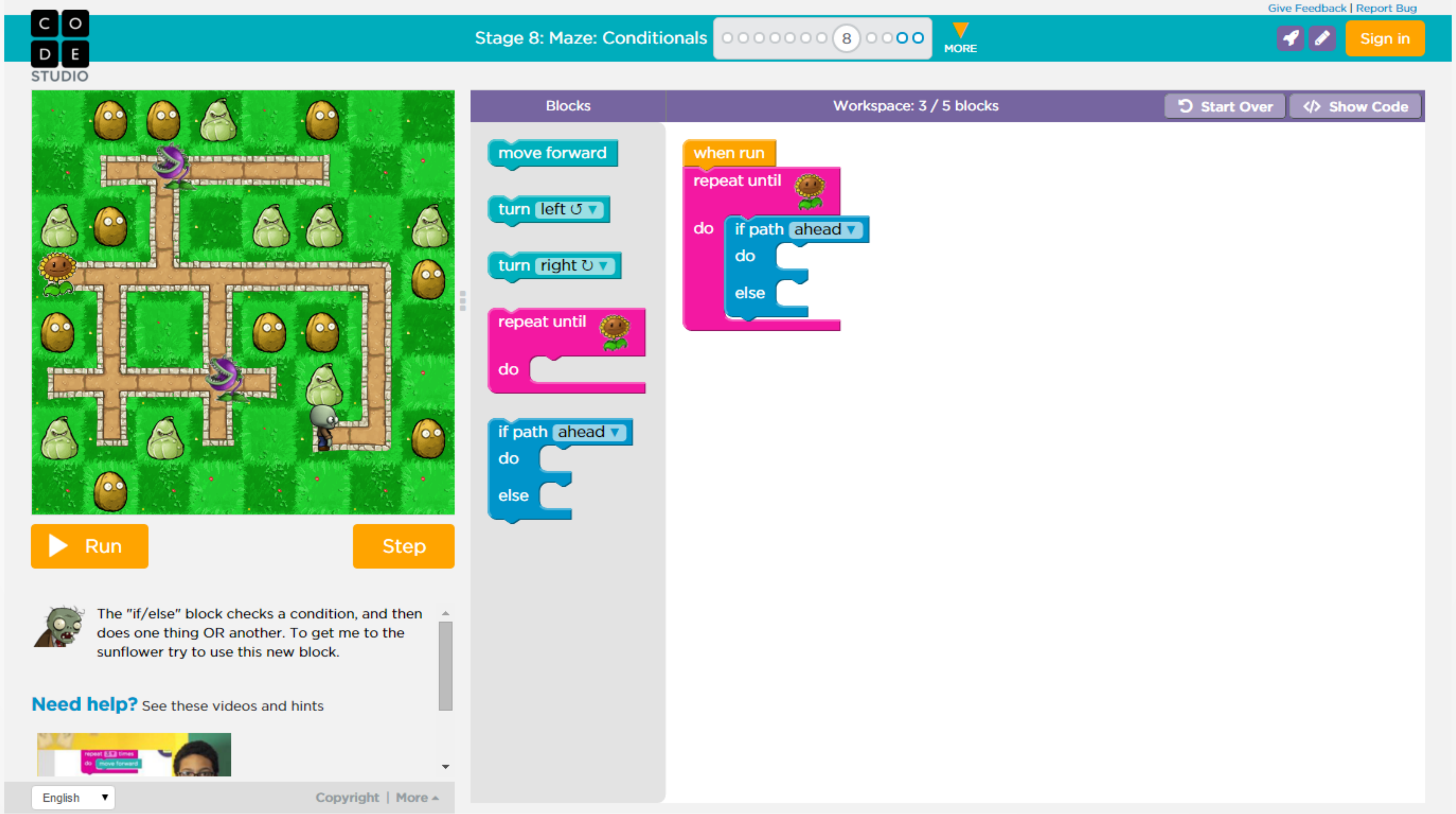
```
move forward by 100 pixels

turn right by 90 degrees

turn left by 90 degrees

jump forward by 100 pixels

repeat ??? times
do

set color

set color random color
```

Moves the artist without leaving any marks.

```
when run
repeat 5 times
do  set color
    repeat 2 times
    do  turn right by 90 degrees
        move forward by 60 pixels
        ght by 45 degrees
        move forward by 20 pixels
        turn right by 45 degrees
        move forward by 60 pixels
    turn right by 60 degrees
```

My pinwheel is not finished. How many times do I need to repeat to finish it?

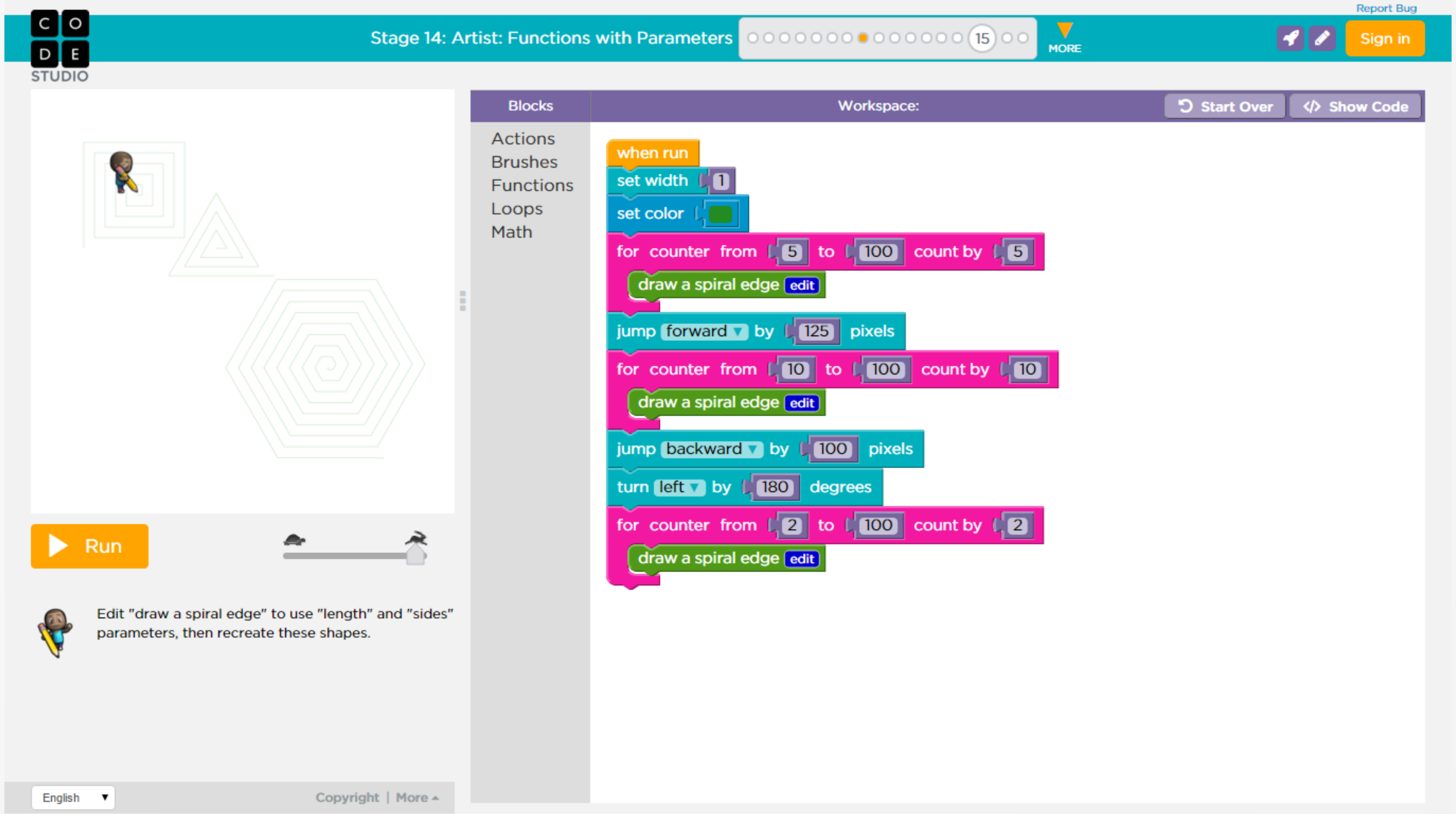
Coding through puzzles



The "if/else" block checks a condition, and then does one thing OR another. To get me to the sunflower try to use this new block.

Need help? See these videos and hints

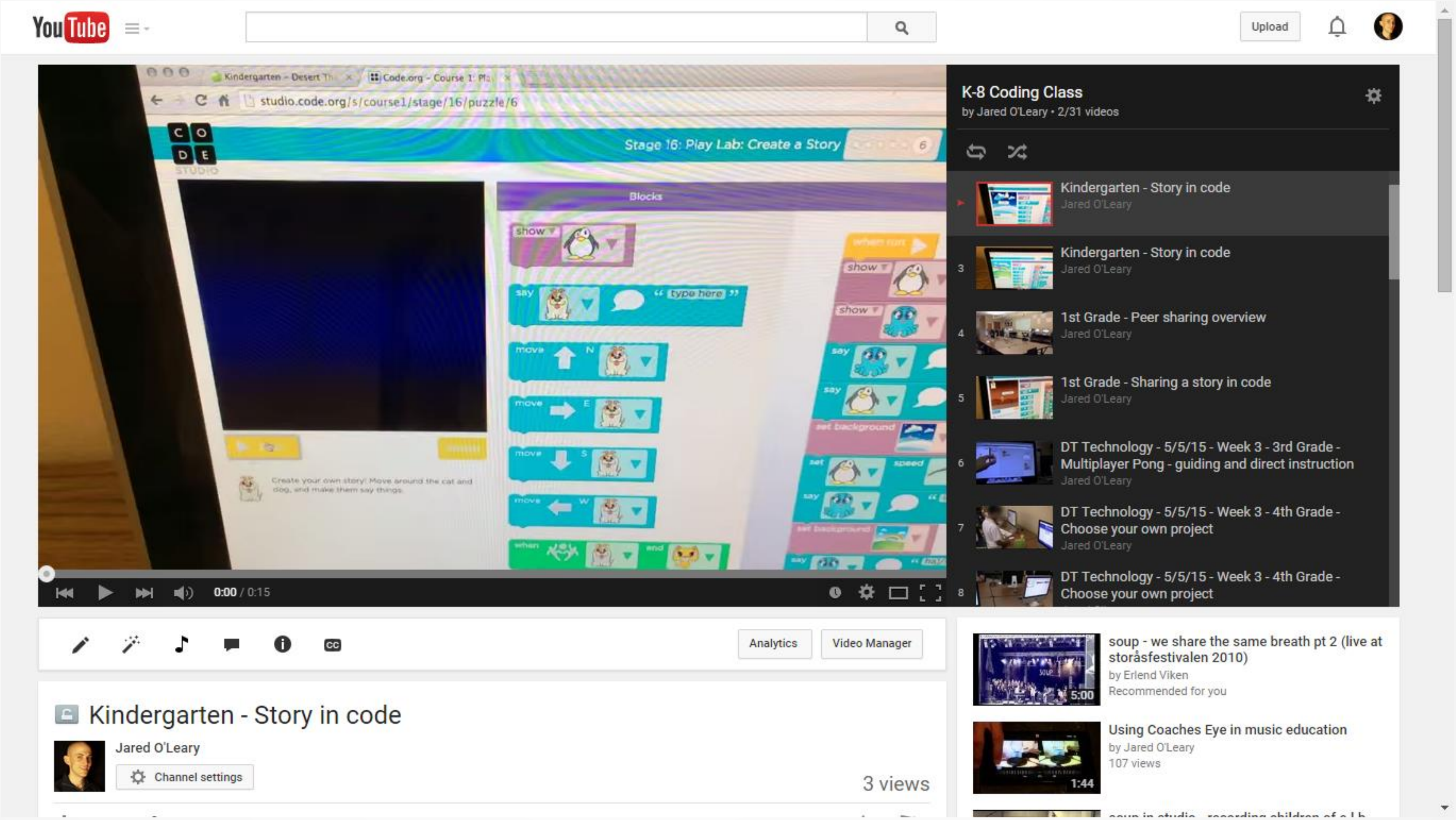
Coding through puzzles



```
when run
set width 1
set color
for counter from 5 to 100 count by 5
    draw a spiral edge edit
jump forward by 125 pixels
for counter from 10 to 100 count by 10
    draw a spiral edge edit
jump backward by 100 pixels
turn left by 180 degrees
for counter from 2 to 100 count by 2
    draw a spiral edge edit
```

Edit "draw a spiral edge" to use "length" and "sides" parameters, then recreate these shapes.

Coding through puzzles and more



YouTube
Upload
Kindergarten - Desert Th...
Code.org - Course 1: Pla...
studio.code.org/s/course1/stage/16/puzzle/6
CODE STUDIO
Stage 16: Play Lab: Create a Story
Blocks
show
say
type here
move N
move E
move S
move W
when
and
when run
set background
set speed
Create your own story! Move around the cat and dog, and make them say things.
0:00 / 0:15
Analytics
Video Manager
Channel settings

K-8 Coding Class
by Jared O'Leary • 2/31 videos

Kindergarten - Story in code
Jared O'Leary

3 Kindergarten - Story in code
Jared O'Leary

4 1st Grade - Peer sharing overview
Jared O'Leary

5 1st Grade - Sharing a story in code
Jared O'Leary

6 DT Technology - 5/5/15 - Week 3 - 3rd Grade - Multiplayer Pong - guiding and direct instruction
Jared O'Leary

7 DT Technology - 5/5/15 - Week 3 - 4th Grade - Choose your own project
Jared O'Leary

8 DT Technology - 5/5/15 - Week 3 - 4th Grade - Choose your own project

Kindergarten - Story in code
Jared O'Leary
3 views

soup - we share the same breath pt 2 (live at storåsfestivalen 2010)
by Erlend Viken
Recommended for you
5:00

Using Coaches Eye in music education
by Jared O'Leary
107 views
1:44

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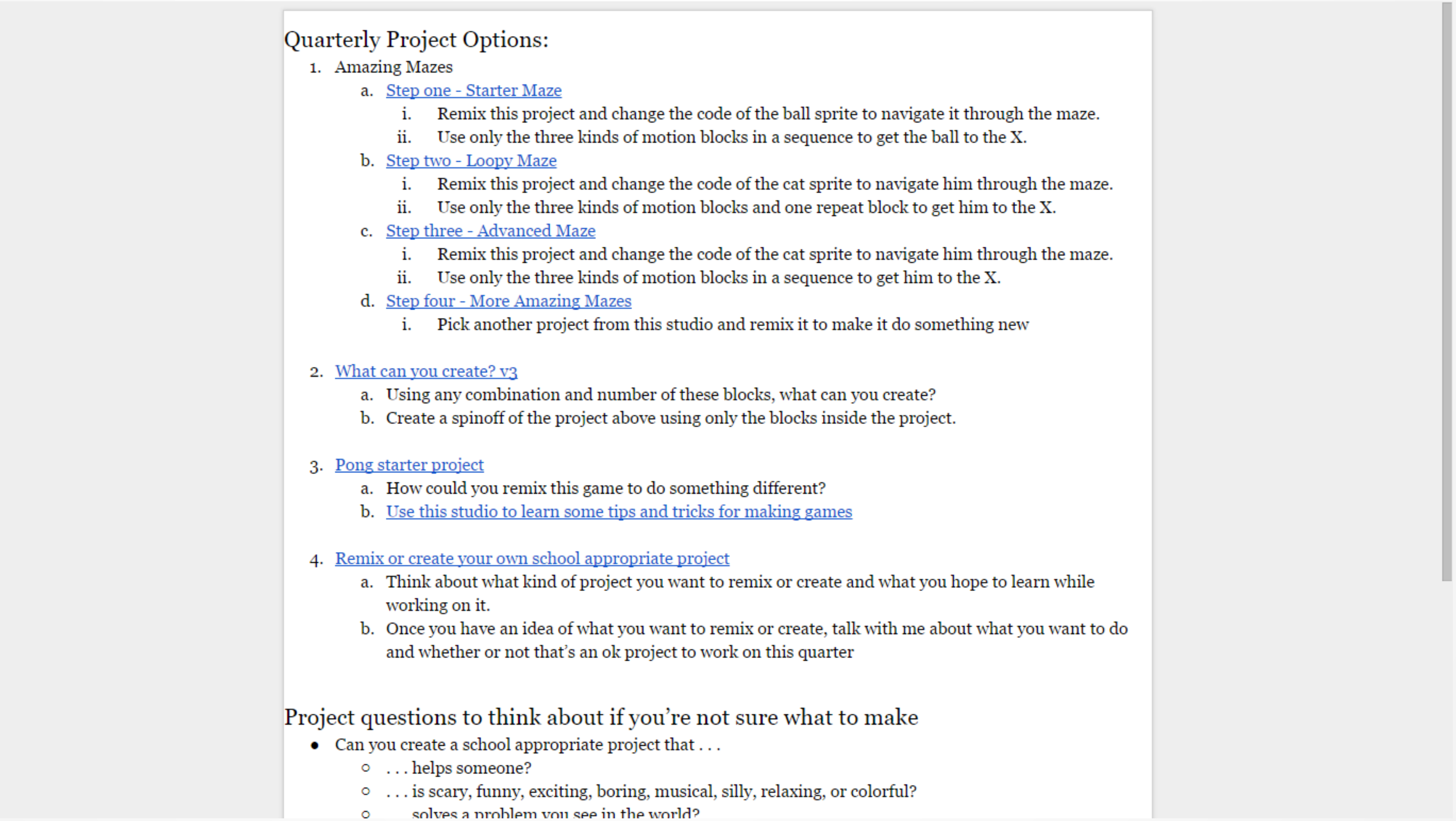
Sharing student perspectives on Code.org

- Josie
- Jordan

How are we coding in Avondale? Scratch

From puzzles to projects



Quarterly Project Options:

1. Amazing Mazes
   a. Step one - Starter Maze
      i. Remix this project and change the code of the ball sprite to navigate it through the maze.
      ii. Use only the three kinds of motion blocks in a sequence to get the ball to the X.
   b. Step two - Loopy Maze
      i. Remix this project and change the code of the cat sprite to navigate him through the maze.
      ii. Use only the three kinds of motion blocks and one repeat block to get him to the X.
   c. Step three - Advanced Maze
      i. Remix this project and change the code of the cat sprite to navigate him through the maze.
      ii. Use only the three kinds of motion blocks in a sequence to get him to the X.
   d. Step four - More Amazing Mazes
      i. Pick another project from this studio and remix it to make it do something new

2. What can you create? v3
   a. Using any combination and number of these blocks, what can you create?
   b. Create a spinoff of the project above using only the blocks inside the project.

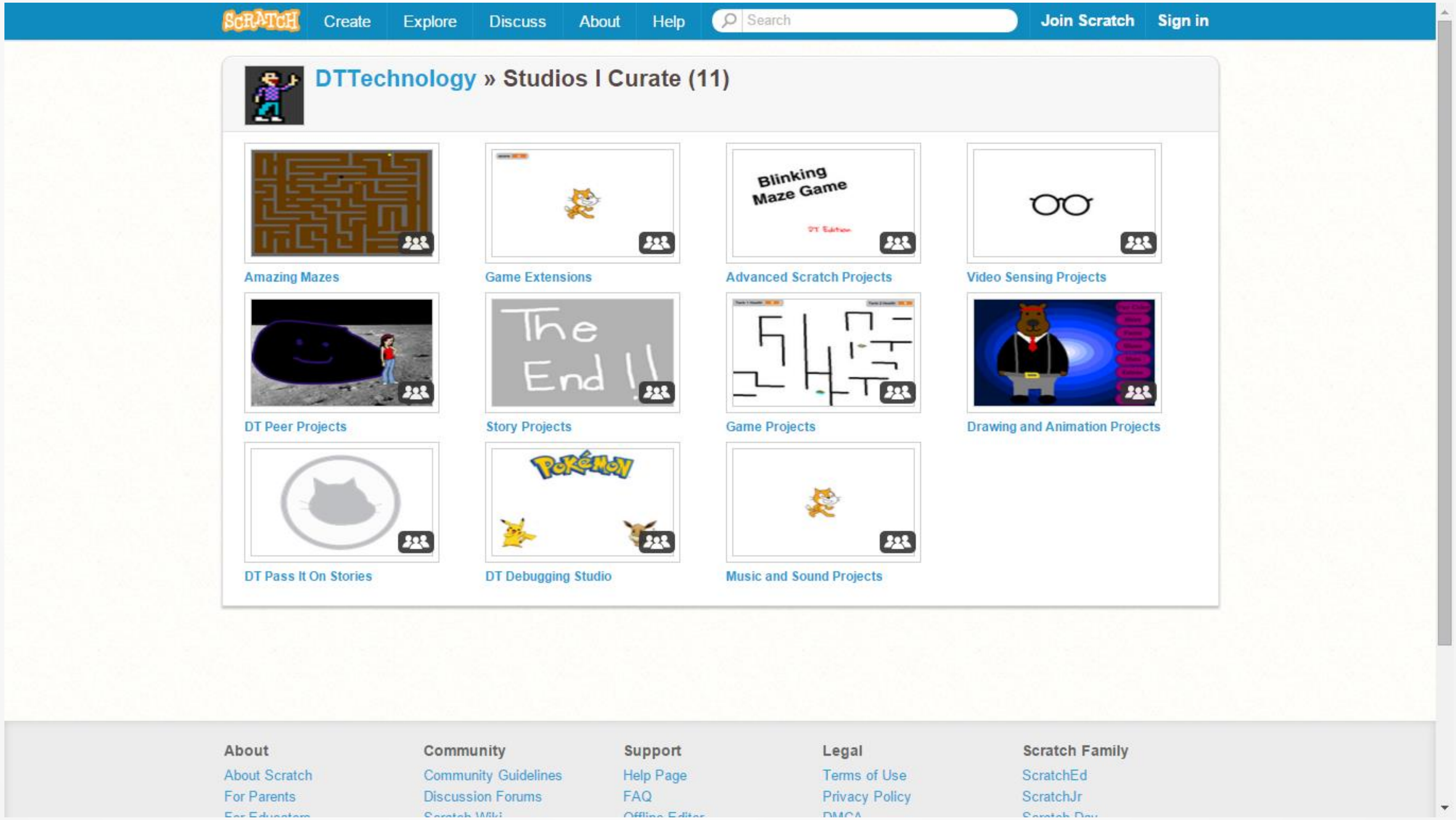
3. Pong starter project
   a. How could you remix this game to do something different?
   b. Use this studio to learn some tips and tricks for making games

4. Remix or create your own school appropriate project
   a. Think about what kind of project you want to remix or create and what you hope to learn while working on it.
   b. Once you have an idea of what you want to remix or create, talk with me about what you want to do and whether or not that's an ok project to work on this quarter

Project questions to think about if you're not sure what to make

- Can you create a school appropriate project that . . .
  - . . . helps someone?
  - . . . is scary, funny, exciting, boring, musical, silly, relaxing, or colorful?
  - . . . solves a problem you see in the world?

From puzzles to projects



DTTechnology » Studios I Curate (11)

Amazing Mazes

Game Extensions

Advanced Scratch Projects

Video Sensing Projects

DT Peer Projects

Story Projects

Game Projects

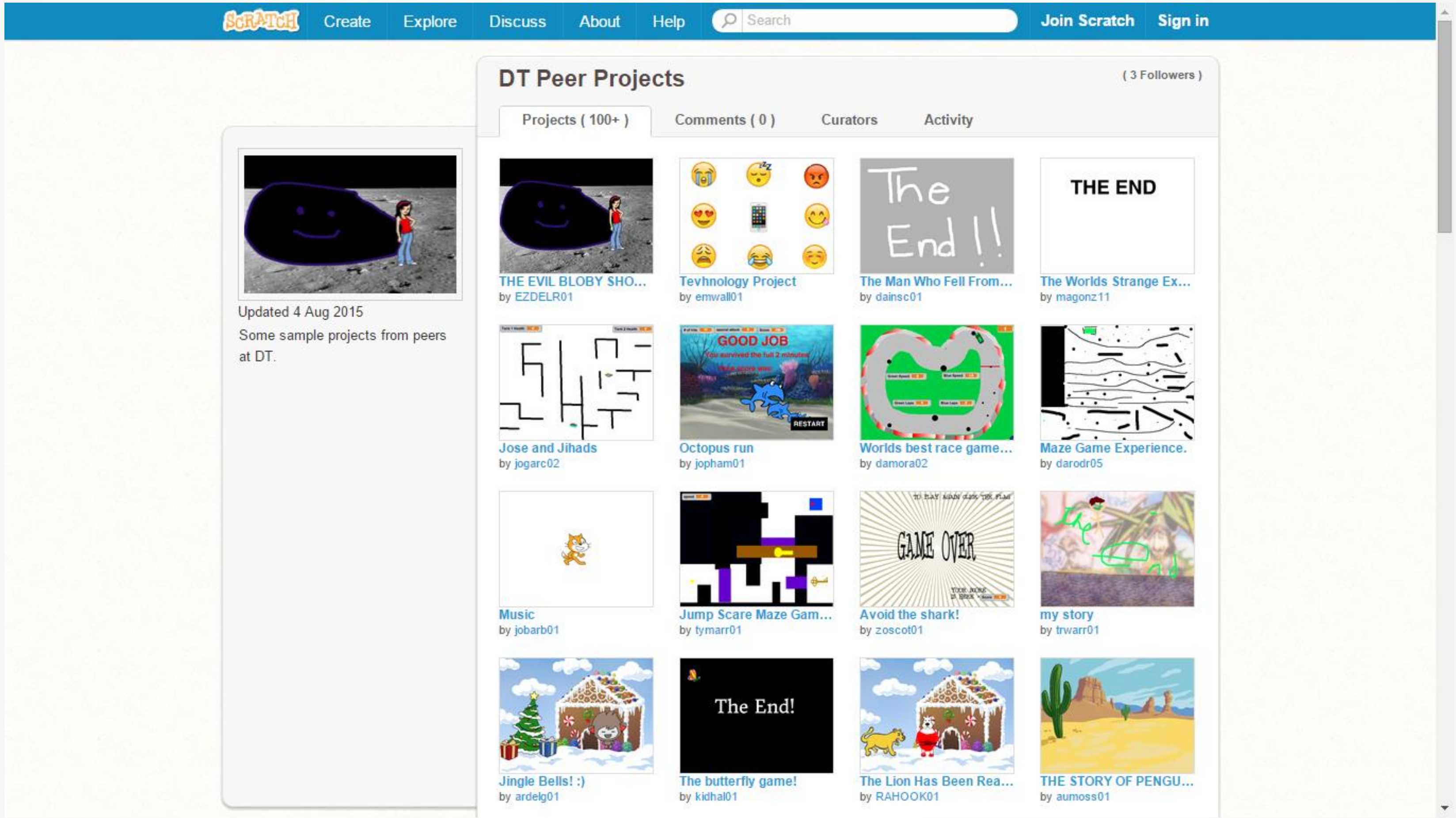
Drawing and Animation Projects

DT Pass It On Stories

DT Debugging Studio

Music and Sound Projects

From puzzles to projects



DT Peer Projects

(3 Followers)

Projects (100+) | Comments (0) | Curators | Activity

Updated 4 Aug 2015

Some sample projects from peers at DT.

THE EVIL BLOBY SHO...
by EZDELR01

Tevhnology Project
by emwall01

The Man Who Fell From...
by dainsc01

The Worlds Strange Ex...
by magonz11

Jose and Jihads
by jogarc02

Octopus run
by jopham01

Worlds best race game...
by damora02

Maze Game Experience.
by darodr05

Music
by jobarb01

Jump Scare Maze Gam...
by tymarr01

Avoid the shark!
by zoscot01

my story
by trwarr01

Jingle Bells! :)
by ardelg01

The butterfly game!
by kidhal01

The Lion Has Been Rea...
by RAHOOK01

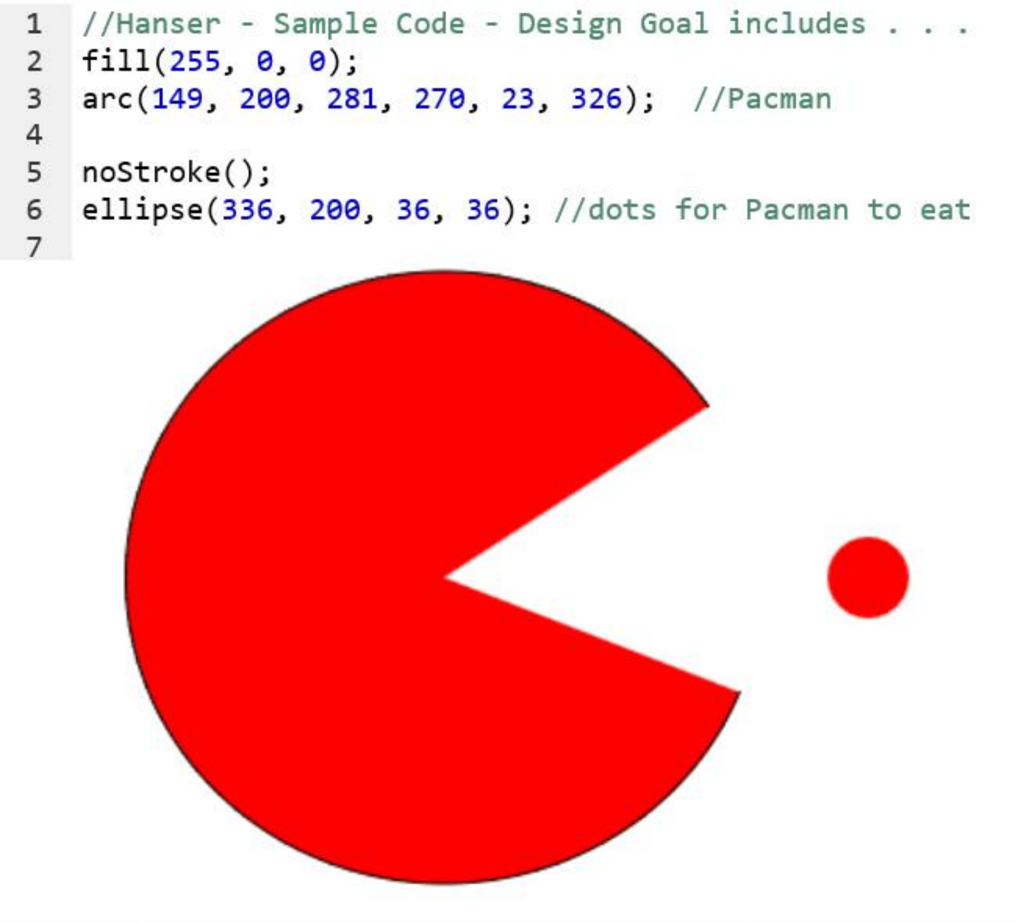
THE STORY OF PENGU...
by aumoss01

Sharing student perspectives on Scratch

- Alonso
- Victor

How are we coding in Avondale? Khan Academy

From blocks to text

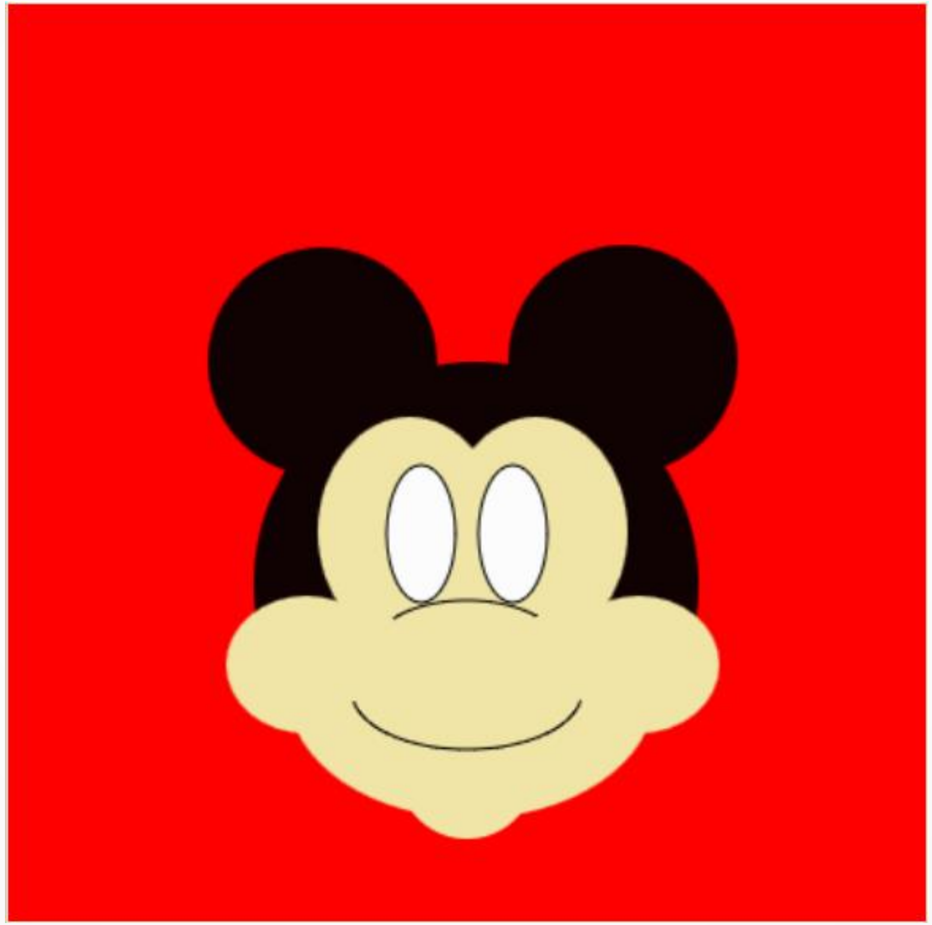


```
//Hanser - Sample Code - Design Goal includes . . .
fill(255, 0, 0);
arc(149, 200, 281, 270, 23, 326);  //Pacman

noStroke();
ellipse(336, 200, 36, 36); //dots for Pacman to eat

```

From blocks to text



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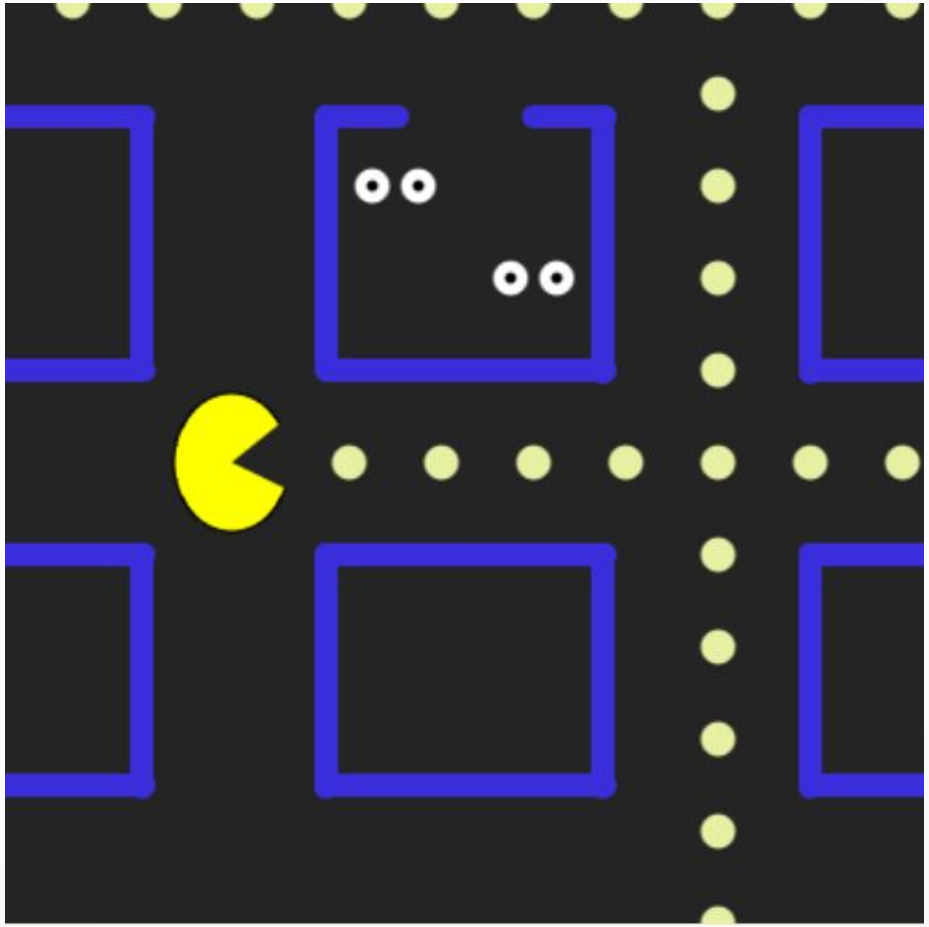
From blocks to text

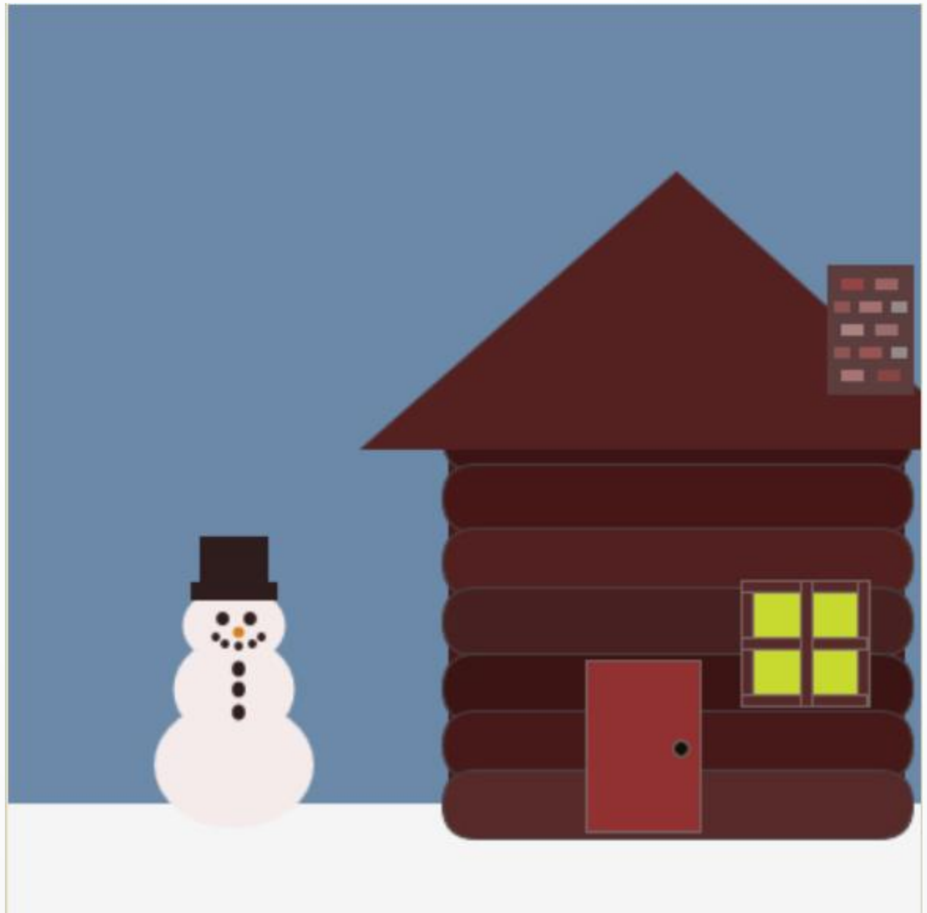
From blocks to text



Sharing student perspectives on Khan Academy

- Rachel
- Lauren

From blocks to text



From blocks to text

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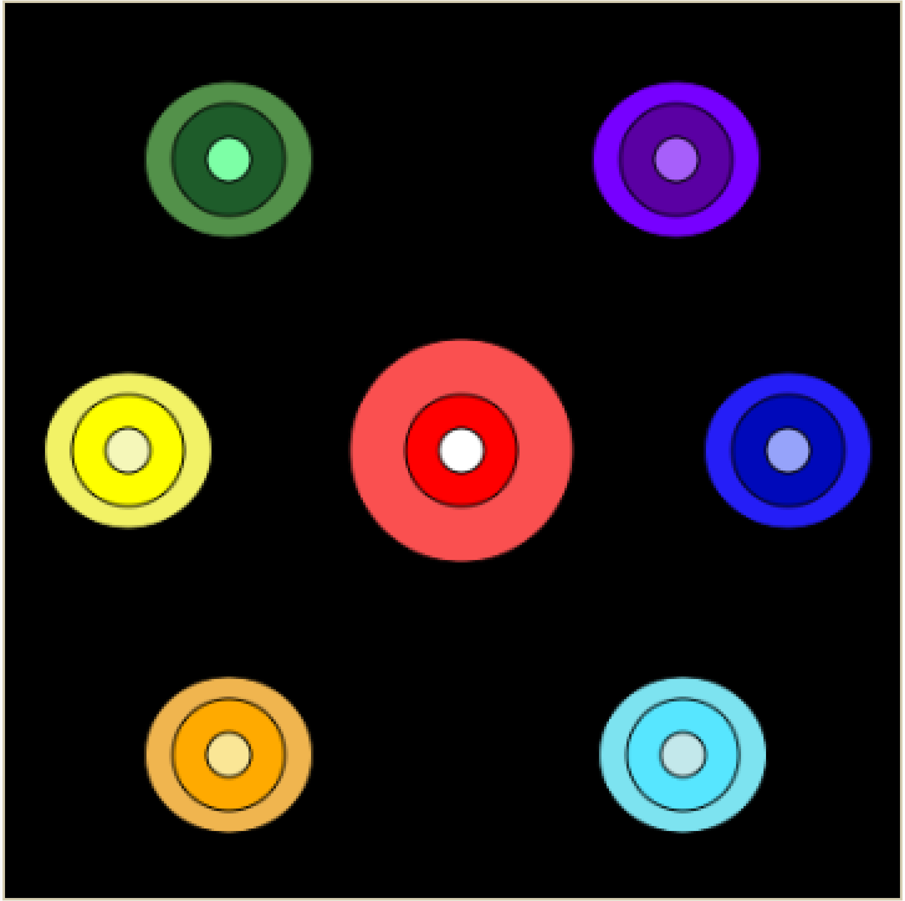
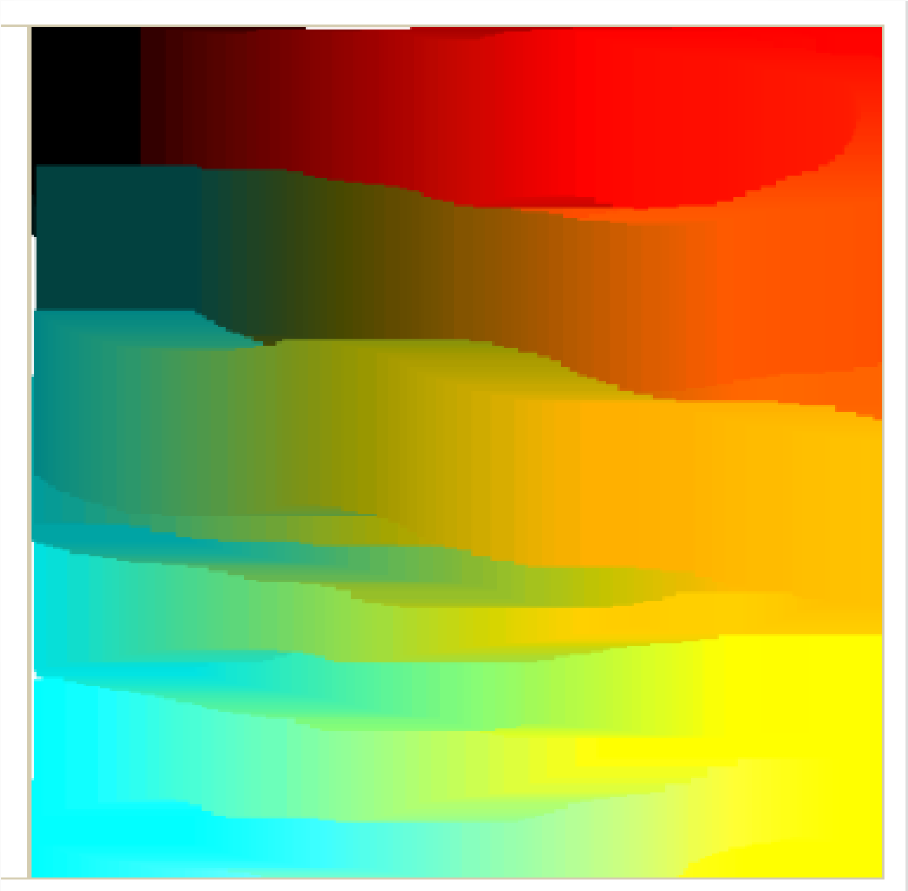
From blocks to text

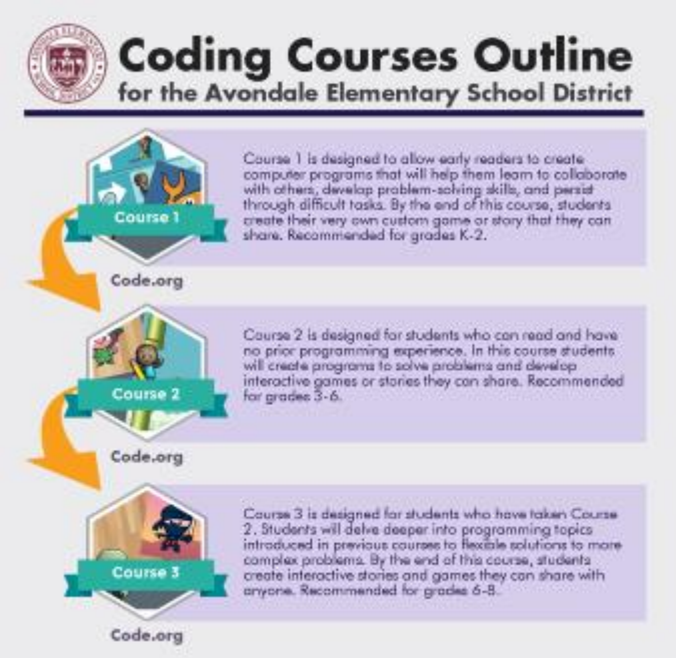


From blocks to text



How does is all work together?

How might platforms work together?

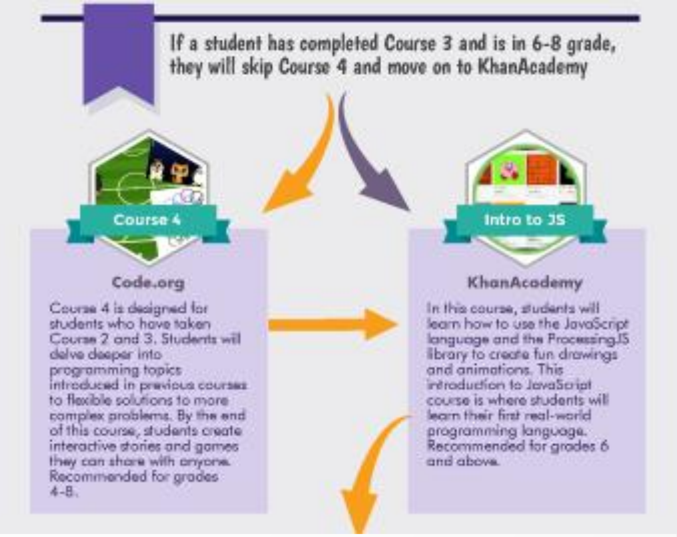


Coding Courses Outline
for the Avondale Elementary School District

Course 1 is designed to allow early readers to create computer programs that will help them learn to collaborate with others, develop problem-solving skills, and persist through difficult tasks. By the end of this course, students create their very own custom game or story that they can share. Recommended for grades K-2.

Course 2 is designed for students who can read and have no prior programming experience. In this course students will create programs to solve problems and develop interactive games or stories they can share. Recommended for grades 3-6.

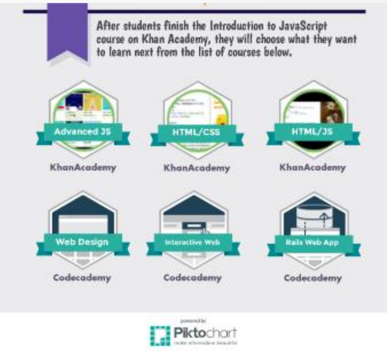
Course 3 is designed for students who have taken Course 2. Students will delve deeper into programming topics introduced in previous courses to flexible solutions to more complex problems. By the end of this course, students create interactive stories and games they can share with anyone. Recommended for grades 6-8.



If a student has completed Course 3 and is in 6-8 grade, they will skip Course 4 and move on to KhanAcademy

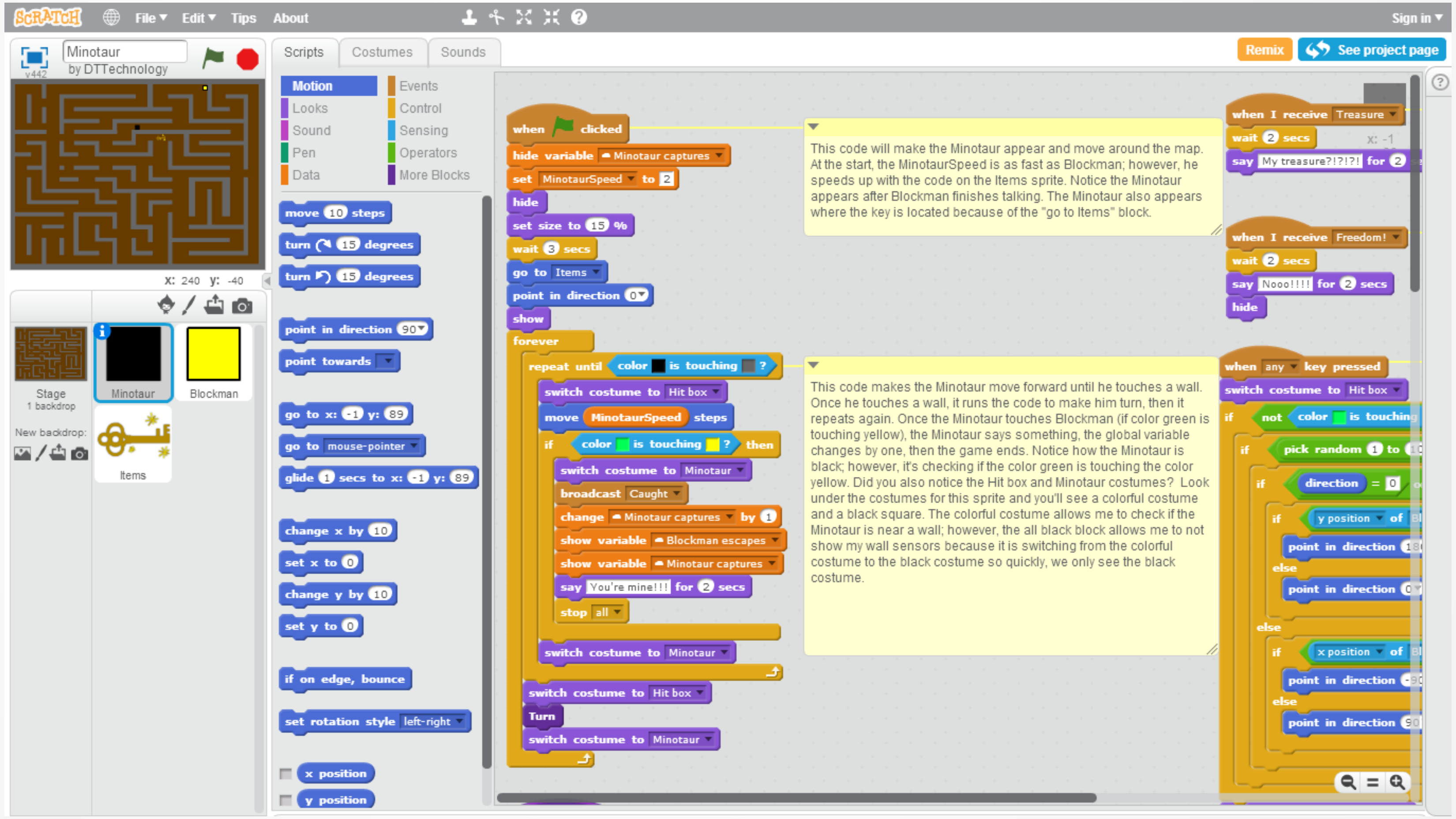
Course 4 is designed for students who have taken Course 2 and 3. Students will delve deeper into programming topics introduced in previous courses to flexible solutions to more complex problems. By the end of this course, students create interactive stories and games they can share with anyone. Recommended for grades 4-8.

In this course, students will learn how to use the JavaScript language and the ProcessingJS library to create fun drawings and animations. This introduction to JavaScript course is where students will learn their first real-world programming language. Recommended for grades 6 and above.



After students finish the Introduction to JavaScript course on Khan Academy, they will choose what they want to learn next from the list of courses below.

Augmenting instruction through design



```
when ⚑ clicked
hide variable [Minotaur captures ▾]
set [MinotaurSpeed ▾] to 2
hide
set size to 15 %
wait 3 secs
go to [Items ▾]
point in direction 0▾
show
forever
    repeat until < color ■ is touching ■ ? >
        switch costume to [Hit box ▾]
        move (MinotaurSpeed) steps
        if < color ■ is touching ■ ? > then
            switch costume to [Minotaur ▾]
            broadcast [Caught ▾]
            change [Minotaur captures ▾] by 1
            show variable [Blockman escapes ▾]
            show variable [Minotaur captures ▾]
            say [You're mine!!!] for 2 secs
            stop [all ▾]
        switch costume to [Minotaur ▾]
    switch costume to [Hit box ▾]
    Turn
    switch costume to [Minotaur ▾]
```

This code will make the Minotaur appear and move around the map. At the start, the MinotaurSpeed is as fast as Blockman; however, he speeds up with the code on the Items sprite. Notice the Minotaur appears after Blockman finishes talking. The Minotaur also appears where the key is located because of the "go to Items" block.

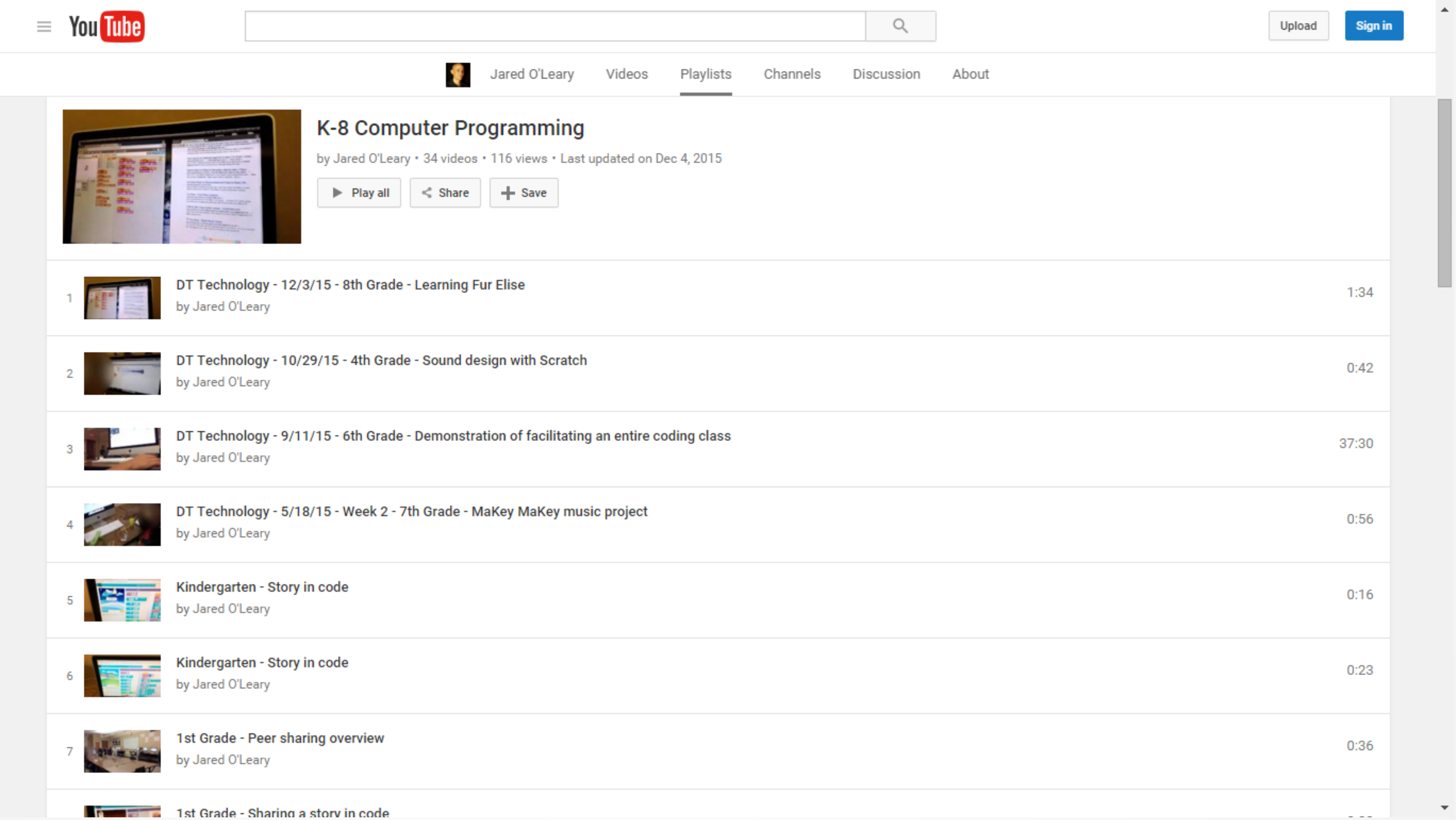
This code makes the Minotaur move forward until he touches a wall. Once he touches a wall, it runs the code to make him turn, then it repeats again. Once the Minotaur touches Blockman (if color green is touching yellow), the Minotaur says something, the global variable changes by one, then the game ends. Notice how the Minotaur is black; however, it's checking if the color green is touching the color yellow. Did you also notice the Hit box and Minotaur costumes? Look under the costumes for this sprite and you'll see a colorful costume and a black square. The colorful costume allows me to check if the Minotaur is near a wall; however, the all black block allows me to not show my wall sensors because it is switching from the colorful costume to the black costume so quickly, we only see the black costume.

```
when I receive [Treasure ▾]
wait 2 secs
say [My treasure?!?!?!] for 2

when I receive [Freedom! ▾]
wait 2 secs
say [Nooo!!!!] for 2 secs
hide

when [any ▾] key pressed
switch costume to [Hit box ▾]
if < not < color ■ is touching
    if < pick random 1 to 1
        if < (direction) = 0
            if < [y position ▾] of Bl
                point in direction 18
            else
                point in direction 0▾
        else
            if < [x position ▾] of Bl
                point in direction -9
            else
                point in direction 90
```

Interested in seeing a class in action?



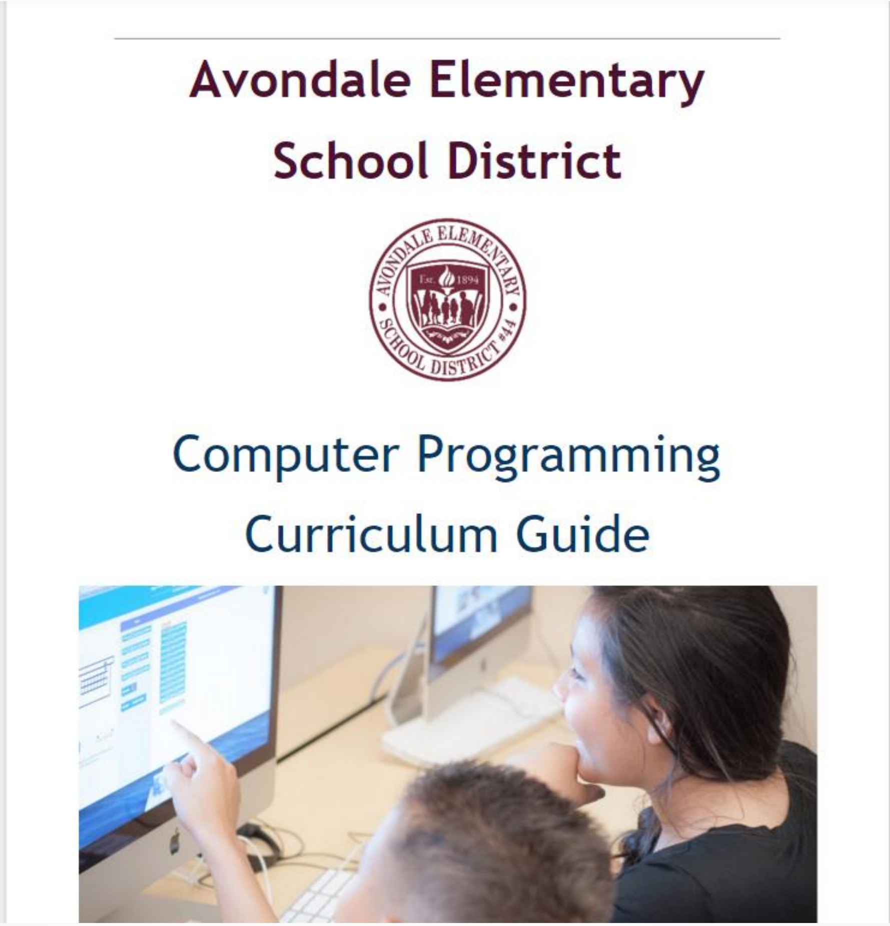
K-8 Computer Programming

by Jared O'Leary • 34 videos • 116 views • Last updated on Dec 4, 2015

1	DT Technology - 12/3/15 - 8th Grade - Learning Fur Elise by Jared O'Leary	1:34
2	DT Technology - 10/29/15 - 4th Grade - Sound design with Scratch by Jared O'Leary	0:42
3	DT Technology - 9/11/15 - 6th Grade - Demonstration of facilitating an entire coding class by Jared O'Leary	37:30
4	DT Technology - 5/18/15 - Week 2 - 7th Grade - MaKey MaKey music project by Jared O'Leary	0:56
5	Kindergarten - Story in code by Jared O'Leary	0:16
6	Kindergarten - Story in code by Jared O'Leary	0:23
7	1st Grade - Peer sharing overview by Jared O'Leary	0:36
	1st Grade - Sharing a story in code	

Some resources to get started

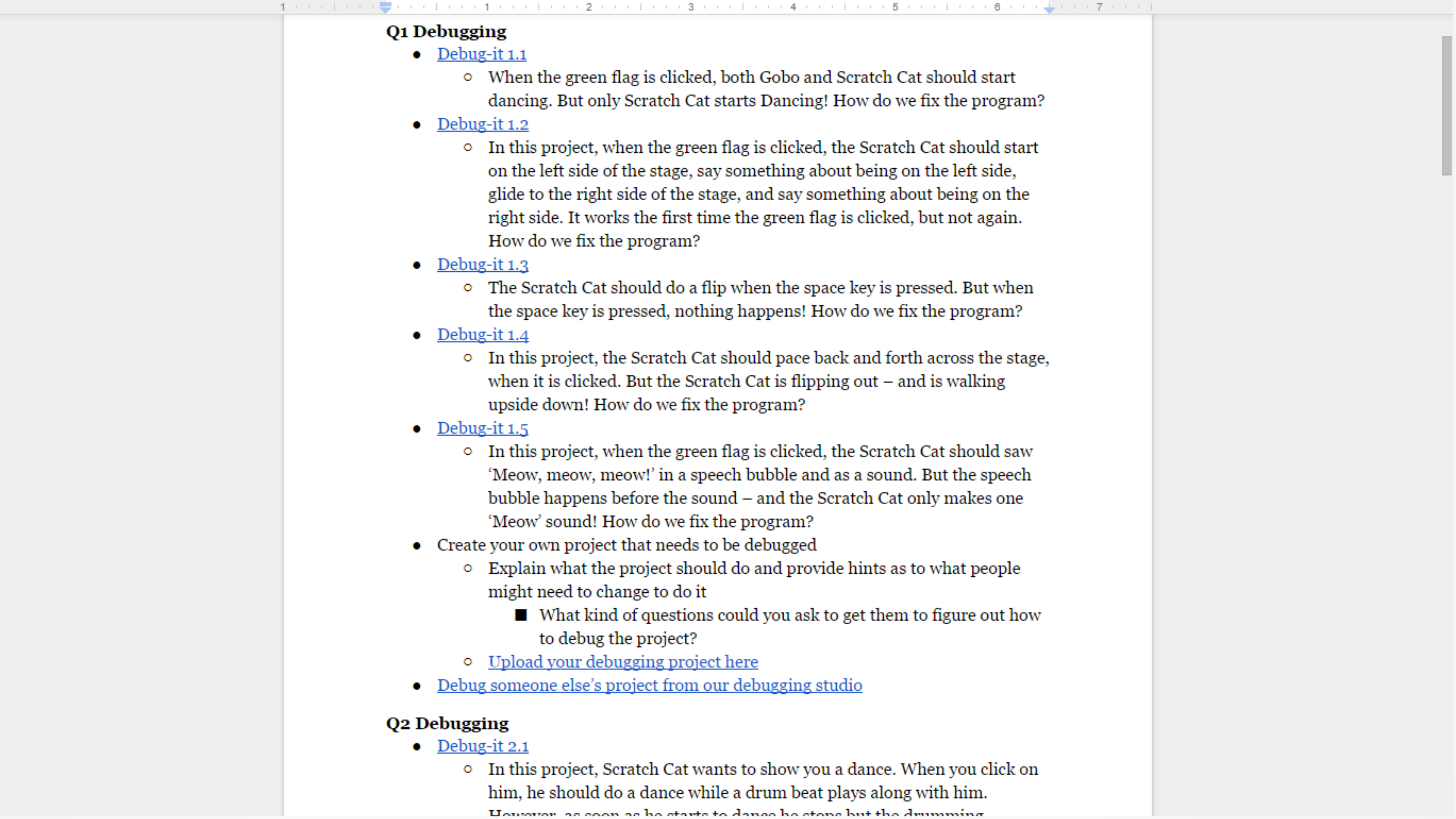
Curricular resources



Avondale Elementary School District

Computer Programming Curriculum Guide

Scratch resources



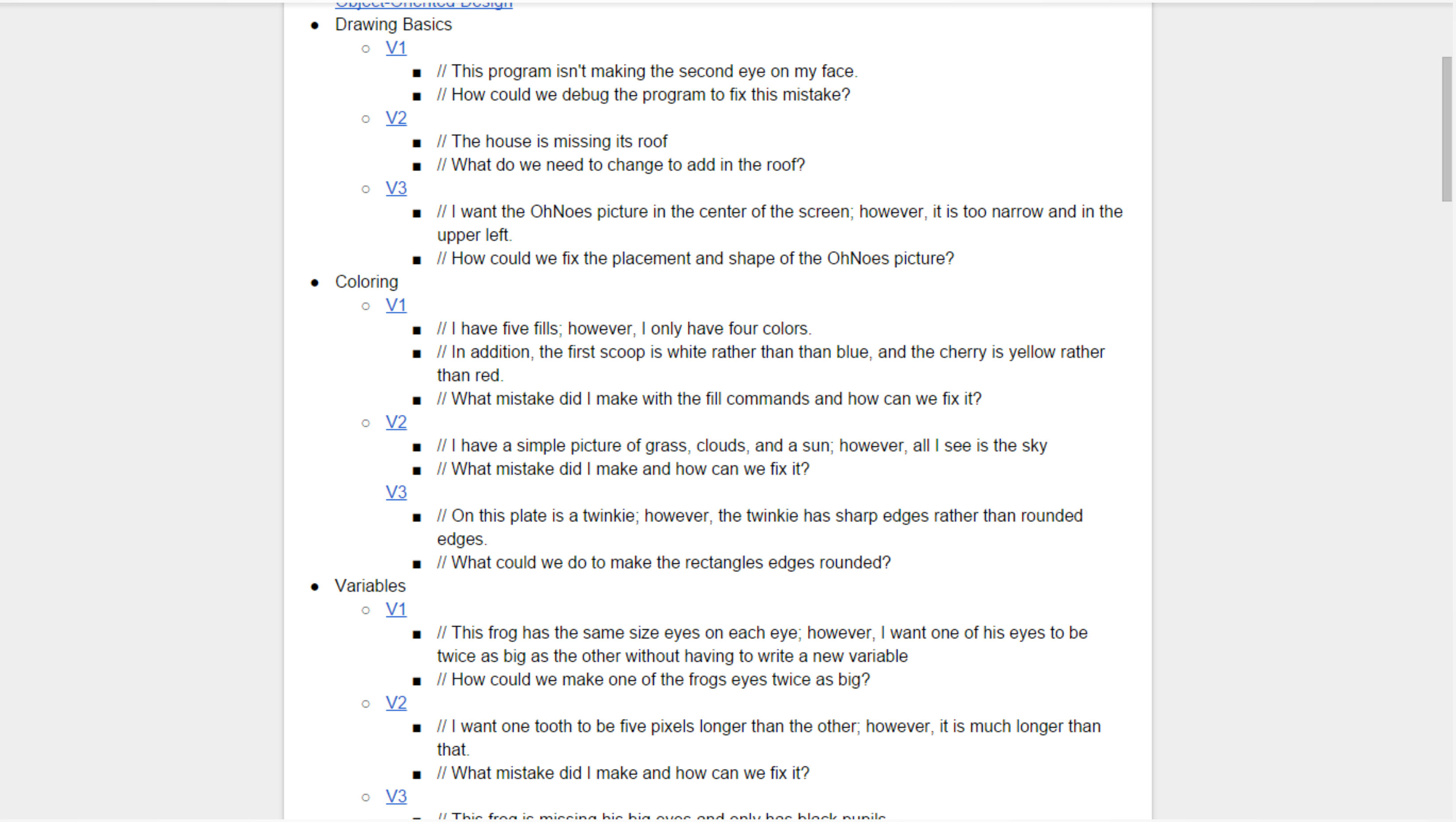
Q1 Debugging

- Debug-it 1.1
  - When the green flag is clicked, both Gobo and Scratch Cat should start dancing. But only Scratch Cat starts Dancing! How do we fix the program?
- Debug-it 1.2
  - In this project, when the green flag is clicked, the Scratch Cat should start on the left side of the stage, say something about being on the left side, glide to the right side of the stage, and say something about being on the right side. It works the first time the green flag is clicked, but not again. How do we fix the program?
- Debug-it 1.3
  - The Scratch Cat should do a flip when the space key is pressed. But when the space key is pressed, nothing happens! How do we fix the program?
- Debug-it 1.4
  - In this project, the Scratch Cat should pace back and forth across the stage, when it is clicked. But the Scratch Cat is flipping out – and is walking upside down! How do we fix the program?
- Debug-it 1.5
  - In this project, when the green flag is clicked, the Scratch Cat should saw 'Meow, meow, meow!' in a speech bubble and as a sound. But the speech bubble happens before the sound – and the Scratch Cat only makes one 'Meow' sound! How do we fix the program?
- Create your own project that needs to be debugged
  - Explain what the project should do and provide hints as to what people might need to change to do it
    - What kind of questions could you ask to get them to figure out how to debug the project?
  - Upload your debugging project here
- Debug someone else's project from our debugging studio

Q2 Debugging

- Debug-it 2.1
  - In this project, Scratch Cat wants to show you a dance. When you click on him, he should do a dance while a drum beat plays along with him. However, as soon as he starts to dance he stops but the drumming

JavaScript resources



- Object-Oriented Design
- Drawing Basics
  - V1
    - // This program isn't making the second eye on my face.
    - // How could we debug the program to fix this mistake?
  - V2
    - // The house is missing its roof
    - // What do we need to change to add in the roof?
  - V3
    - // I want the OhNoes picture in the center of the screen; however, it is too narrow and in the upper left.
    - // How could we fix the placement and shape of the OhNoes picture?
- Coloring
  - V1
    - // I have five fills; however, I only have four colors.
    - // In addition, the first scoop is white rather than than blue, and the cherry is yellow rather than red.
    - // What mistake did I make with the fill commands and how can we fix it?
  - V2
    - // I have a simple picture of grass, clouds, and a sun; however, all I see is the sky
    - // What mistake did I make and how can we fix it?
  - V3
    - // On this plate is a twinkie; however, the twinkie has sharp edges rather than rounded edges.
    - // What could we do to make the rectangles edges rounded?
- Variables
  - V1
    - // This frog has the same size eyes on each eye; however, I want one of his eyes to be twice as big as the other without having to write a new variable
    - // How could we make one of the frogs eyes twice as big?
  - V2
    - // I want one tooth to be five pixels longer than the other; however, it is much longer than that.
    - // What mistake did I make and how can we fix it?
  - V3
    - // This frog is missing his big eyes and only has black pupils

Let’s talk

- www.JaredOLeary.com
  - Presentations
  - Coding in the K8 classroom