



# Authentic Learning through Computer Coding

Turning Consumers into Creators

Lead speaker: Dawn DuPriest

Preston Middle School, Fort Collins, CO

Presentation #302

Thursday, April 16, 3:30pm, Room 157A

Links for this presentation available at:

<http://tinyurl.com/nctmcoding>



# Presentation Agenda

- Why coding?
- Coding structures and connections to math tasks:
  - Variables
  - Boolean Expressions and Conditionals
  - Loops
- Programming as project-based learning
  - Structures & assessment

Q&A

## How to integrate coding? What tools to use?

Graphical Languages  
(Grades K-6)

Scratch 

Code Studio 

**HOPSCOTCH**

Text-based Languages  
(Grades 7-12)

Python 

JavaScript 

Scheme  
([bootstrapworld.org](http://bootstrapworld.org))



# Path to authentic assessment

- Troubleshooting activities and problem-based lessons that tackle concepts and tools
  - Starter programs, pair programming activities
- Unit projects that encourage deep thinking and creation.
  - Creative and open-ended, shows evidence of learning.

# Computer Science Concept: Variables

A variable is a location for stored data.

A variable can be:

- declared (or created)
- assigned (or set)
- read (substituted)

In many languages, a variable name is all one word and starts with a letter.

```
var num;  
num = 50;  
ellipse(num, num, 100, 100);
```

# Computer Science Concept: Conditionals

A boolean expression evaluates to true or false.

An “if” statement executes code if the boolean expression is true.

```
var a;  
a = random(0,100);  
if(a < 50)  
{  
    fill(255,0,0); // red  
}  
else  
{  
    fill(0, 26, 255); // blue  
}  
  
ellipse(200,200,50,50);
```

# Computer Science Concept: Loops

Repeat a set of instructions based on the value of a boolean expression.

3 steps:

- Initialize the loop
- Iterate
- Terminating condition

```
var q = 1;
var f = 1;

while (q <= 5)
{
    f = f * q;
    q = q + 1;
}
```

```
fill(255, 0, 0);
textSize(30);
text(f, 50, 50);
```

f

120

q

6

# Authentic, Project-based Learning

## Considerations:

- Cognitive demand
- Intrinsic reward
- Sharing / publishing
- Design / engineering cycle
- Assessing math understanding
- “Messy” trajectory. Not everyone will learn the same thing.

## Q&A

If you are interested in connecting about professional development or have other questions, contact me at:

[dawnd@psdschools.org](mailto:dawnd@psdschools.org)

Twitter: @DuPriestMath

Blog: <http://codinginmathclass.wordpress.com/>