

# Practical Teacher Training: Grade 4-8 Coding



## I. Coding Intro

Coding	Math
<ul style="list-style-type: none"><li>• basic shapes</li><li>• transformations</li><li>• grouping<ul style="list-style-type: none"><li>◦ hierarchy</li></ul></li><li>• variables</li><li>• defintions</li><li>• functions</li></ul>	<ul style="list-style-type: none"><li>• Cartesian coordinates (x,y)</li><li>• negative numbers</li><li>• transformations</li><li>• fractions</li><li>• variables<ul style="list-style-type: none"><li>◦ Elm variables are algebraic variables</li></ul></li><li>• problem decomposition as drawing strategy</li></ul>



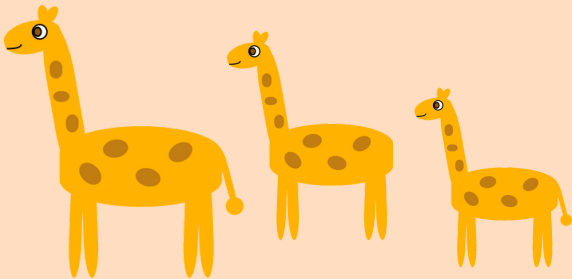
Lesson Plan: Emojis

Group Debrief



- 9 hours of small group instruction
- register individually or as a group (3-8 teachers)
- 3 x (in-class coaching sessions + group discussion)
- 10 hours of homework
- Sufficient logins needed for in-class coaching sessions

Fee: \$850 +HST



## II. Math 4 Graphics

Coding	Math
<ul style="list-style-type: none"><li>• custom colours (rgb &amp; hsl)</li><li>• gradients</li><li>• image math (clip &amp; subtract)</li></ul>	<ul style="list-style-type: none"><li>• estimation of sizes, colour components, etc.</li><li>• set theory as foundation for image math</li></ul>

Lesson Plan: Herogram

Group Debrief



## III. Animation



Coding	Math
<ul style="list-style-type: none"><li>• adding model.time to<ul style="list-style-type: none"><li>◦ scale</li><li>◦ move</li><li>◦ rotate,</li><li>◦ makeTransparent</li><li>◦ rgb colour</li><li>◦ hsl colour</li></ul></li><li>• repeatDistance &amp; repeatDuration</li></ul>	<ul style="list-style-type: none"><li>• animation = function of time<ul style="list-style-type: none"><li>◦ plot helper function</li></ul></li><li>• wave functions<ul style="list-style-type: none"><li>◦ sin and cos</li></ul></li></ul>

Lesson Plan: Sunset

Group Debrief



McMASTER  
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CODING



# Practical Teacher Training: Grade 4-8 Coding

## Program description:

In this program, grade 4-8 teachers will learn the fundamentals of coding and how to use them to make math come alive. Your students will never again ask what negative numbers are useful for! We will go over three lesson plans, and assist you in delivering them by visiting your class virtually. To increase the effectiveness of this program, you will learn with a small group of peer teachers. After each teaching session, your group will discuss what went well, where your students did not react as you expected, and how the lesson plan can be better adapted to your particular class.

The programming language we will be using is called Elm. It is a text-based functional language where students can create scalable vector graphics by coding and relying on their knowledge of algebra. No previous coding experience is needed for this program. Many of your students will have learned some block coding, and text-based coding will be a big step! That is why we created the ShapeCreator, an interactive single page documenting everything they need to know for the first lesson, and beyond. In it, they can adjust a shape to understand its parameters, and then copy the resulting code into the text editor.

## Outline:

- 9 hours of small group (3-8 teachers) instruction
- 3 × (in-class coaching sessions, followed by group discussion)
- 10 hours of homework (coding practice with asynchronous help)
- Sufficient logins for your current students, so you can immediately apply everything you learn in your own class

## Registration & Inquiries

email: [training@stabl.foundation.org](mailto:training@stabl.foundation.org)

## Customization

We can customize the program length and content for a group of 3 or more teachers.

## Module 1: Coding Intro (3 hours)

### Objectives:

- Learn the Platform (<https://stabl.rocks/>)
- Web Integrated Development Environment (WebIDE)
- Help messages and mentor view
- ShapeCreator (<https://macoutreach.rocks/SC3.html>)
- Creating a ShareLink (viewable for parents, and shareable for classmates)

### Coding topics

- Draw basic shapes and position them on the screen.
- How to recognize and fix all the common errors made by beginners.

### Math topics

- Cartesian coordinates (x,y)
- Negative numbers
- Transformations
- Translation (move)
- Rotations using degrees (rotate)
- Scale (scale)
- Fractions

### Lesson plan

Everyone, make your own emoji!

### In-class coaching

Deliver the first lesson plan with help from our experienced instructor.

### Group discussion

Share your teaching experience with your peers, and brainstorm improvements.

# Practical Teacher Training: Grade 4-8 Coding

## Module 2: Math 4 Graphics (3 hours)

### Coding topics

- Group shapes (and use problem decomposition to plan your drawing)
- Create definitions and add variables
- Colour Spaces (red-green-blue and hue-saturation-lightness)
- Colour Gradients
- Clip & subtract (Using image math to take a bite out of an apple.)
- Herogram module

### Math topics

- Variables
- Note that Elm variables have the semantics of algebraic variables, not Java or Python variables, which is why we call our curriculum Algebraic Thinking and not Computational Thinking
- Problem decomposition as a drawing strategy
- Make connection to solving other problems
- Introduce the idea of “Divide and Conquer”
- Colour theory (part of art, but we put numbers into the theory)
- Image math (clip, subtract) and the link to set theory.

### Lesson plan

Everyone, make your own Herogram

### In-class coaching

Deliver the first lesson plan with help from our experienced instructor.

### Group discussion

Share your teaching experience with your peers, and brainstorm improvements.

## Module 3: Animation (3 hours)

### Coding topics

- model.time in scale, move, rotate, and makeTransparent
- Animating colour
- repeatDistance & repeatDuration
- If-then-else expressions

### Math topics

- Functions of time
- Basic trigonometry
- sin and cos functions

### Lesson plan

Make an animated Herogram for your hero!

### In-class coaching

Deliver the first lesson plan with help from our experienced instructor.

### Group discussion

Share your teaching experience with your peers, and brainstorm improvements.

