The Windows & Doors

of Scratch

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Create Your World • Scratch at MIT 2012

I love the theme for this year's Scratch conference – Create Your World. We use computers to model and shape our world. Scratch is a window into that process, and a door to opportunities. Here I'd like to highlight some of the windows and doors I've observed at our school.

A Door Unexpectedly Opens

The Learning Center for the Deaf
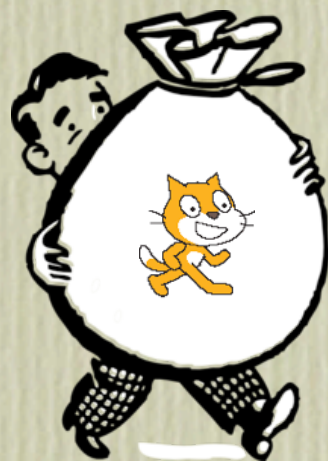
Boston Scientific Foundation

A grant from The Boston Scientific Foundation opened a door that words alone could not – to put Scratch into action with our teachers and deaf students. So far, Scratch is still in use, and people outside the project are recognizing its value.

# Scratch Pilot Project and Beyond

- Equipment

- Teacher Stipends

- Afterschool Program (4th-6th grades)

- Beyond the Pilot Project:

  - Middle School students

  - Additional teachers

The BSF grant provided equipment, as well as stipends for three teachers to learn Scratch and run a 10-week after-school program for 4th-6th graders. Our group of 10 deaf students was a mix of interests & abilities, including several on the autism spectrum.
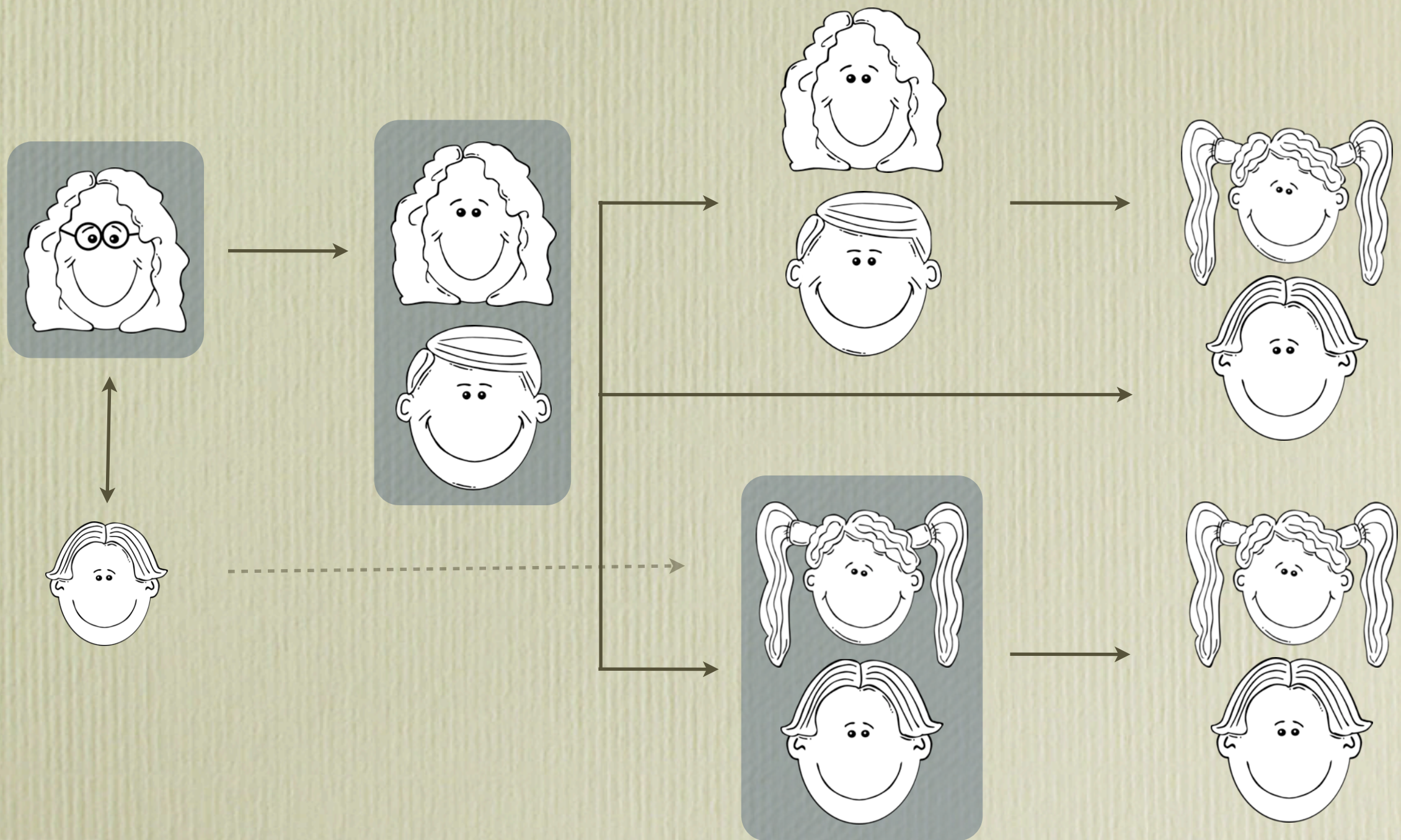
Scratch Generations
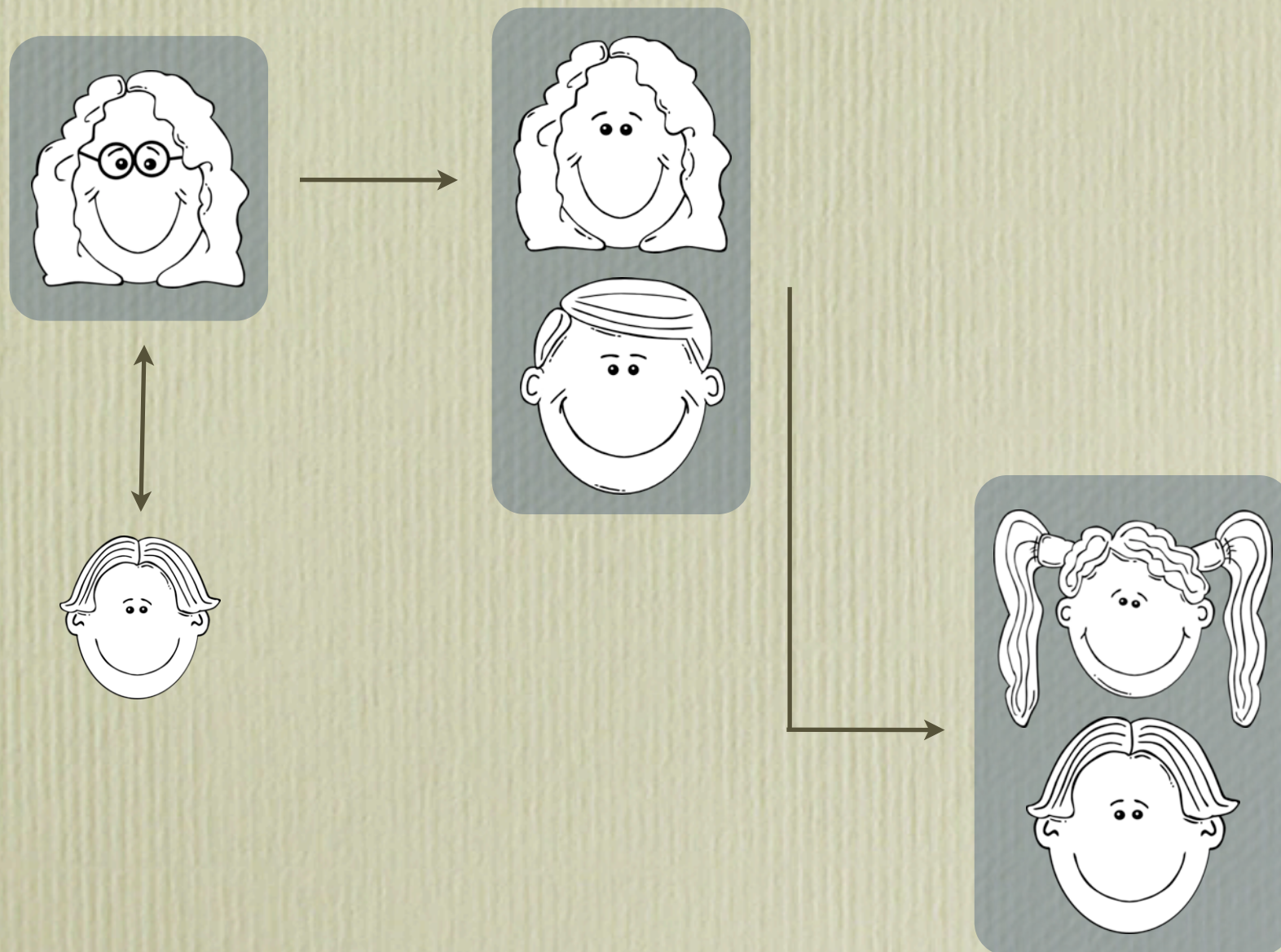
Thus our "generations" of Scratch began... As I prepared teacher workshops, my son was an invaluable informant; sharing ideas, Scratch tips, and insights into the online community. After their workshops, the teachers planned the after school program.

Scratch Generations cont'd

One of the teachers continued using Scratch in Middle School classes, and shared Scratch ideas and how-to's with interested Middle School teachers. This spring she and I led workshops for 20 faculty from Elementary through High School -- a wide range of abilities and interests!

Principles underlying Scratch

"Scratch: Programming for All"
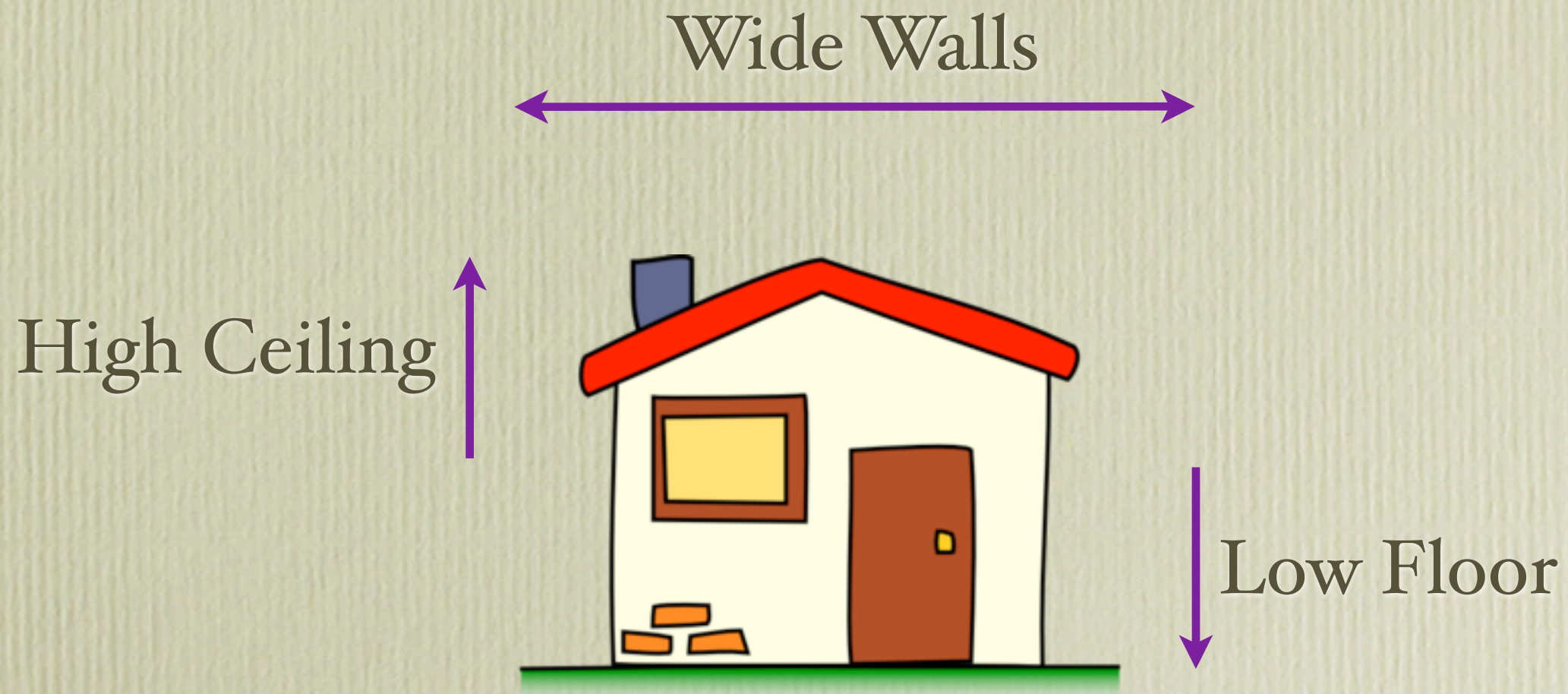
The Wide Walls, Low Floor, and High Ceiling principles of Scratch (along with the built-in paint program) make it an accessible and powerful tool for a wide variety of users -- whether adults or children.

Windows & Doors

...More Building Elements...
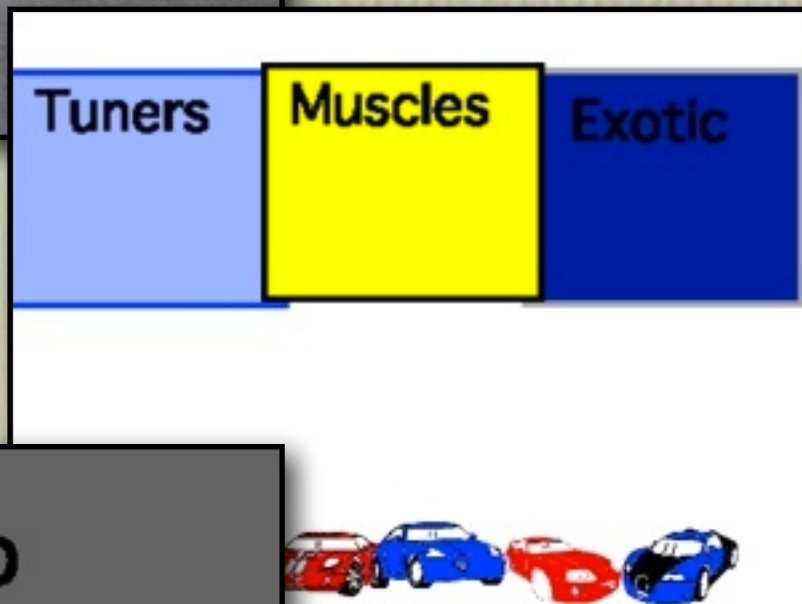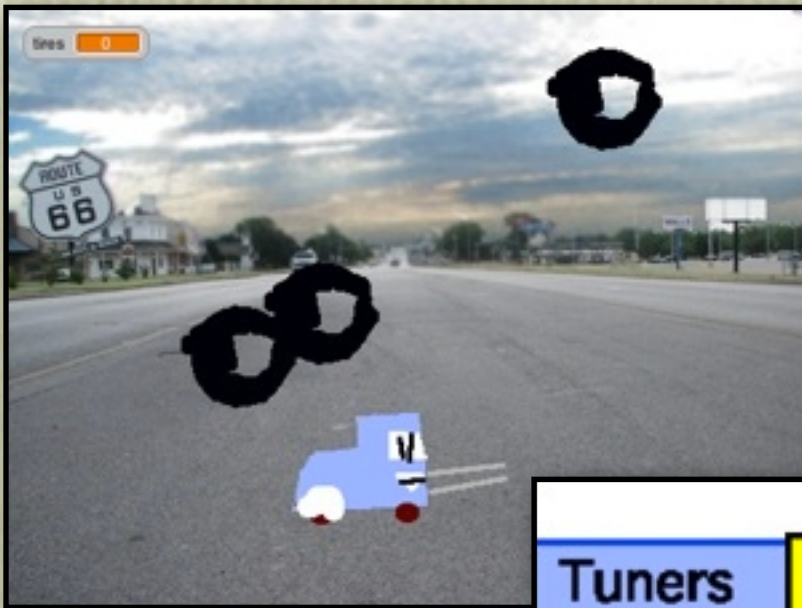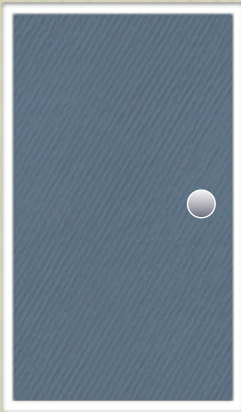
Windows: Scratch provides windows on thinking
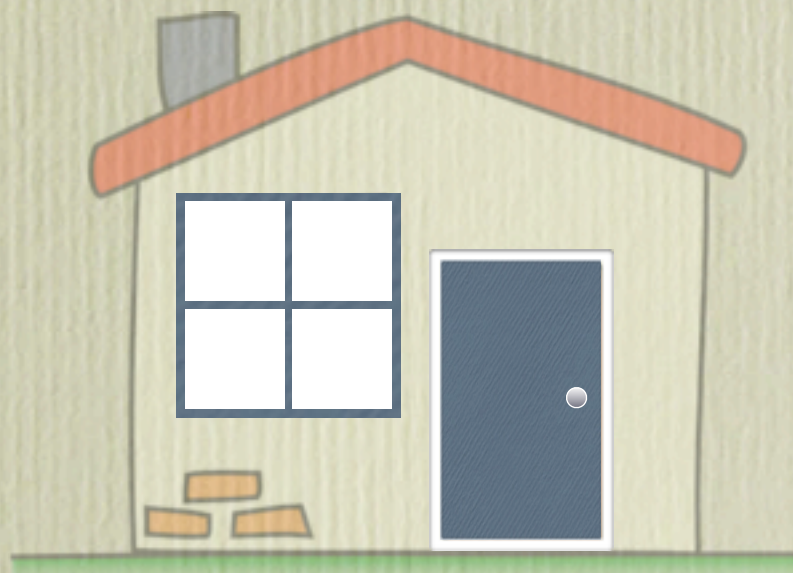
Doors: Scratch opens doors of opportunity

True to its principles, Scratch is infinitely malleable. To describe Scratch in action, to capture snapshots of its unfolding at our school, here I extend the floor–ceiling–walls metaphor to include Windows on Thinking and Doors of Opportunity.
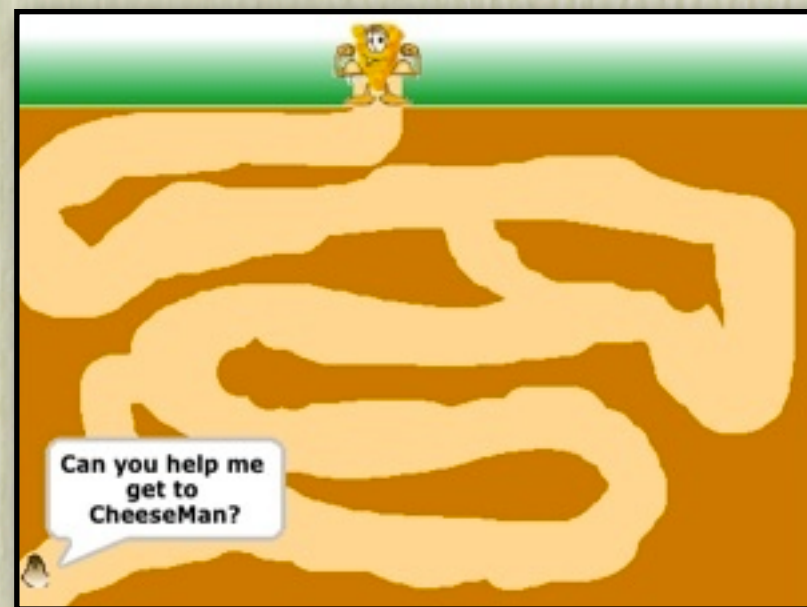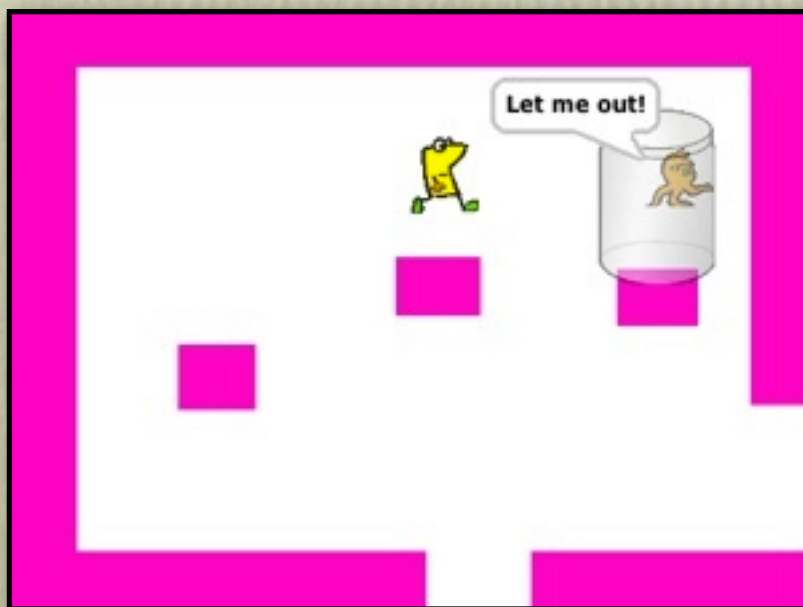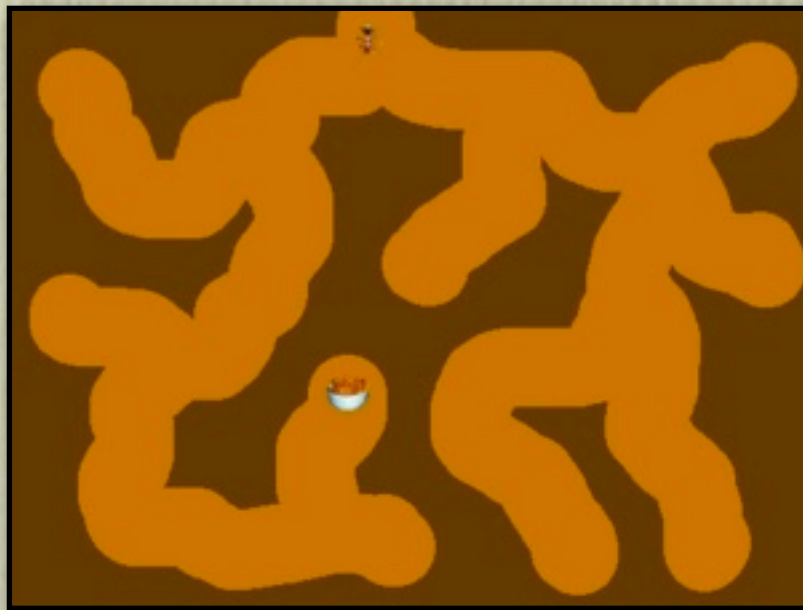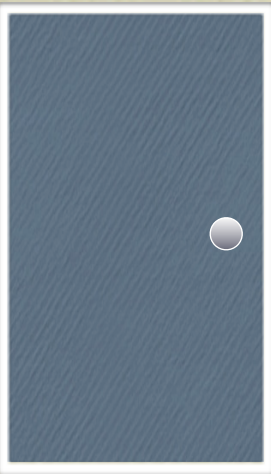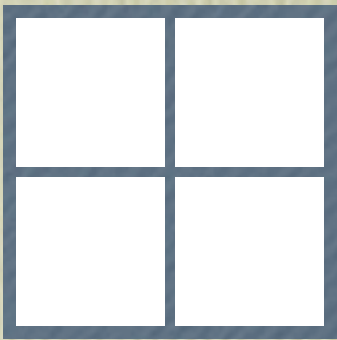
Window on Interests

In the real world, marketing does a fine job of telling us our interests, and delivers the final product – themed books, games, t–shirts, Happy Meal prizes. Scratch gives the opportunity to bring one's own interests to life, an engaging context for learning.
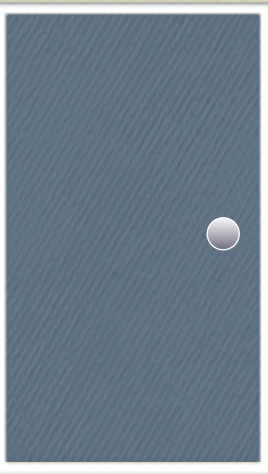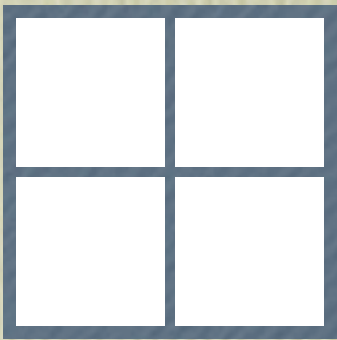
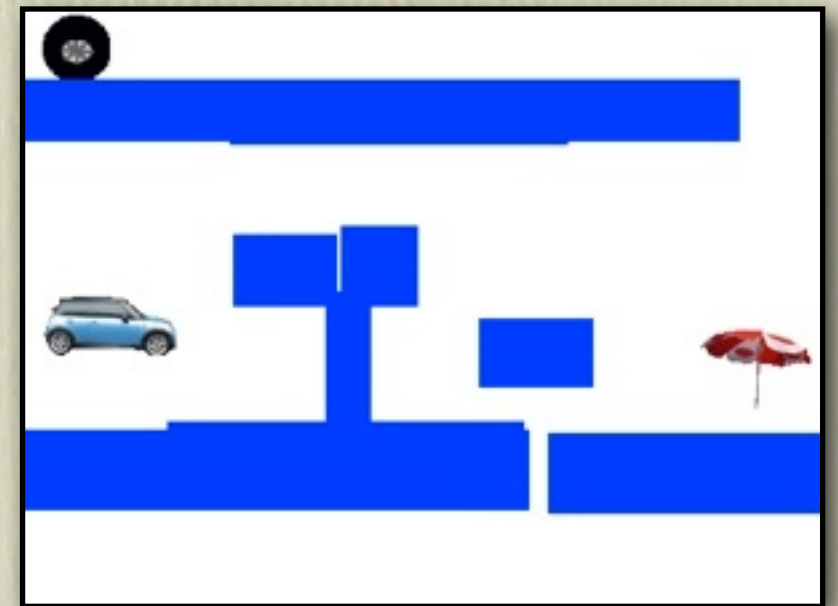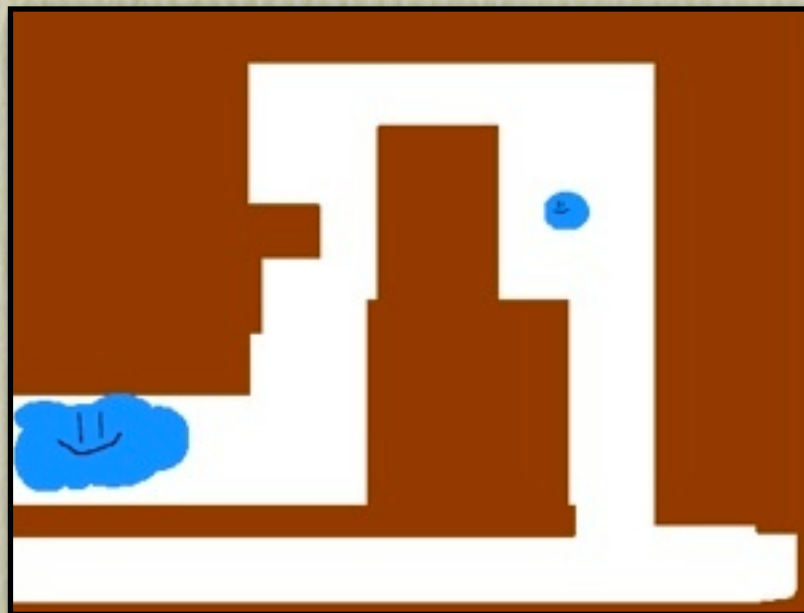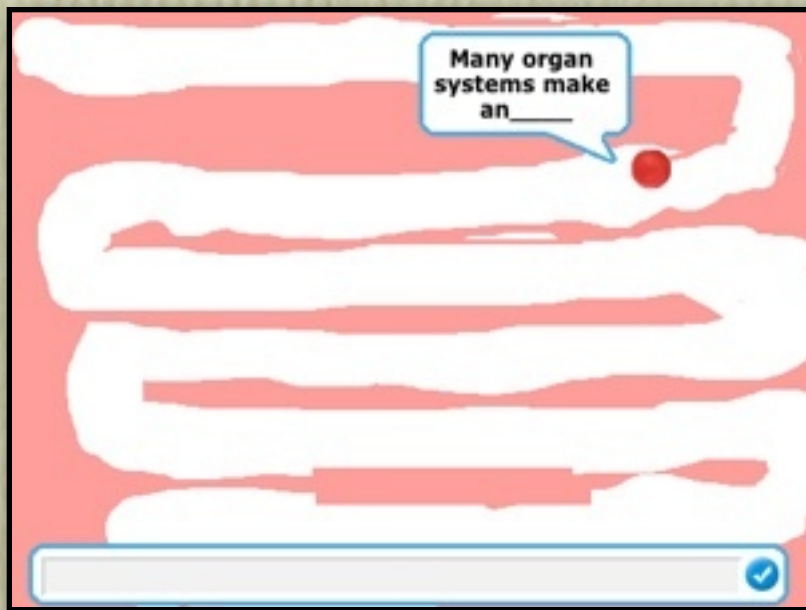# Window on Creativity

Personalized Projects

Familiar paper & pencil mazes come to life in Scratch. A window on a maze project reveals creativity in story as well as in Scratch techniques. For example, as creatures are caught, how does one save them in a glass jar?
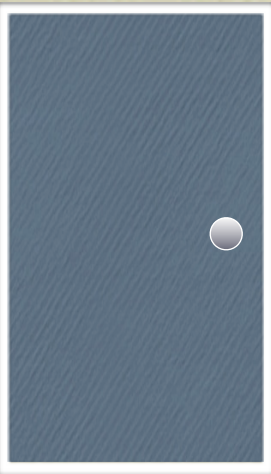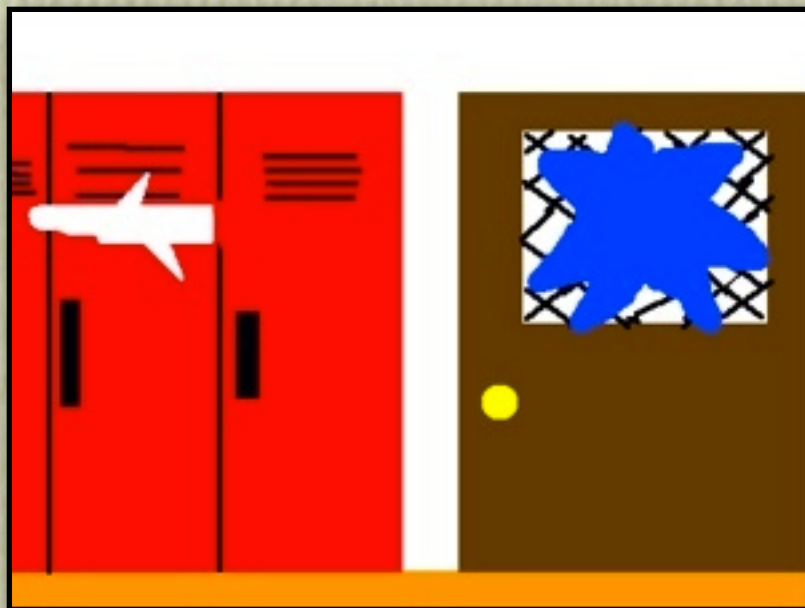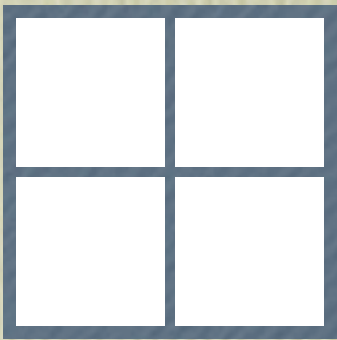
A-maze-ing!
Doors of Opportunity

So, a seemingly "basic maze" opens doors of possibility. Shape, story, controls, lives, levels, and prizes. Which commands and techniques will work? I was struck when my son said, "Mom, you're not going to draw the maze in the stage, are you? You need to make it a sprite!"
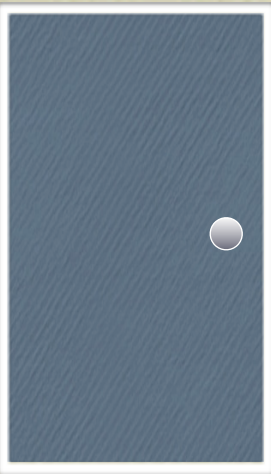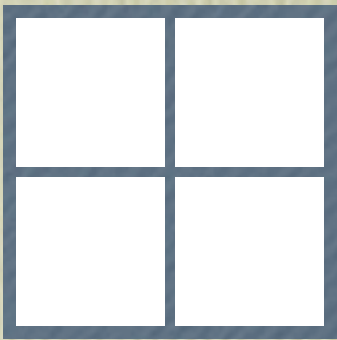
Thinking Through Scenarios

What if...?

Students can explore scenarios in Scratch, working through 'what if' situations. Whether creating a dialogue for a life-skills class project, or placing themselves as a character in an imaginary scene, their projects reveal attitudes, beliefs, ideas, and understandings.

A Class Project
Goes the Extra Mile
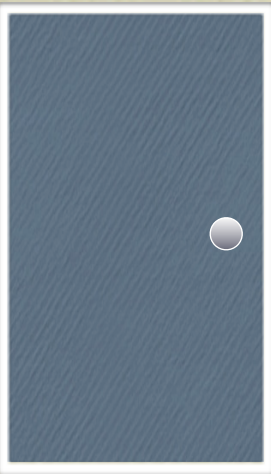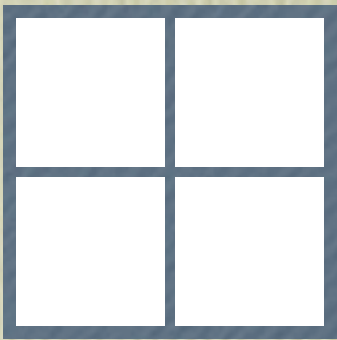
Assessment

Learning

World-wide Recognition

In class, a teacher can assess a project's content to see what a student knows about a topic. Here, each 'button' leads to a narrative and related quiz. On the Scratch website, an Australian remixed the IDEA of this project, replacing the content with World War II information.

Outside of Class Walls

Rocket Game

Programming Momentum*

Momentum - Part 4

Trigonometric Function
Explanation for sine, co-sine and tangent

• **TRIG & SCRATCH** -
The relationship of functions we'll use and which Scratch blocks you'll need are illustrated here, note that we won't be needing tangent (tan) but it's here for completeness, almost any discussion including sine and cosine will also mention tangent.

sin ▾ of angle   tan ▾ of angle

angle = θ   cos ▾ of angle
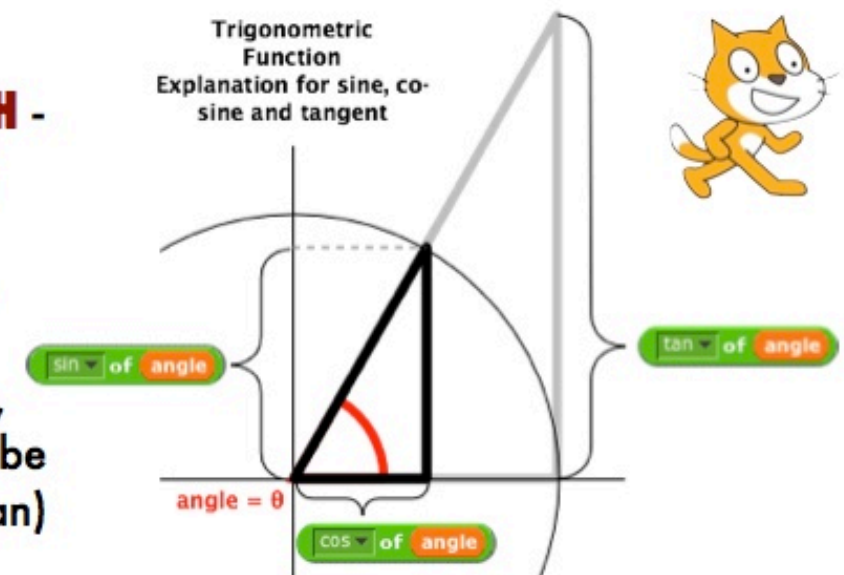
** Momentum - Part 4
by Daniel Green*

Student interests lead to learning outside class. Interested in creating a rocket game, a Middle Schooler with his teacher looked at the trig behind a rocket's movement in space. Thanks go to Daniel Green, for sharing a Scratch explanation of this topic.
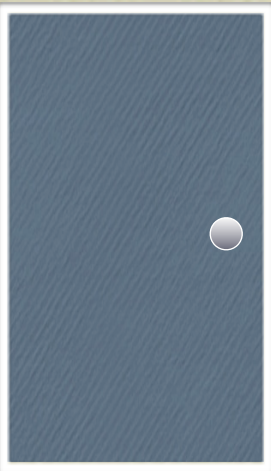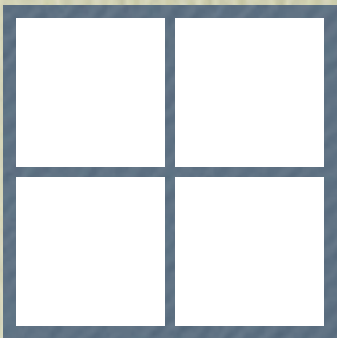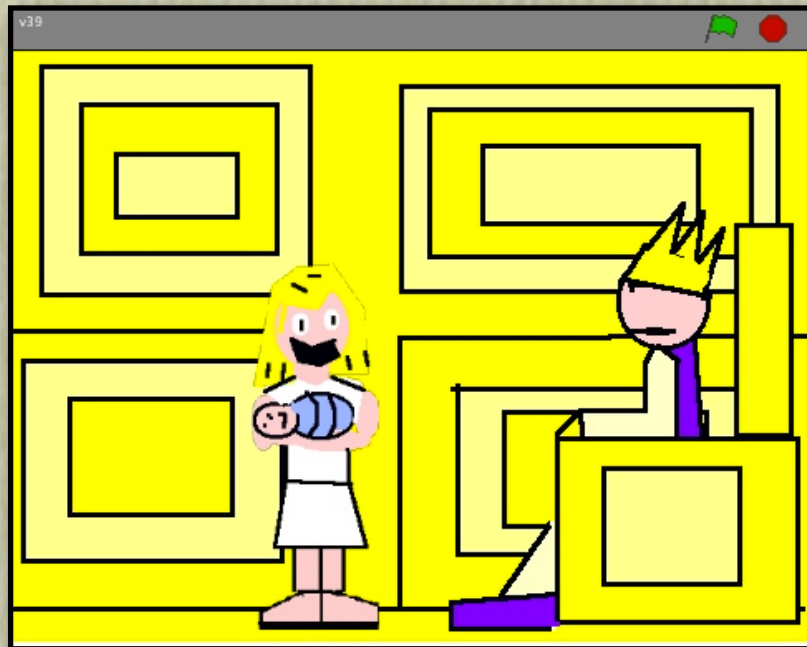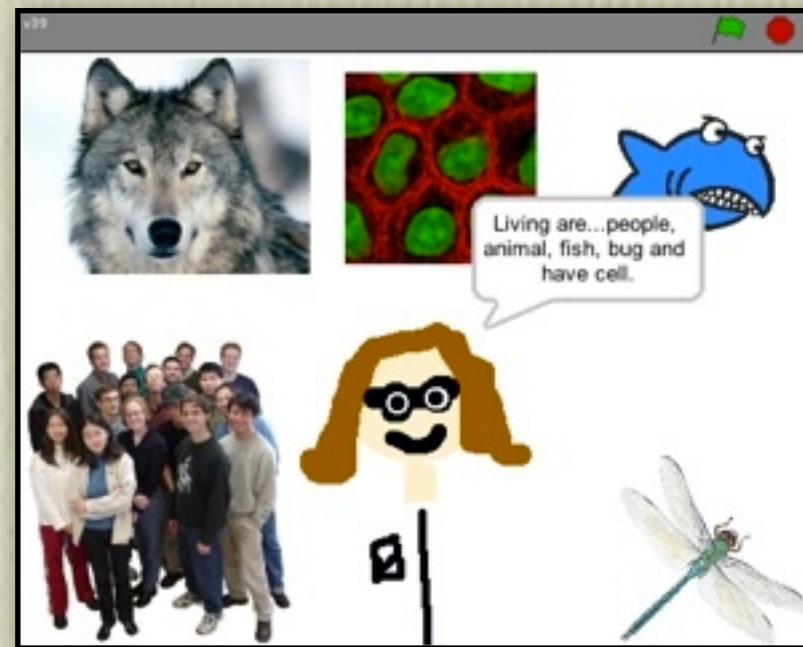
Student Scratch Fluency

Animated Presentations & Storytelling
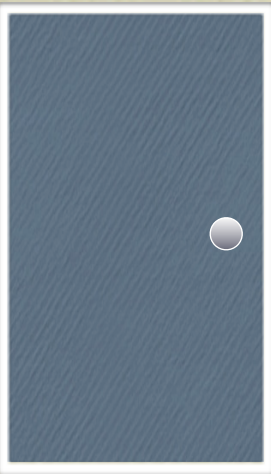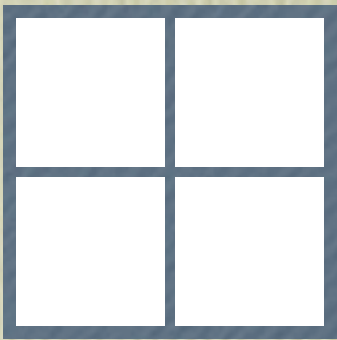
Sargon

Living or non-living

Camp White Cloud

Amelia Earhart

Over time, students develop a fluency in thinking with Scratch. Deaf students on the autism spectrum used Scratch adeptly to create animations. They were motivated to read books, gather information, and figure out English wording for 'say' and 'think' bubbles.
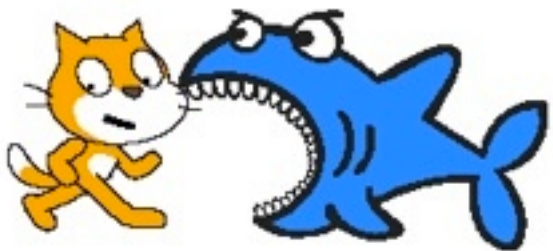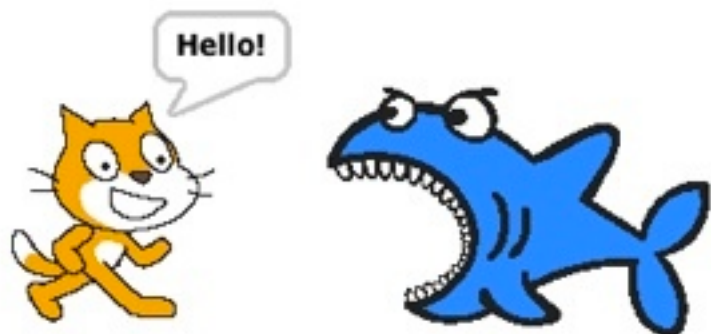
Teacher as Scratcher

Social Skills Animated Model
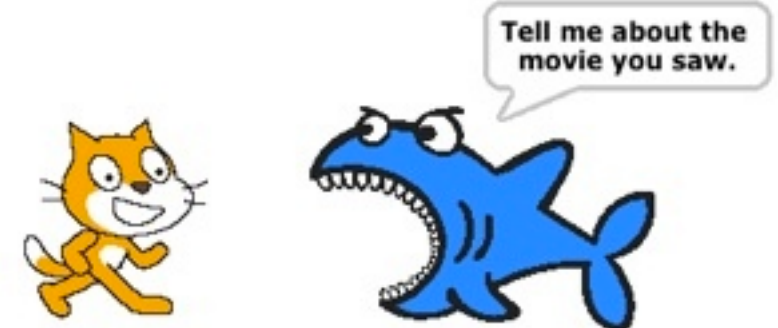
A teacher made an animated dialogue for a student as a way to discuss social skills. The student herself is comfortable creating Scratch animations. In a sense, she and her teacher have another common language besides ASL or English -- using Scratch projects to communicate ideas and information.

Teacher Scratch Fluency

Sundiata - Animated Scanned Student Drawings
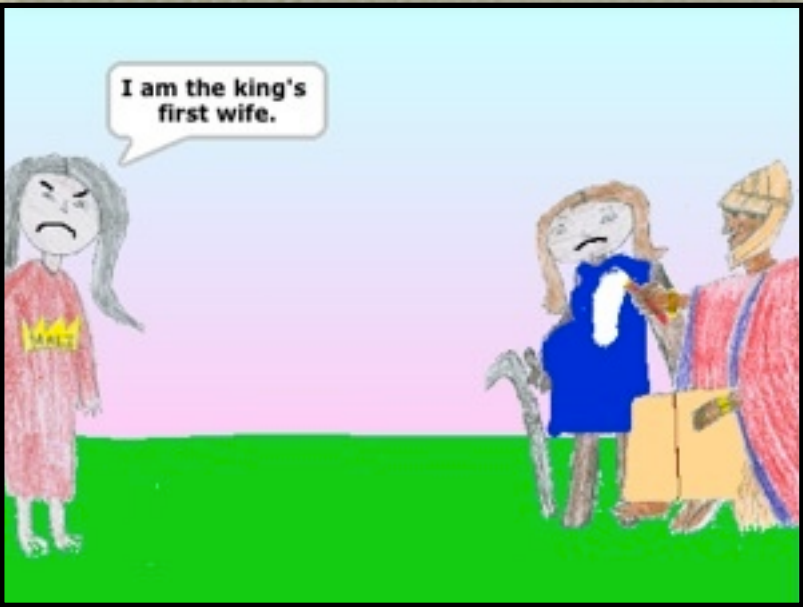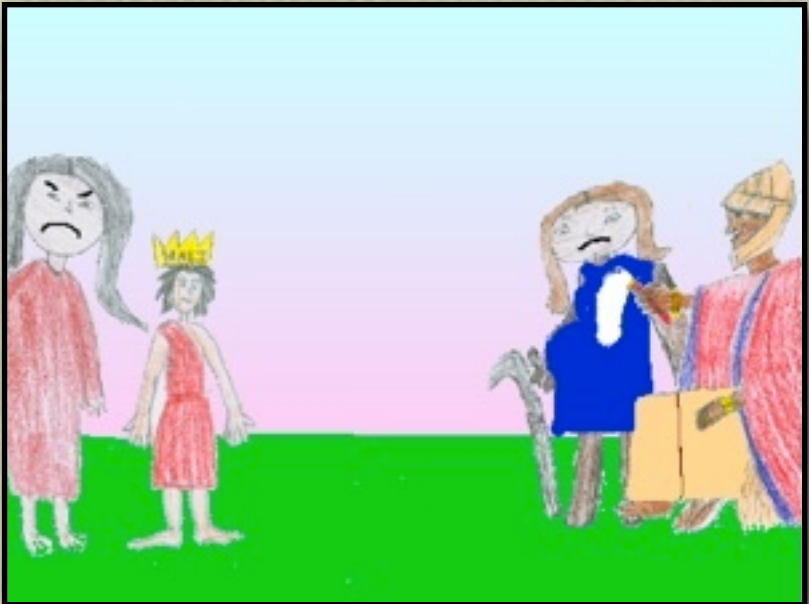
With experience, teachers also begin to 'think in Scratch,' seeing new applications for classes, and even becoming comfortable doing live coding. Here a teacher scanned in her students drawings, and via a Smartboard, animated the epic of Sundiata with her class.
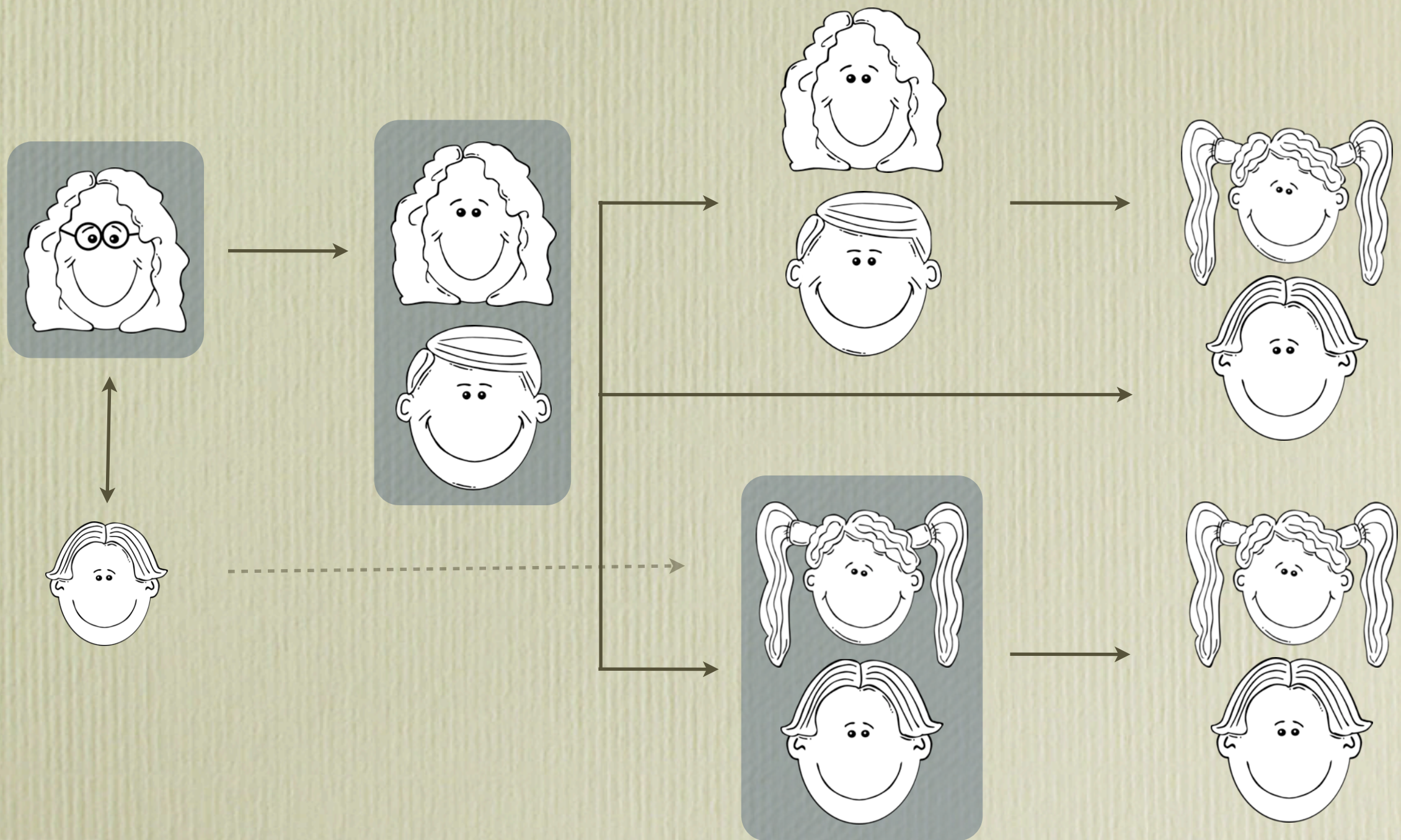
Scratch as a Tool for Teachers

English Verb Tense Animations

Most teachers have not had experience programming, but have lots of ideas. An English teacher who took our recent Scratch workshop went on to create many animations to demonstrate English verb tenses for her deaf students.
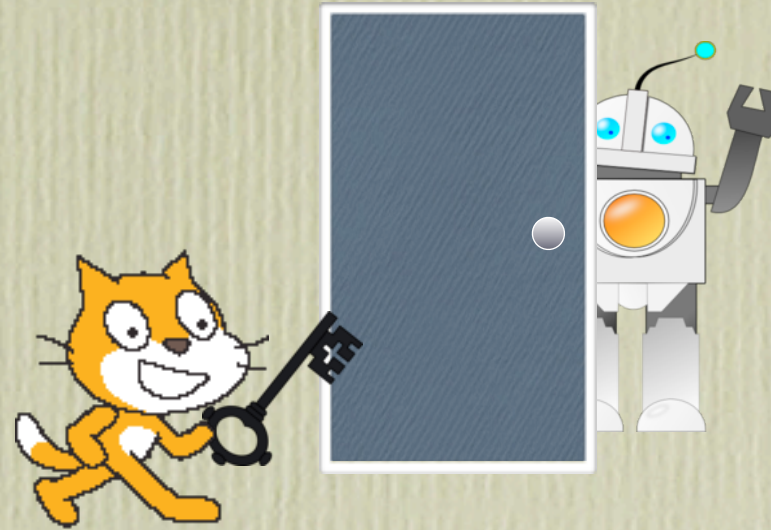
Our Growing Scratch Community

- BSF Grant

In the past year and a half, our community of Scratch users has been growing. We had an elective class, but much of the Scratch work was done in regular classes. This spring we gave an all-school update on the Scratch project, which led to people asking "what next?"

Scratch is a "Small Key"

- *A small key opens big doors.*
  --Turkish Proverb

- *We keep moving forward, opening up new doors and doing new things, because we're curious...and curiosity keeps leading us down new paths.*
  --Walt Disney

A small key opens big doors. –– As a small key, Scratch can unlock big ideas.

We keep moving forward, opening up new doors and doing new things, because we're curious...and curiosity keeps leading us down new paths. –– Scratch is fertile ground for curiosity and ideas.

Open Doors for Others
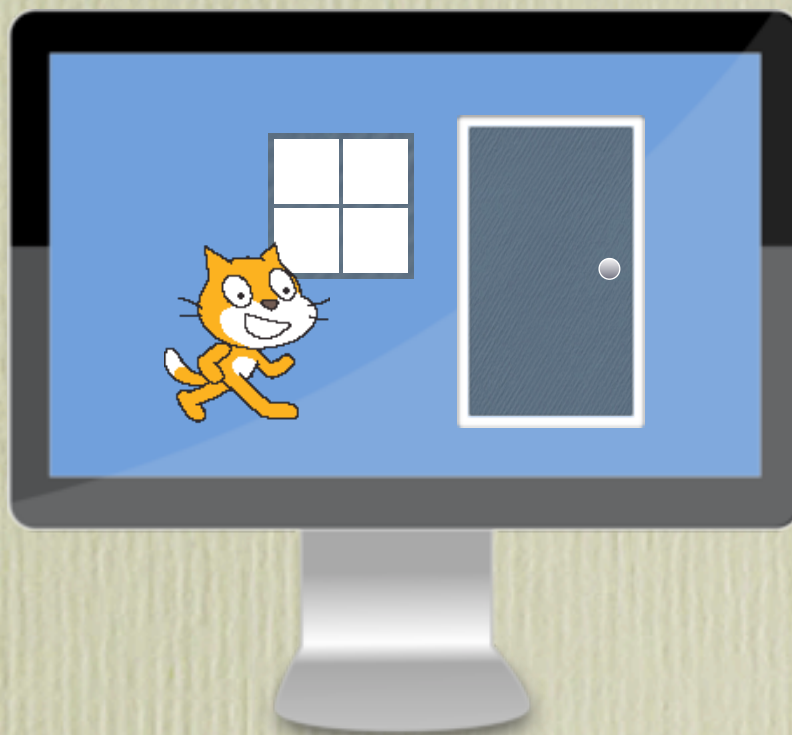
- *We must open the doors of opportunity. But we must also equip our people to walk through those doors.*
  --Lyndon B. Johnson

- *Be an opener of doors for such as come after thee.*
  --Ralph Waldo Emerson

We must open the doors of opportunity. But we must also equip our people to walk through those doors.
-- Scratch learning is at its best in the context of community. There we inspire and support each other.

Be an opener of doors for such as come after thee. -- With Scratch, learners become the next mentors.