1312129 Promoting Computational Thinking through Game & Simulation Design
1138526 CT4TC - Computational Thinking for Teaching Computing: Validating a Theory of Broadening Participation

STEM Tools

Crossing the Educational Chasm

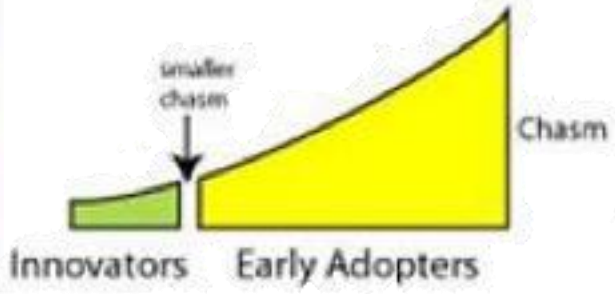
Alexander Repenning

University of Colorado Boulder

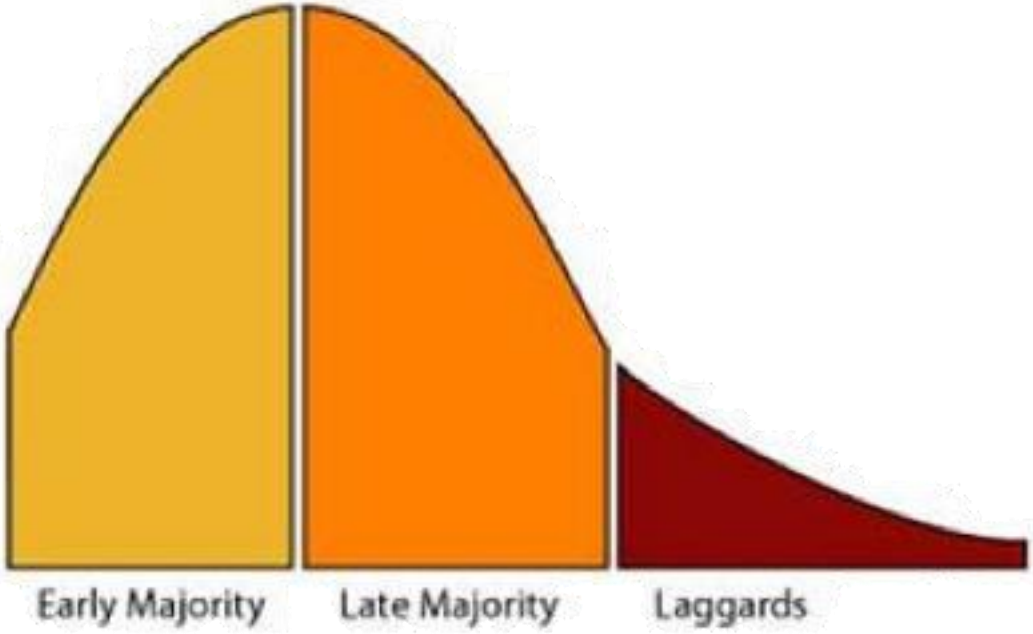
the STEM Tools Chasm

happy kids in front of computer

Self-selected teachers and students



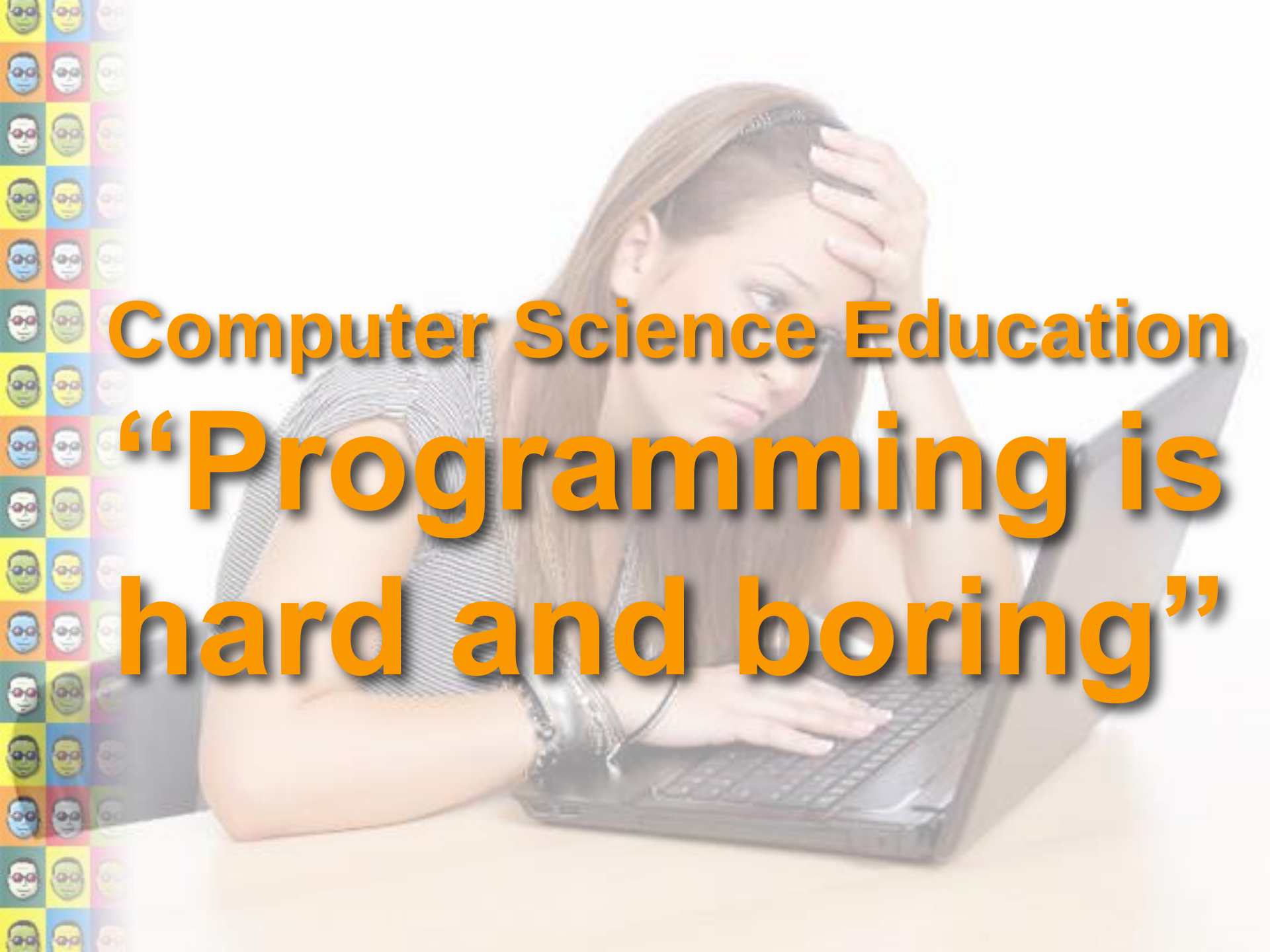
everybody ELSE



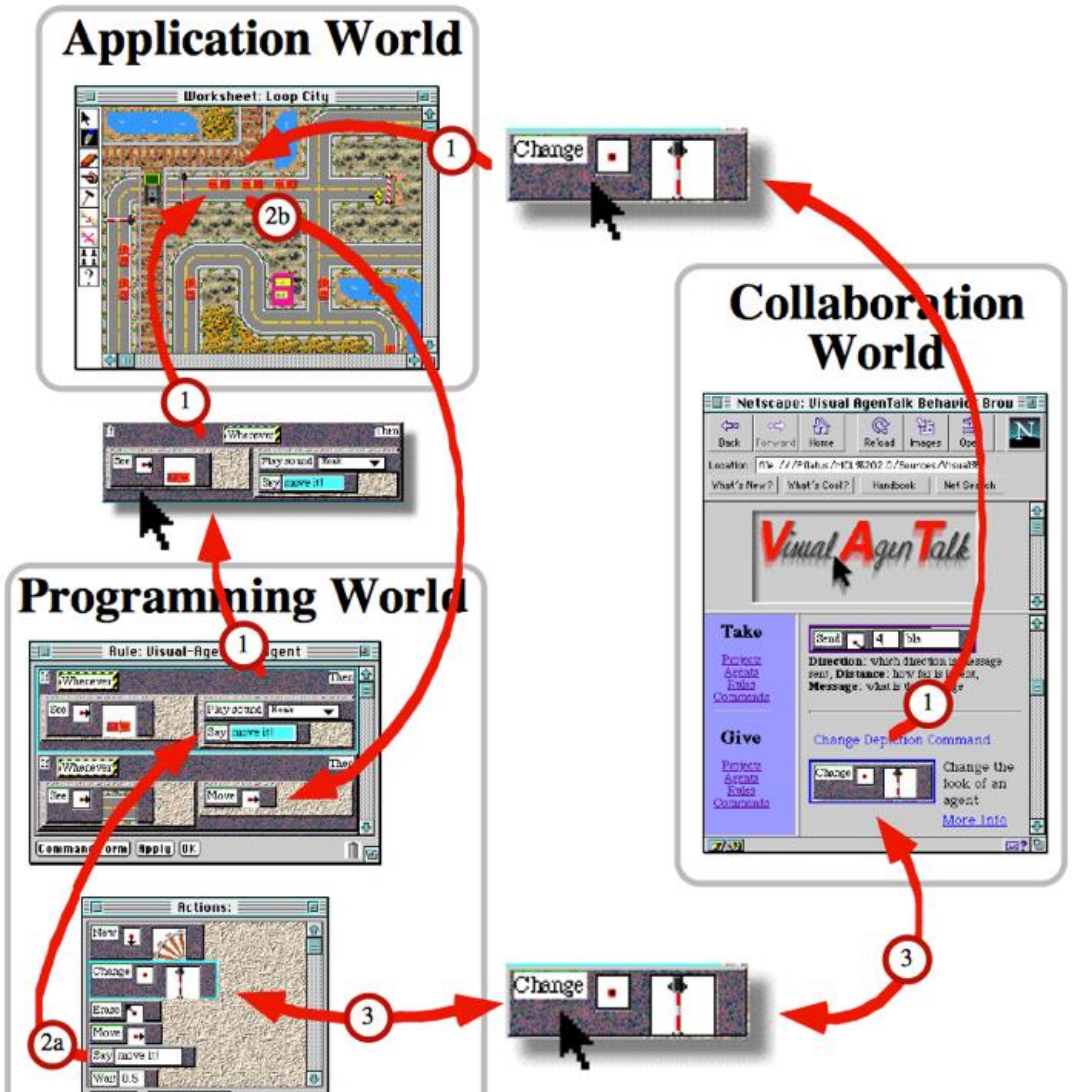
source: Geoffrey Moore

Exposure

expose everybody through low-threshold tools to engaging STEM activities


Computer Science Education
“Programming is hard and boring”

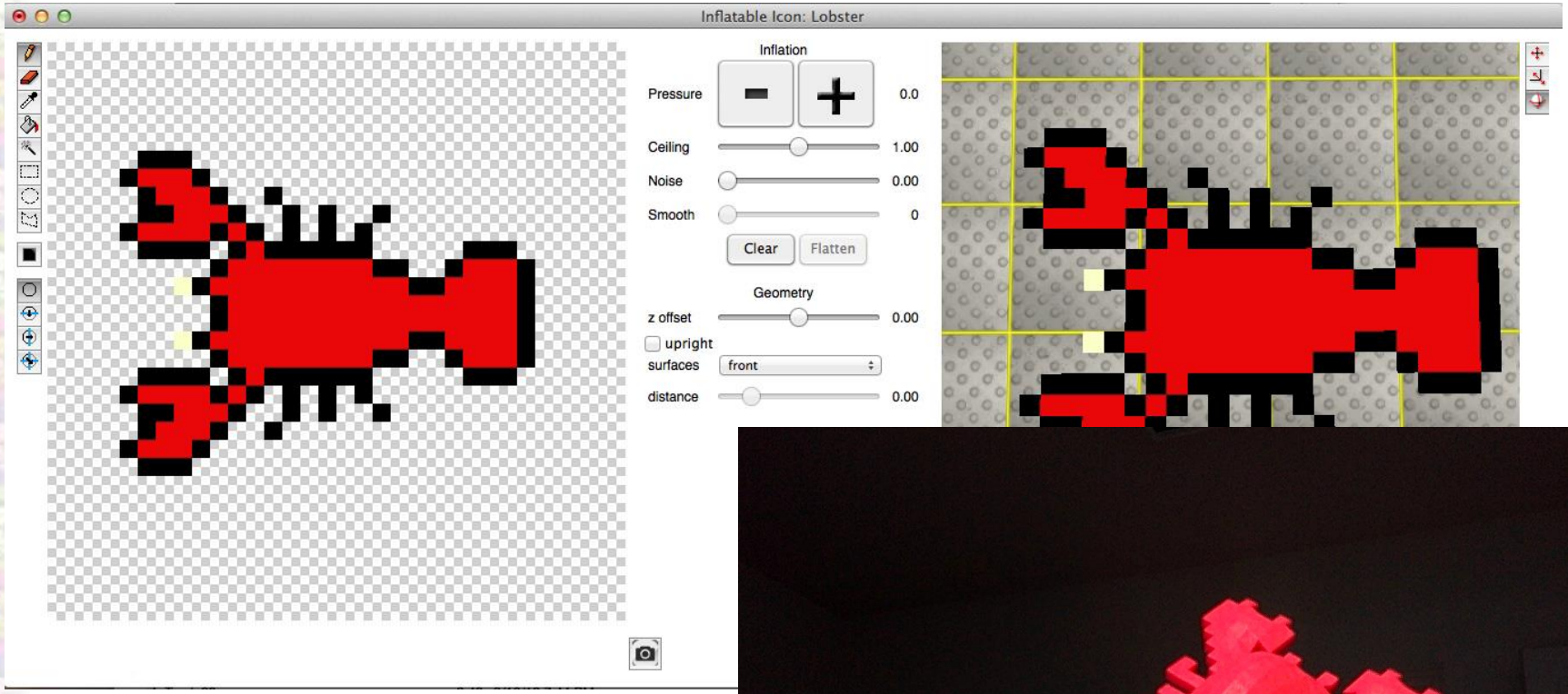
Cognitive Challenge
"hard" → accessible

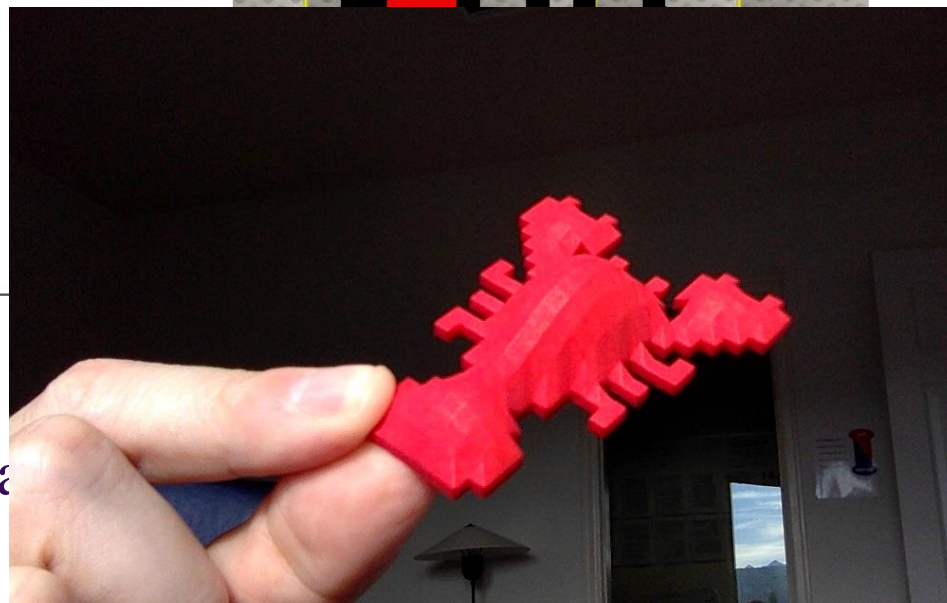


1995:

AgentSheets pioneers drag and drop programming

Affective Challenge
“boring” → exciting





Inflata

AgentCubes
Creativity3D

social dimension: share your STEM simulation

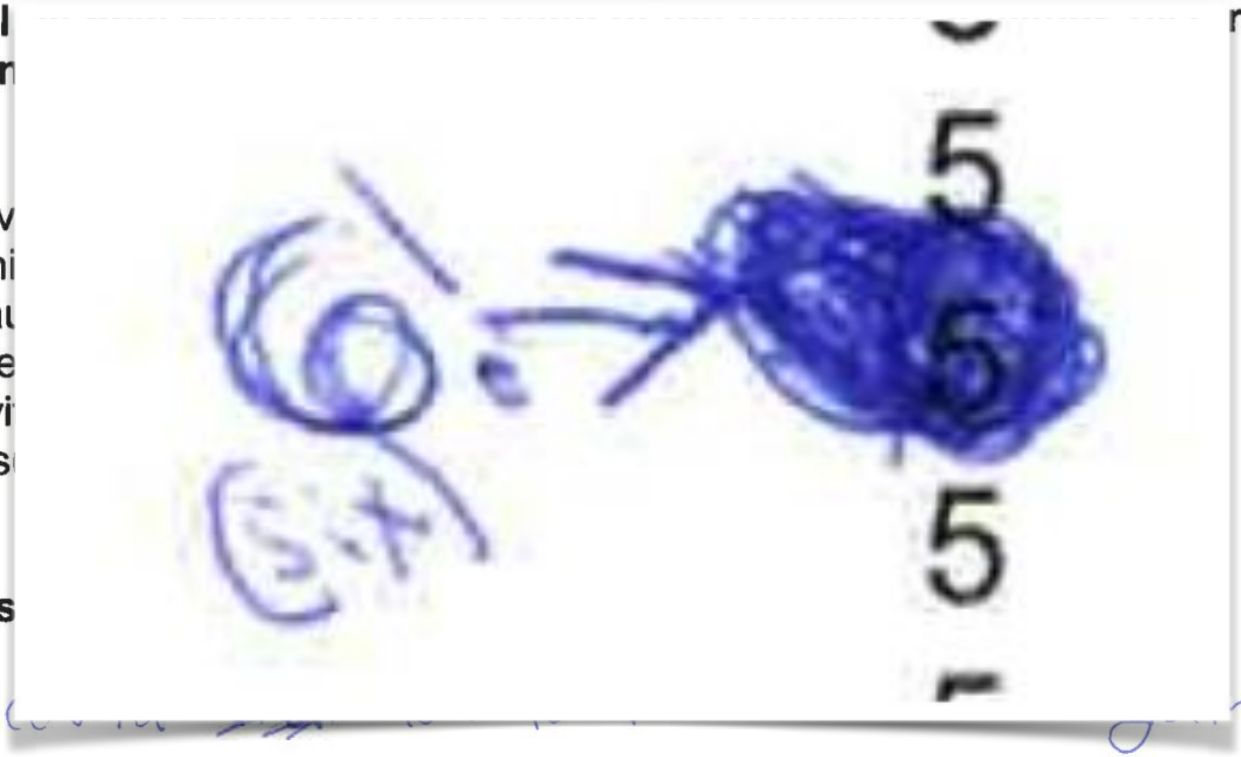
how motivated?

Girl Scout Survey

Please tell … **rcling a number on**

ACTIVITY		**WORST**
NCAR mov		1
NCAR Exhi		1
Balloon Lau		1
I Can Code		1
Wind Activi		1
Field Meas		1

Describe s



I disc… …e or the comp…

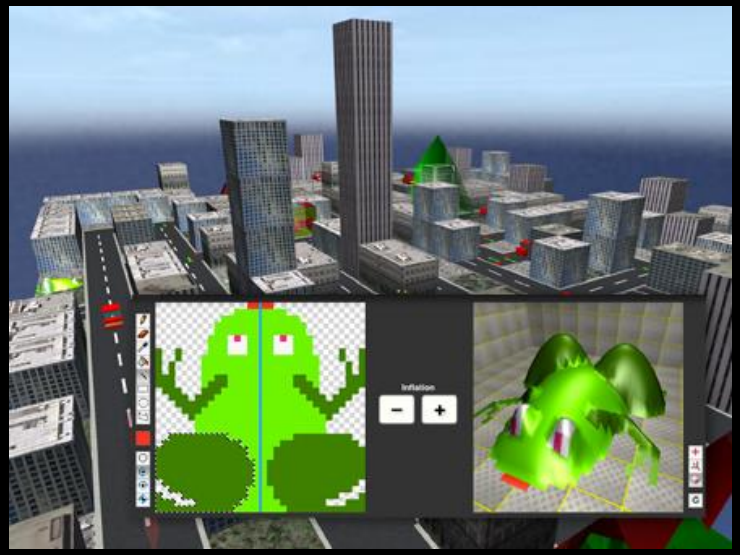
I also discoverd a new job I want to be when I grow up!

Computer Science Education Week
DECEMBER 9-15, 2013

HOUR OF CODE

how much exposure?

Exposure 2013: as part of Hour of Code the AgentCubes "Make a 3D Frogger" game activity was used by **~250,000 participants in just one week**.



In-Service Teacher Professional Development

SCALABLE GAME DESIGN

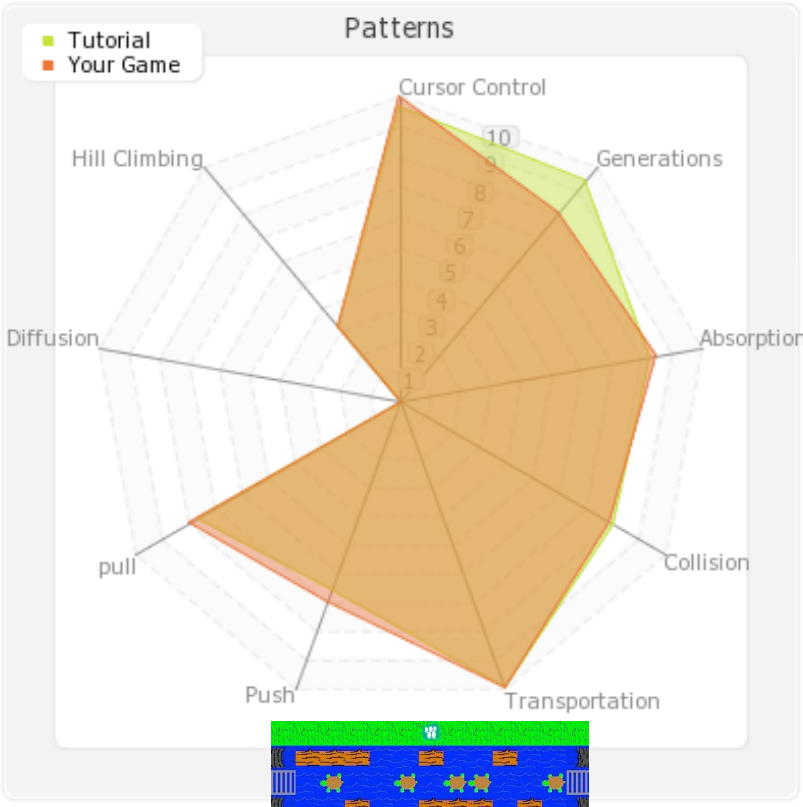
STEM + C curriculum for all

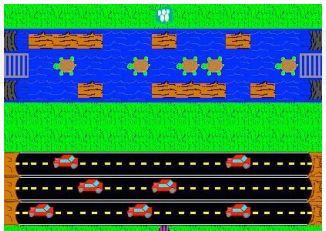
1. Learn about **Computational Thinking** by creating increasingly complex games
2. Leverage **Computational Thinking** to create STEM simulations (NGSS)

Instrumentation Challenge

- ***Assessing Transfer***: how can we measure that skills acquired in game design can be leveraged in STEM simulation building?
- ***Scaling Up***: how can we determine shifts in teacher professional development efficacy when transitioning from face2face to online learning?

Computational Thinking Pattern Analysis






does it work?
SCALABLE
GAME DESIGN
WISDOM
BRAVERY
FORTITUDE
We
Are
All
Relatives!

SCALABLE GAME DESIGN

ro… …xposure

- …48% un…
- Alaska, …
  Georgia, Ohio, …
  Texas and Wyoming...

Pre-Service Teacher Professional Development

Incentive Challenge

An intricate mix of economic needs, funding, educational standards, certifications, available tools and many other factors result in potential incentives for schools of education to integrate Computer Science education.

Fachhochschule Nordwestschweiz
Pädagogische Hochschule

2017

Every new elementary school teacher will receive **mandatory training** in computer science education

how to cross the chasm

Exposure

In-Service
Teacher
Professional
Development

Pre-Service
Teacher
Professional
Development

Thank you!

SCALABLE GAME DESIGN

AMD Foundation
Changing the Game

AgentSheets
computational thinking tools

Google

national center for women & INFORMATION TECHNOLOGY

SHODOR

csta Computer Science Teachers Association

SRI International®