

ScratchEd Case Study

You are probably familiar with the *Scratch* programming environment. It is a direct descendant of Logo, and cousin to NetLogo. Launched in 2007, Scratch uses a blocks-based drag-and-drop approach to programming that relieves coders of concern with syntax, allowing them to focus on design and creativity and the overall goal of developing a competency known as *computational thinking*, which the NSF and NRC argue is a key component of STEM education. From an overview of the learning goals of Scratch written by team members at the MIT Media Lab:

Scratch supports the cultivation of *computational thinking*, a set of strategies, skills, and capacities that draw on ideas from the world of computing (e.g., abstraction, debugging, and problem decomposition). In the past few years, there has been a growing recognition of the importance of computational thinking for understanding and solving problems in a wide range of contexts, not only in the field of computer science... As young people program and share Scratch projects, they begin to develop as computational thinkers: they learn core computational and mathematical concepts, while also learning important strategies for designing, problem solving, and collaborating. At the same time, young people begin to see themselves as computational creators, confident and capable of designing, creating, and expressing themselves with computational media, not merely interacting with it. (ScratchEd NSF Proposal)

Scratch was originally developed in conjunction with Mitch Resnick's work in after-school Computer Clubhouses, and has continued to thrive in part due to a large and active online community that enables project sharing, remixing, and discussion. The global community of "Scratchers" is akin to the "Maker" or "Hacker" movement, what Henry Jenkins would call an instance of participatory culture. But whatever you want to call it, Scratch has thrived mostly apart from formal education, in a variety of informal and organic contexts. What would happen if Scratch were to become part of a computational thinking "curriculum" in formal K-12 settings? What would happen to the use-model(s) for Scratch as conceived by the Media Lab?

In 2010, Resnick and colleagues were awarded an NSF grant to explore extensions of Scratch into formal education (ScratchEd). Their stated goal was:

...not simply to proliferate the use of Scratch, but to support and encourage a design-based approach to teaching and learning. While some of the initial teachers using Scratch have adopted design-based approaches for introducing Scratch, many others have adopted more traditional "instructionist" strategies due to various pressures, such as insufficient support, lack of resources, or challenges in accommodating standards. We believe a design-based approach is important for connecting to the interests of a broader range of students, creating a space for deeper understanding of computational ideas through reflection, expanding possibilities for collaboration, and providing opportunities for experiencing and learning about the process of design – an important component of computational thinking. (ScratchEd NSF Proposal)

The MIT team proposed to develop "technologies, models, and resources" to support the use of Scratch in formal K-12 education, and also to employ the following mechanisms for teacher support and professional learning:

- An online community, called ScratchEd, for teachers working with or interested in Scratch

- Face-to-face and online gatherings where teachers can gain a deeper understanding of Scratch, computational thinking, and design-based approaches to learning
- Guides for teachers to use when introducing Scratch to students and when conducting workshops for their colleagues

A key component of this work was the development of a curriculum guide (<http://tinyurl.com/scratchteacherguide>), designed to be subject-area and grade-level neutral, and containing a range of activities for introducing Scratch and connecting it to fostering design-based learning in the formal classroom setting.

In her dissertation on ScratchEd, Karen Brennan focused on the tradeoffs that arose in the transition from informal to formal learning. She cast this as striking a balance between *agency* and *structure*. Scratch and the Scratch online community emphasize agency for learners/creators. Work on whatever interests you, in whatever way interests you, and for however long it interests you, and in whatever amount of depth you are interested in achieving. Papert described this as “low floors and high ceilings,” and it was a core design attribute of Logo. Resnick and colleagues extend this metaphor with Scratch to include “wide walls,” emphasizing that learners should be able to work on whatever motivates them. Schools, however, often emphasize structure. What standards are being addressed? How will learning be evaluated across students/teachers/schools/nations? How does the lesson fit within a class period or within the term/semester?

The developers of Scratch focused their development around informal learning to avoid many of the constraints of formal schooling. Will they be successful in making the transition to the world of K-12 education?

Questions for Discussing the Case:

1. What types of school contexts do you think are good places to help bring this innovation to scale? Why?
2. What kinds of conversations would you want to have with school teachers or school leaders to better understand the constraints for using Scratch in school?
3. What do you anticipate will be the challenges associated with bringing Scratch to scale in formal education?
4. What would you study, to inform and adjust the process of scaling?