

# Getting Unstuck

## Teacher and student resources to support conceptual and creative fluency with Scratch

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### Motivation

PK–12 introductory programming experiences are often highly scaffolded, and it can be challenging for teachers and learners to transition from scaffolded experiences to experiences of learner-directed work, where learners are solving problems and fluently expressing ideas through programming. Professional development and educative curriculum materials (ECM) can support teachers in cultivating the skills and strategies for facilitating learning experiences for young people.

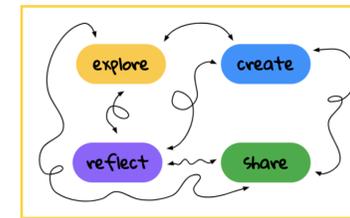
In this design-based research project, we are studying how an online professional learning experience for PK–12 computer science teachers called *Getting Unstuck* can be adapted for use by teachers in the classroom, through the design of ECM for upper elementary grades. Our goal is to increase teachers' conceptual and creative fluency with the Scratch programming environment, in service of cultivating conceptual and creative fluency with their students.

### Research design

In spring 2020, we partnered with four classroom teachers at Title I and/or rural schools to design upper elementary ECM to support students and teachers in developing their creative and conceptual fluency. The ECM consist of ten prompts for creating Scratch projects, where each prompt is focused on a key computational concept. The ECM then served as the foundation for our two-week professional learning experience for teachers, hosted in summer 2020. During the summer experience, 298 participants created and shared 2,251 projects.

In spring 2021, six participants from the summer experience piloted the ECM. Pilot teachers, who were working in Title I and/or rural schools, taught at least three of the prompts. Data collection included: pre- and post- interviews with teachers, teachers' reflective journals, student work (i.e., Scratch projects), and classroom observations. Findings from the pilot are informing revisions to the ECM, which will be released publicly in July 2021.

### Design studio model



This work is guided by a vision of the classroom as a design studio—a culture of learning that supports students' developing fluency with computational concepts and creative practices. Through this work, we have developed a new learning framework called the *creative computing design studio model*.

The model identifies four key activities of design processes: *exploring*, *creating*, *sharing*, and *reflecting*. In design, these activities are not sequential; they often happen concurrently and iteratively. In the design studio classroom, students work on creating projects, with scaffolded opportunities to explore their interests, share their work, and reflect on their learning.

### Preliminary findings

Pilot teachers shared positive feedback, describing the ECM as comprehensive, flexible, and full of ideas and resources that helped them experiment with new teaching practices. Teachers documented development of students' creative and conceptual fluency during the pilot, noting how students experimented with new concepts and became invested in their projects.

In revisions to the ECM, we are focused on: (1) how examples and models can support the development of creative and conceptual fluency; (2) how to support greater student autonomy at different moments in the design process; and (3) how to encourage student writing in support of reflection and feedback. Revisions include the introduction of new materials, such as additional feedback strategies, as well as changes to existing materials, such as modifications to existing examples to better connect to student needs.



**SPRING 2020**  
Co-design  
curriculum materials



**SUMMER 2020**  
Facilitate online professional  
learning experience



**SPRING 2021**  
Pilot curriculum materials  
in classrooms



**SUMMER 2021**  
Revise and release  
curriculum materials