

# Introduce Programming in a Fun, Creative Way

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**W**HAT if there was a way to get younger students excited about learning to program? There is: Scratch, a computer programming language developed at the MIT Media Lab by the Lifelong Kindergarten Group. It teaches the basics of programming at an introductory level and in an engaging way.

Scratch projects are developed by snapping together movable blocks of code, enabling even young children to design animated stories, games, and artwork. The best part is that Scratch is free and your students can share their creations with others around the world!

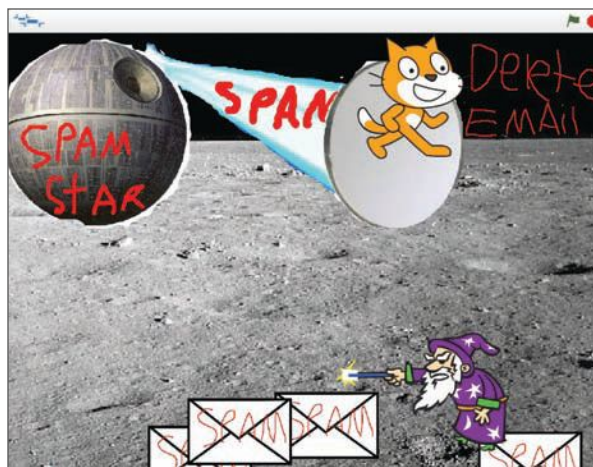
## Details on Scratch

With Scratch 2.0, the newest version of the language, students can create and share their own multimedia animations. To begin programming, they choose characters, known as “sprites,” from the Scratch database. They can also draw their own sprites. Next, they drag a block of code using the mouse. Each block of code tells the sprite to perform a certain function or command (for example: Move 10 steps). Students snap these blocks together until they form an algorithm, or chain of commands.

Students can select various costumes for their characters. They can also add music or sound effects, or record their own sounds using

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Left, screenshot of a student-designed Scratch animation

a microphone. For example, a student animating a dragon sprite can record the sound of the dragon roaring every time it moves forward or approaches another character. When they are finished with their animations, students share them online, while following teacher guidelines. They are shared within the Scratch community, which is safe and supportive.

Students improve their digital literacy when they learn to read and write code. According to Mitch Resnick, its inventor, Scratch teaches children to “think creatively, reason systematically, and work collaboratively.” They learn to experiment with new ideas.

By placing an object or character at different coordinates on an axis, they can effectively grasp abstract



Below, a student programs with Scratch.

programming concepts, which become concrete and meaningful. For example, they learn about loops and conditionals.

Scratch also teaches persistence. Students have to figure out how to program sprites to behave a certain way by using a set of commands. If a sprite doesn't respond the way they expected, they need to “debug” their animations, by changing them slightly and then observing the outcome. Succeeding in these chal-

allenges gives students a sense of accomplishment and helps build confidence.

## Computer Literacy Courses

This year, a colleague and I teamed up to devise a new Introduction to Computer Programming unit for our sixth-grade students. We received a generous grant from a local organization, the Arlington Education Foundation, for the purchase of high-quality headsets with microphones for our students to use with Scratch. The headsets enabled students to work with audio in a classroom that was quiet and productive.

In our Digital Citizenship and Literacy class, students learn to stay safe online, protect their privacy, and act responsibly using the computers. Our goal was for students to create animations in Scratch that would embody one of the core values of digital citizenship they had learned about in class—for example: “Be kind online,” “Choose a safe password,” or “Think before posting on a website.” We walked them through the process of setting up their accounts (<http://scratch.mit.edu>), while laying down some basic rules about interacting within the Scratch community. Rules can be found on the Scratch website, under Scratch Community Guidelines.

Our students started learning by viewing video tutorials online (<http://inventwithscratch.com>) and practicing what they had learned. For their first project, which gave them an understanding of how Scratch works, they figured out how to animate the letters of their first name. Each letter, when clicked on, had to perform an action: move, change colors, or make a sound. Next, each student created a dialogue illustrating the importance of one of the core values of digital citizenship.

## A Successful Project

We were impressed with the results. Most students loved working on this project! Some liked the project so much that they even worked on their project from home. Students with prior experience using Scratch were willing and often eager to help

others. Our students shared their animations, and my colleague and I were both able to create “studios,” or collections, of students’ work in Scratch.

Part of what made this curriculum such a positive experience for students was the social networking aspect of Scratch. Being part of a social network creates a sense of community and belonging. After viewing a project in Scratch, it is possible to show your appreciation by clicking on the heart or the star or

leaving a positive comment. Students liked that they could show off their animations and interact with peers virtually by leaving positive feedback online.

One talented student created a game for her Digital Citizenship project. Games are especially challenging because they involve using variables. The student’s game showed the dangers of phishing emails, phony spam emails sent with the intent of tricking someone into giving out personal information. Many of my students



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“loved” her project, clicked the star to add it to their favorites, or left positive comments. Needless to say, the game creator was very pleased with the reactions of her peers.

## Advice for Educators

Teachers need to ensure that students conduct themselves ap-

or go to <http://inventwithscratch.com>. (For teachers in the New England area, there are also free Scratch Educator Meetups at MIT.)

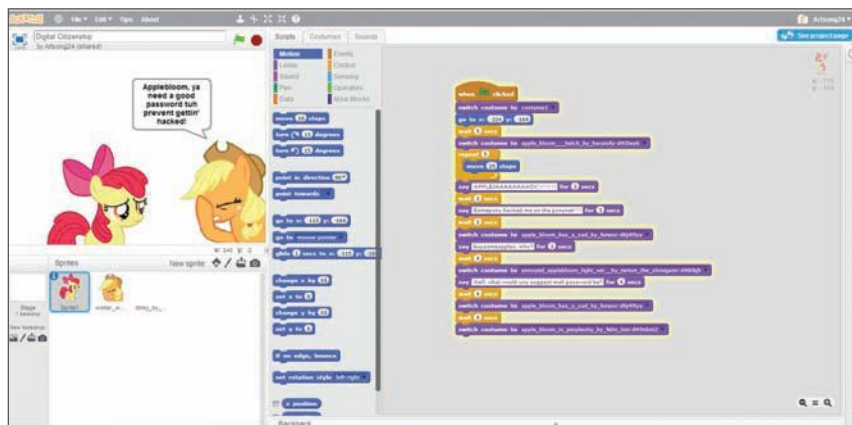
- Use a permission slip for this assignment. We created a permission slip for our students to take home for parents or guardians to sign. We also encouraged parents to contact

they can select a checkbox that will disable commenting.

- Stress the importance of following the Scratch Community Guidelines, which can be found at [http://scratch.mit.edu/community\\_guidelines](http://scratch.mit.edu/community_guidelines).

- Keep students accountable by collecting data, such as their Scratch username and the link or URL to their project. Students should create a username that is different from their actual name so that their private information stays private. (If desired, they can incorporate their first name into their user name.) By keeping track of their user names, if any comment is less than positive, you will know immediately who made the comment. We used Google Forms to collect this data. We also had students email us the links to their projects.

- Display student work by creating a Scratch Studio and then uploading finished projects. This is very easy to do. A studio is essentially a gallery that makes it easy to view students' work. This way, you can keep all students'



Scratch user interface

propriately online. Throughout the school year, I stress the importance of keeping personal information private. Much of the curriculum for our Digital Citizenship and Literacy course is based on the Digital Citizenship lessons from Common Sense Media ([www.commonsensemedia.org](http://www.commonsensemedia.org)).

Since many of my students already use social networking platforms outside of school, I teach them the norms of appropriate behavior with regards to technology use. With Scratch, I can show them what following these guidelines looks like, while allowing them to express their creativity and participate in the Scratch Community.

Here are some tips to help teachers incorporate Scratch into their curriculum:

- First, learn about Scratch yourself. Set up your own Scratch account online. By exploring the website, creating a project, and experimenting on your own, you can learn how to drag blocks of code to create scripts that will tell the sprites what to do. To view guided video tutorials or ask a question via the Scratch forum, visit the Scratch Help Page

us with any questions. We used a checklist to keep track of who had turned in their permission slip. Once we had them all, we began guiding our students in the account setup process.

- Give students the option NOT to share their work. Each project made public has a unique URL which can be shared in the form of a link. If any students or parents feel uncomfortable with the idea, projects can remain private. There is a “share” button on Scratch, and if clicked, the project will be shared on Scratch; if it isn’t clicked, it will stay private.

- Inform students that they can choose not to allow comments. If students are comfortable with the sharing aspect of Scratch but don’t want anyone commenting on their project,



A student shares her animation.

projects together in one place, side by side. You can give the studio a name and share it using the direct link.

## Final Thoughts

We found this approach to teaching programming very effective and the response from our students overwhelmingly positive. Scratch is a fun and engaging way to introduce programming, and it’s a platform for creativity that can be used across various subject areas. ©