

Mother's Day, Warrior Cats, and Digital Fluency: Stories from the Scratch Online Community

Mitchel Resnick, mres@media.mit.edu
MIT Media Lab

Abstract

In many parts of the world today, young people grow up surrounded by computers, electronic toys, game machines, and mobile phones, and they use these digital devices to engage in a diverse range of activities: playing games, texting friends, exploring virtual worlds, searching for information online. But most young people have little experience designing and creating with digital media. They feel comfortable playing with interactive games, animations, and simulations, but not creating their own. They are not truly fluent with digital technologies: it is as if they can “read” but not “write.” This paper uses stories from the Scratch online community to explore the meaning of digital fluency, providing examples of how young people can learn to express themselves fluently with digital media.

Keywords

Programming, fluency, Scratch

Story #1: Mother's Day

On Saturday, May 7, 2010, I suddenly realized that the following day was Mother's Day and I hadn't gotten a gift for my mom. So I started thinking about last-minute gifts. Instead of buying a gift, I decided that I would make my mom an interactive Mother's Day card, using the Scratch programming software developed by my research group at the MIT Media Lab.

Before starting to create my Mother's Day card, I decided to check out the Scratch community website, where people share Scratch projects. People have shared more than 2.5 million Scratch projects since we launched the website in 2007, so the website can serve as a great source of inspiration. By looking through the website, you can view and try out a wide diversity of different types of projects, many of which you never would have imagined on your own. I wondered if other people had created Scratch projects for Mother's Day, so I typed “Mother's Day” in the search box on the website, and pressed Return.

I was surprised and delighted by the results that appeared. There was a list of dozens and dozens of Mother's Day card, most of them created by young people between the ages of 8 and 16, the core demographic of the Scratch online community. I checked the dates on the projects, and I saw that most of them had been created in the past couple days, by procrastinators like myself.

I began clicking on the links to see the projects. One of the projects (see Figure 1) was a short animation featuring a kitten and a larger cat. The kitten turns around, sees the larger cat, and shouts out “MOMMIE!” Then, the kitten joyfully jumps on the big cat, knocks her over, and says “I♥U”. At the end of the animation, the creator added a replay option, to make it easy for her mother to view the animation again (and again and again).

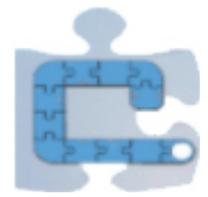


Figure 1: Sample Mother's Day projects from the Scratch community

Another project was an extended story in which a Scratcher explains how she had searched online to find the correct date for Mother's Day. The project includes photographs of her room and the computer on which she did the search, along with sound effects to simulate her keystrokes as she types the search query into the computer. The story ends with a cartoon image of herself saying "I love you SO much!" with arms stretching across the screen to show how much she loves her mom.

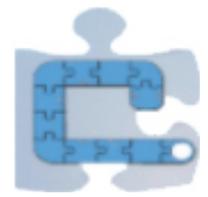
A third project started with the words "HAPPY MOM DAY" drawn on top of a large red heart. Each of the 11 letters was interactive, transforming to a word when touched by the mouse. As I moved the mouse across the screen, touching each letter, a special 11-word Mother's Day message was revealed: "I love you and care for you. Happy Mother's Day mom."

As I played with the Mother's Day projects, I felt a sense of satisfaction. This was exactly what our team at the Media Lab had hoped would happen when we developed Scratch. Our goal was to help young people become *fluent* with digital technologies. We hoped that young people would use Scratch to create projects that were meaningful in their everyday lives, not just as school assignments. We hoped that creating Scratch projects would become as common and familiar as writing an entry in your diary or baking a cake for a friend's party – or creating a card for your mom on Mother's Day.

Of course, most young people already spend lots of time interacting with digital media. They have grown up surrounded by computers, electronic toys, game machines, and mobile phones, and they use these digital devices to engage in a diverse range of activities: playing games, chatting with friends, exploring virtual worlds, searching for information online. Indeed, they are often described as "digital natives."

But, despite their comfort and familiarity with digital media, most young people have little experience *creating* with digital media. Even when they do create with digital media (for example, manipulating images with Photoshop or mixing music with Garage Band), they rarely create *interactive* projects, and thus do not take full advantage of the possibilities of digital media. Most young people feel comfortable playing with interactive games, animations, and simulations, but not creating their own. As I see it, they are not truly fluent with new digital technologies: it is as if they can "read" but not "write."

In developing Scratch, we wanted to support both reading and writing with interactive media. We wanted to enable everyone to create their own interactive stories, games, and animations – and to share their creations with one another. Our ideas were strongly influenced by earlier research on



Constructionism 2012, Athens, Greece

programming languages for young people, most notably the work on Logo and Squeak Etoys. We were inspired by this earlier work, but we also recognized the need to do some things differently. We designed Scratch to be:

- *More tinkerable.* To create programs in Scratch, you snap together graphical blocks into stacks, just like LEGO bricks, without any of the obscure syntax (square brackets, semi-colons, etc.) of traditional programming languages. Thus, it is easier to “tinker” with Scratch – quickly trying out new ideas, then continually modifying and refining.
- *More meaningful.* Scratch supports many different types of projects (games, stories, animations) and many different types of media (graphics, photos, sounds, music), so it can engage people with a wide diversity of interests, even people who had never imagined themselves as programmers.
- *More social.* The Scratch website hosts a vibrant online community with more than 1 million registered members. You can share and get feedback on your own projects, remix other people’s projects, or join a “collab” to create collaborative projects.



If you look at the Scratch website, you get a sense of the fluency in the community. Young people (mostly ages 8 to 16) are using Scratch to create an extraordinary range of diverse projects, including interactive newsletters, science simulations, virtual tours, public-service announcements, re-creations of classic video games, animated dance contests, and even Mother’s Day cards.

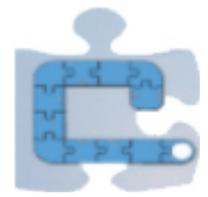
So what happened with my own Mother’s Day card? As it turns out, I never ended up making a card for my mom. Instead, I sent her links to a dozen Mother’s Day projects that I found on the Scratch website. And my mom, a lifelong educator, responded exactly as I hoped she would, sending me the following email message: “Mitch, enjoyed viewing all the kids’ Scratch cards so much... and I love that I’m the mother of a son who helped give kids the tools to celebrate this way!!!!”

Story #2: Warrior Cats

A few years ago, I was invited to make a presentation at a conference called *Story 3.0*. The conference focused on “the innovation, culture, and business of next-generation storytelling,” examining how digital technologies could transform the nature and role of stories in the 21st century, just as previous technologies (like the printing press and photography) had transformed story-telling in earlier eras.

I was scheduled to speak about story-telling in the Scratch community during the first morning of the conference. The speaker immediately before me was from an educational publishing company in Europe. His company was developing an immersive online world based on *Warriors*, the popular series of children’s books that follow the adventures of four clans of wild cats in their forest homes. The publishing company hoped to leverage the popularity of the *Warriors* books to engage children in new forms of online interaction. As the speaker described in his presentation:

There will be hundreds of other cats in this forest with you... What will happen is that you will consume these narrative missions, and each mission is presented as an essential piece of the clan’s mythology that you need to grasp.



Theory, Practice and Impact

As I listened to this, one word jumped out at me: *consume*. From the point of view of the publishing company, digital technologies provided new ways for children consume stories. It was a stark contrast to Scratch, which provides opportunities for children not only to interact with other people's stories but to create and share their own.

As the publishing-company representative continued his presentation, I opened my laptop, went to the Scratch website, and typed "warrior cats" in the search box. A list with hundreds of projects and galleries appeared. Members of the Scratch community had been very active creating projects based on the *Warriors* books. One gallery called "BEST WARRIOR CATS PROJECTS!" had 150 projects. Another called "Warrior cat games and makers" had more than 70 projects (see Figure 2). "Warrior Cats Rule!" had more than 60.

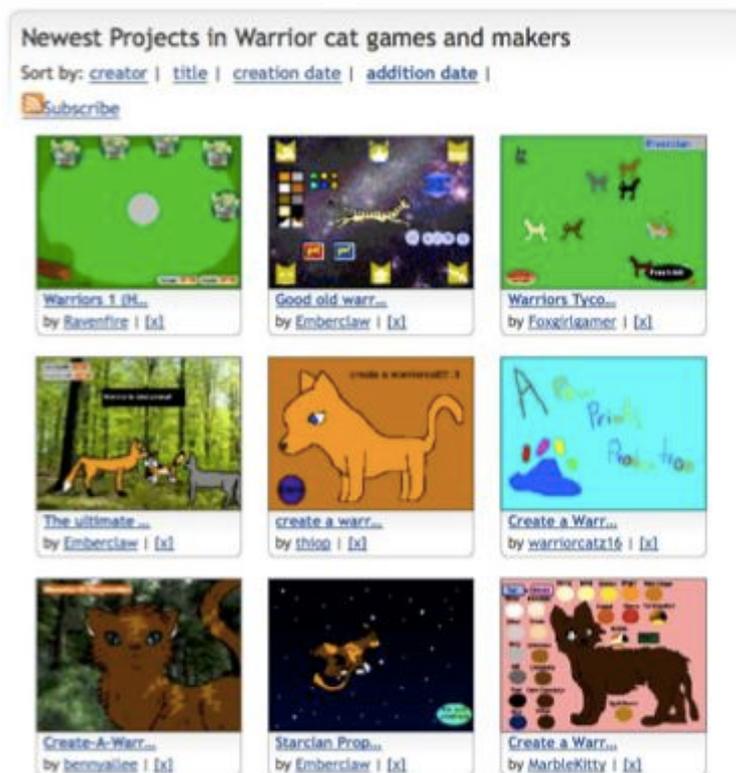


Figure 2: Gallery of Warrior Cat projects on Scratch website

I started looking at some of the projects, hoping to integrate a few of them into my presentation. I opened a project called "Warriors cats maker 2," created by a Scratcher with username Emberclaw (see Figure 3). The project allows you to create your own Warrior cat. By pressing different buttons, you can select the length of the cat's fur (3 options), the color of the fur (16 options), the pattern of spots on the fur (11 options), the type of eyes (10 options), and the environment where the cat lives (4 options).

Next, I tried a project called "Warrior Cats Game v2," created by a Scratcher with username Flamespirit. In the game, you can use the arrow keys to move a cat through a series of environments, interacting (and fighting) with other cats along the way. You can press different keys to execute different fighting moves (such as Back Kick and Claw Attack), or click on plants in the environment to get information on their medicinal value.

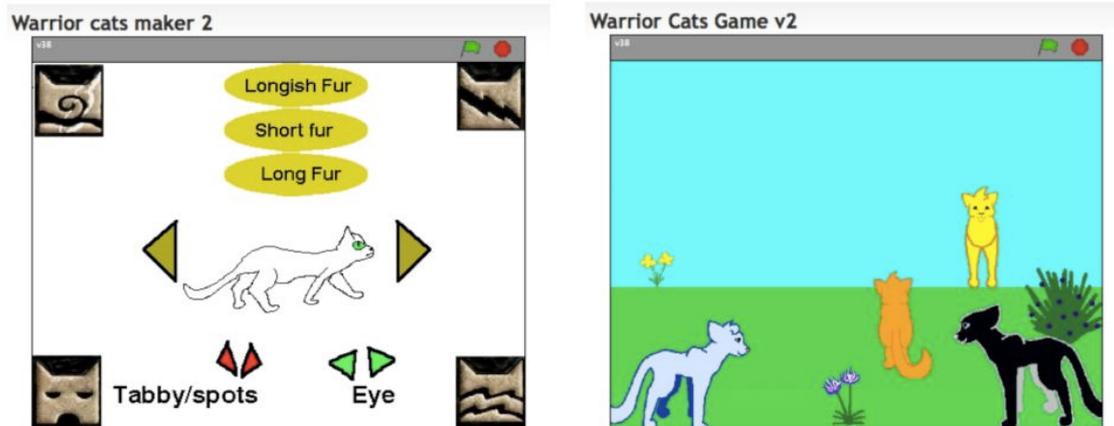


Figure 3: Sample Warrior Cat projects from the Scratch community

More than 1500 members of the Scratch community had played with the Warrior Cats Game v2 project, and they left more than 100 comments and suggestions. In response to a comment that said simply *Awesome!*, Flamespirit encouraged the commenter to try out a new, enhanced version of the project: *Posted v3. It has an extra level you'll love. Check it out!*

Another comment asked Flamespirit for advice:

OMG AWESOME! Hey, can you help me? I'm making a new-age interactive Warriors Cats game, a bit like yours, but with different styles... I just don't know how to interact! I know how to get the cats to jump, but to get onto different levels and to talk with others.... I'm stuck!

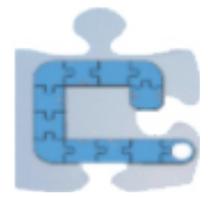
Flamespirit responded:

To talk with others, I just programmed the cats to say something when clicked. As for the change of levels, I just programmed a key that would change backgrounds, and, if certain sprites touched certain colours, to just hide/show them.

As I explored the Warrior cat projects on the Scratch website, I was still using half of my mind to listen to the Story 3.0 conference speaker talk about the new immersive online world based on Warrior cats. As the speaker was finishing his remarks, I quickly revised my presentation to include some of the Warrior cat projects from the Scratch community.

In my presentation, I emphasized the differences between the immersive online Warrior cats world (featured in the previous presentation) and the Scratch online community. For me, the two initiatives represent two very different approaches to story-telling with digital technologies – and, more broadly, very different approaches to education and learning. In both projects, children are actively participating and interacting with digital technologies, but the nature of the participation is very different. In the immersive online world from the publishing company, children participate by interacting with other characters and playing games. But, as described in the company's presentation, the children are “consuming” narratives, not creating their own. In the Scratch community, children both consume and create, trying out projects on the Scratch website but also creating and contributing their own narrative projects.

As I see it, participants in the immersive online Warrior cats world achieve a very limited form of digital fluency, learning to read but not write with digital media. Scratchers who create Warrior cat projects take steps towards a much fuller form of digital fluency, learning to use digital media to tell their stories and express their ideas to one another.



Theory, Practice and Impact

As they become more fluent with digital media, members of the Scratch community develop an important array of “fluency skills.” In particular, they learn to:

- *Think creatively.* The ability to “create” is at the root of “creativity.” As young people create characters and story lines for their Scratch projects, they are developing as creative thinkers, using their imaginations to explore new ideas and new directions.
- *Reason systematically.* In creating Scratch projects, young people must carefully and systematically combine programming blocks into scripts. Although we have tried to make Scratch as easy and intuitive as possible, programming in Scratch is not trivial: it still requires systematic reasoning.
- *Work collaboratively.* Members of the Scratch community learn to collaborate in many different ways. They give feedback through comments on projects, they work together on joint projects, they remix one another’s projects, they crowd-source artwork for their projects, they create Scratch tutorials to share their knowledge with one another.

Of course, as young people work on Scratch projects, they also learn important mathematical and computational concepts, such as variables, conditionals, events, and parallelism. But, in my mind, the fluency skills of thinking creatively, reasoning systematically, and working collaboratively are far more important. These skills are essential for full participation and success in today’s workplace, not only for computer programmers but for marketing managers, journalists, graphics designers, and most other occupations. And these skills are just as important for success and happiness in other aspects of one’s life, from community participation to personal relationships.

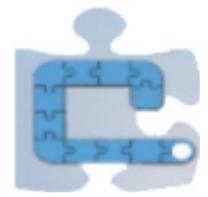
Looking Ahead

In the five years since its launch, Scratch has emerged as the most popular way for children and teens to learn to program – and an important pathway for becoming fluent with digital media. But the current version of Scratch is just the beginning. We are continuing to refine and extend Scratch to engage broader and more diverse audiences, and to enhance opportunities for developing digital fluency.

Later this year, we will release a new generation of Scratch, called Scratch 2.0, which will move Scratch into the cloud, enabling people to program, save, share, and remix Scratch projects directly in the web browser. We hope that this new version will provide a more seamless experience for creating and collaborating with Scratch, since people will no longer need to download the programming application to their local machine, or upload their Scratch projects to the website. This new version will also enable Scratchers to:

- share at multiple levels of granularity, exchanging scripts, procedures, sprites, images, and sounds as well as projects
- store “persistent data” in the cloud to create online surveys, high-score lists, and interaction between projects
- create projects that react to movements and colors in the physical world by using the webcam as a sensor
- import sets of specialized programming blocks for continually adding new capabilities to the core language
- export projects from Scratch to other social-media sites

We are excited by these new features and capabilities. But we are also aware that the biggest challenges for Scratch are not technological but cultural and educational. Just developing a new



generation of software is not enough. To help young people learn to express themselves fluently with Scratch, we need to develop new types of support materials, resources, and examples, for educators and for Scratchers themselves. Even more important (and more difficult), we need to encourage a cultural shift in the ways people think about computers and fluency, shifting people's conception of digital fluency to include the creation of interactive Mother's Day cards and Warrior cat games, not just the ability to interact with websites and online worlds.

Acknowledgements

My ideas about digital fluency have been inspired and influenced by the work of Seymour Papert (1980), Alan Kay (1991), Andy diSessa (2000), and Henry Jenkins (2006). Many members of the Lifelong Kindergarten research group at the MIT Media Lab contributed to the ideas and technologies discussed in this paper. To learn more about Scratch and the educational ideas underlying Scratch, see the Scratch website (<http://scratch.mit.edu>), the ScratchEd website (<http://scratched.media.mit.edu>), and the Scratch Team's overview article about Scratch (Resnick et al., 2009).

References

- diSessa, A. (2000). *Changing Minds: Computers, Learning, and Literacy*. MIT Press.
- Jenkins, H. et al. (2006). *Confronting the Challenges of Participatory Culture: Media Education for the 21st Century*. MacArthur Foundation.
- Kay, A. (1991). Computers, Networks and Education. *Scientific American* (September 1991).
- Papert, S. (1980). *Mindstorms: Children, Computers, and Powerful Ideas*. Basic Books.
- Resnick, M., Maloney, J., Monroy-Hernandez, A., Rusk, N., Eastmond, E., Brennan, K., Millner, A., Rosenbaum, E., Silver, J., Silverman, B., & Kafai, Y. (2009). Scratch: Programming for All. *Communications of the ACM*, 52 (11), 60-67.