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WELCOME TO THE NEW MAGAZINE FOR COMPUTING & DIGITAL MAKING EDUCATORS

BAREFOOT REACHES ONE MILLION KIDS

THE TECH LITERACY PROGRAMME HOPES TO REACH FIVE MILLION BY 2020

10 YEARS OF SCRADUNE We speak to Mitch Resnick about the visual programming

tool that revolutionised learning for an entire generation

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SCRATCH: THE FIRST TEN YEARS

The educational programming language celebrates its tenth anniversary

n 15 May 2007, a revolutionary programming tool was made freely available to the public. Developed by MIT's Media Lab, Scratch (scratch.mit.edu) featured a unique graphical interface that allowed programs to be assembled like building blocks, making it accessible to new coders of all ages. Since then, Scratch has gone through several iterations and experienced exponential growth in the number of users, becoming a mainstay in classrooms and after-school code clubs around the world. To celebrate its tenth anniversary, we chatted to Scratch Team leader Mitchel Resnick, Papert Professor of Learning Research at the MIT Media Lab.

Mitchel tells us that he and his team were inspired to start work on Scratch back in 2003 when working with youngsters in Computer Clubhouse after-school learning centres. "We saw that many of them wanted to create their own interactive stories, games, and animations, but there weren't good tools. So we produced Scratch to enable them to do it." He adds, "The fact that you can make a wide diversity of projects is an important part of its appeal."

Mitchel says that Scratch was built upon a lot of lessons learnt over the years. "I worked closely with Seymour Papert, the developer of Logo, the first programming language for kids. So the work was very inspired by Seymour's ideas and his work on Logo, as well as other things that had been done in the field."



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Collaborative coding

While Mitchel says that the team always had high hopes that Scratch would eventually become something commonly used by young people around the world, "we continue to be surprised, delighted, and amazed at the wide range of ways the kids make use of it, particularly in relation to the online community: kids aren't just creating things of their own, but are finding all different ways of collaborating and sharing. You'll often hear kids say, they came to make a project but they stayed for the community." This collaborative aspect was given a major boost by the arrival of Scratch 2.0 in May 2013, with the addition of an online code editor to the Scratch website. This also made it possible to instantly see the code inside other users' projects and 'remix' them. Previously, users would need to do all their programming in an offline code editor before uploading projects to the website. "I do think our second version of Scratch made it much more seamless to go between authoring and the community."

Following the launch of Scratch 2.0, there was a huge jump in the monthly number of

new projects and users, an upward trend that has continued ever since, resulting in a total of more than 18 million users and 22 million projects shared at the time of writing. Mitchel attributes some of its success to the general culture becoming much more interested in coding over the last few years, although he notes that Scratch also probably contributed to that: "One of the reasons the culture became interested in coding was because of Scratch."

Mitchel reveals that he is amazed by some of the Scratch projects created by users. "One of the things that makes it so



SCRATCH IN NUMBERS

22 MILLION PROJECTS SHARED

18 MILLION REGISTERED USERS

3.4 MILLION STUDIOS FORMED

10+ 40+ LANGUAGES USED

12 MODE AVERAGE AGE OF USERS

exciting and rewarding to work on is that we are constantly surprised by what they do. A few weeks ago, there was a ten-yearold [autistic child] who did a project talking about the challenges of being autistic and trying to explain why it's OK to be different. So the fact [Scratch] gave kids the opportunity to express themselves that way is really, really important."

Mitchel is also impressed by a lot of the collaboration that goes on between Scratch users. "There is a young woman in South Africa who did this project called 'The Colour Divide' (v), influenced by her upbringing and the scars of apartheid. It's a story of a fantasy world where people are assigned one colour or another. But it's not that she had this idea which was deep with meaning – she then led a whole team of people working on it together. Some are doing the voices, some doing the illustrations, some developing the music ... a whole international team of kids."

Code to learn

Scratch is used in many schools to introduce children to coding, and Mitchel believes that learning to code is an essential part of education. "I do like to make the analogy of learning to write. We don't have people learn to write because everyone's going to grow up to become a professional journalist or novelist... It's a way of communicating with other people and a way of expressing your ideas. Also, as you write, you organise your ideas. I think we see the same thing with coding."

While Mitchel notes that lots of good jobs will be available for those able to program, learning to code has other benefits. "The act of coding helps you reason systematically: you have to think in a logical way in order

Simple but powerful

The design team has always strived to make Scratch simple for beginners to learn, while offering powerful functionality for advanced users. Mitchel says, "My mentor Seymour Papert used to talk about a 'low floor and high ceiling': it should be easier to get started, but do more advanced things over time. We also talk about 'wide walls': the many pathways of getting started."

Most importantly, Mitchel insists that Scratch is for everyone: "All different ages, all different backgrounds, all different interests, all different cultures."

to create the programs. For us, it's just as important, if not more important, for kids to develop their voice, to express their ideas."

While he appreciates that the teaching of computing may have improved in recent years, "my critique is that a lot of the computer science classes are too focused on learning a set of computer



science concepts." While he notes that this is useful, "They generally don't focus on the ability to express yourself with the computer. And for me, that's an important element that's often left out."

He asserts that one of the most important aspects of learning to code is going through the creative design process.



The current release, Scratch 2.0, features online code editing and project sharing

"For me, it's very important to do things in a project-based way. We learn how to start an idea, and carry it through on a project. That's important for everybody – it's not just about computer science. Computers open up the possibility for kids to work on a much wider array of projects and learn the creative design process in a better way."

Asked whether computing lessons can help engage pupils who are otherwise not that interested in school, Mitchel replies, "It all depends on how it's introduced and used, because there's a risk that computers and coding can be introduced in a way that turns off kids: if you're just giving them problems to solve, they're made to feel inadequate because they get the wrong answer. On the other hand, if it's introduced in a way where kids work on projects that they care about, in collaboration with others, then I think it can be really motivating.

"We want to develop technologies and activities based on what I call the

SCRATCH TIMELINE KEY EVENTS IN THE HISTORY OF SCRATCH

2003

Mitchel Resnick's Lifelong Kindergarten Group at the MIT Media Lab starts work on developing a new programming language 5 MAY 2007

The oldest existing Scratch project, Weekend (helloworld.cc/2pdZOum) is uploaded **15 MAY 2007** Following various beta versions, Scratch 1.0 and the Scratch website are made publicly available

26 MAY 2007

Scratch 1.1 is launched, featuring updated Control blocks and other tweaks four Ps of creative learning: projects, passion, peers, and play. If we introduce it in the right way, then it can help kids develop as creative thinkers, and I think there's nothing more important in today's society."

The future of Scratch

The next stage in the Scratch story is version 3.0, currently in development, although a public release date is still some way off. Mitchel reveals that one key area of improvement will be with regard to physical computing. "We're designing it to be much easier for people to connect external hardware. We talk about trying to meet kids where they are, to be part of [their] lives. So to connect to the physical world is part of that."

He notes that kids also live in the online world, "so we want to make it easier to connect Scratch to online services and data sources. So if I make a Scratch project with a weather map, I should be able to pull in the latest weather data.



improve the experience for newcomers. To this end, Scratch 3.0 will feature both vertical and horizontal block placement. "We're planning to have a couple of different 'grammars'. In Scratch Jr [a mobile The Scratch website made its public debut on 15 May 2007: projects could be played but not edited directly

⁴⁴ THE ACT OF CODING HELPS YOU REASON SYSTEMATICALLY: YOU HAVE TO THINK IN A LOGICAL WAY

Or, if I wanted to get a song for a Scratch project, from within Scratch I should be able to go to Spotify and pull in a music clip." Users will also be able to connect to external online services for functionality such as speech recognition.

Mitchel admits, "Scratch has not done such a great job of supporting use on mobile devices, so that's something we're paying a lot more attention to now." He adds that the team is always looking to version of Scratch aimed at younger kids], we used horizontal blocks, partly because instead of words we use icons."

As for what the next ten years may hold for Scratch, Mitchel says, "My hopes are that it does become more of a type of literacy, an extended form of writing that lets you create all sorts of things. So it'll be part of the creative toolkit that kids grow up with, for when they want to make something dynamic and interactive."



Scratch Team leader Mitchel Resnick is the Papert Professor of Learning Research at the MIT Media Lab

2 DEC 2007 Scratch 1.2 features several new blocks and improvements

2 SEP 2008 Scratch 1.3 includes new

features such as lists

6 DEC 2008 The first annual Scratch Day event takes place at MIT **2 JUL 2009** The last 1.x release, Scratch 1.4 has a revamped UI and many new features

9 MAY 2013 Scratch 2.0 is released to the public: it features a redesigned editor and website, and allows you to edit projects directly from your web browser