Creating your own computer game is child's play

A visual and intuitive programming language lets kids piece together their own games and virtual worlds

NIC FLEMING

TWO young girls focus on a monitor in front of them as one of them steers a blue dog through a bright pink and purple tunnel using a computer mouse. Against a background buzz of classroom noise, a boy nearby is guiding an animated Mini Cooper car around a simple on-screen maze.

There is nothing unusual in 10 and 11-year-olds playing computer games, but the pupils at St Mary's Church of England Primary School near Wolverhampton in the UK are no mere gamers. They are testing games that they have designed and programmed themselves to help even younger children develop computer skills.

The children are the latest members of a rapidly expanding global community using a new programming language called Scratch to create interactive stories, animations, videos, music and games. "We saw a real gap for children today," says Mitchel Resnick at the Massachusetts Institute of Technology's Media Lab, who came up with the idea for Scratch and leads the team that runs the project.

Resnick points out that despite the amount of time children spend playing with computers, games and gadgets, they have little opportunity to create the interactive media they use every day. "I worry about us moving into a world where everybody has access to computers but all they are doing is browsing and chatting."

Anyone who has struggled with the complexities of C++ or Java knows that writing software is not usually child's play. To develop user-friendly Scratch, the researchers watched how children create and learn with Lego building blocks. Users do not have to write complicated code, but instead drag and "snap together" colourful graphical building blocks, each of which represents a simple programming instruction, such as making a character move 10 steps forward, play a sound, or repeat previous actions.

By snapping together different combinations of these blocks, children can create sequences that build up into animations and games. Some blocks, for example, allow players to control characters using keystrokes. They can also design their own characters and make them speak, as well as adding photos.

The software is linked to a website (http://scratch.mit.edu/) that allows kids to upload their projects, as well as comment on and rate each other's work. Since it was launched in May last year, more than 300,000 children have downloaded Scratch. Of these, 30,000 have between them uploaded almost 180,000 projects onto the website. The number of new contributors is growing at close to 1000 a week, and a new project appears on the site on average every 2 minutes.

Last week teachers and researchers from across the world met the software's creators at the Scratch@MIT conference in Cambridge, Massachusetts, to share ideas and experiences. "Children are creating whole new genres of projects that we had not even imagined," says Resnick.

For example, a child from Singapore created a reality-TV-style contest called "Can You Dance", which challenged other users to create the best dancing character. Viewers voted on their favourites and selected a winner through a process of elimination. Another group created an online animated newscast called Scratch News Network in which Scratch, the cartoon cat used as the software's logo, describes the latest developments in the community. This spawned a series of other news-related projects. And a contributor who received positive feedback for her representations of Japanese anime characters began offering advice to others who wanted to create similar illustrations. She then held contests and featured the winners in episodes of a soap opera series she was posting on the site.

"The children love it," says John Rowe, headmaster of St Mary's school, who led the lesson in which pupils created maze-based games to help younger children. "We don't set it as homework but often children will work on their projects at home."

Rowe teaches pupils as young as 7 the basics of programming by getting them to make changes to the code of existing games on the Scratch website. "It is great for children because they don't have to be able to understand masses of code and script," he says. "Having an audience for their output is really important because it provides context and engagement. Once you've got that half your job as a teacher is done."

Scratch, available for Mac OS X and Windows, is by no means the first attempt to make computer programming simple enough for young children to use. The best known previous effort was Logo, a language that allowed users to draw shapes by steering a "turtle" around the screen via typed commands. Logo too had its roots at MIT and was used in schools in

GIRLS TAKE ON THE GEEK BOYS

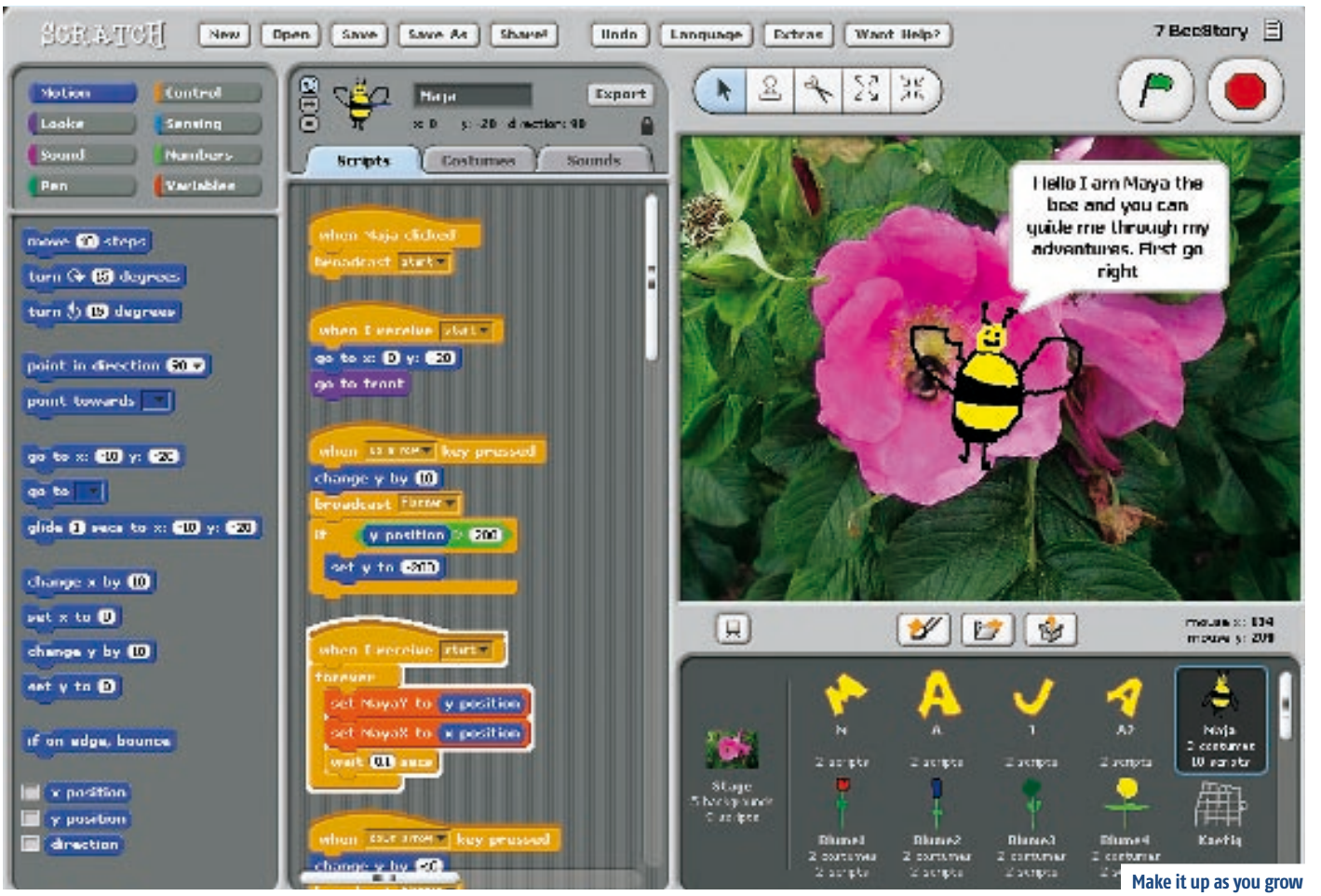
The stereotype is one of a socially awkward white male who has unhealthy obsessions with *Star Trek* and heavy metal. While this view of computer programmers may be unfair, the industry is still far from representative in most countries.

Two presentations in particular at last week's Scratch@MIT conference illustrated how Scratch is helping challenge that. Gabrielle Chevalier, 13, presented a cartoon she had created about dyslexia using a combination of Scratch and iMovie, while Romana Torrecillas, aged 17, presented an animation illustrating the effects of gentrification on poor areas.

Both have completed the Compugirls project at Arizona State University in Tempe, which uses Scratch in computer science classes for girls from schools in low-income areas of Phoenix, Arizona.

Programming has always been male-dominated, and recruiting women to computer science courses that might lead to careers in the industry has always proved difficult.

Kimberley Scott, who runs the Compugirls project, says women often drop out of computer sciences, mainly because they dislike programming. "Scratch is a visually pleasing, easy way to introduce programming to our students," she says. "Research clearly shows girls like to collaborate on projects. I know girls on our programme like the fact there is an online community where they can look at other people's projects and post comments."



SCRATCH.MIT

Make it up as you grow

the 1980s. Possibly Scratch's most significant advance is its open-source, interactive approach.

Contributors can post comments and suggestions about each other's work. They can also see the code for each project that is uploaded onto the website with the click of a mouse, and around 15 per cent of the content consists of "remixes" of previous projects. The name Scratch comes from the way DJs scratch with records and mix existing songs to create new tracks.

A recent example of "Scratchers" working together began when a 15-year-old girl from the UK created a number of animated characters and encouraged others to use them. A 10-year-old girl asked her to create a mountain background, and then invited her to join a company she was creating to produce Scratch games. A 14-year-old from New Jersey was signed up to the company after he fixed a programming problem, allowing a game character to jump. Other team members include a 12-year-old girl from Russia who designs characters, and a 10-year-old American who writes stories.

"Starting with someone else's work and adding to it is often a good way of getting started when learning something new," says Resnick. "Getting feedback and suggestions from other people, and the possibility of collaboration are all important elements of Scratch."

"Children are creating whole new genres of projects that we had not even imagined"

While the largest Scratch communities are in the US and UK, the software is being used in well over 100 countries. Delegates at last week's conference heard examples of its use by teachers in Russia and India, as well as in Cambodian villages and remote Aborigine communities.

The software is already available in many languages that use the Roman alphabet, and later this summer the developers will greatly widen its reach with the release of a version that can be used in Chinese, Japanese, Hebrew and Arabic. It will also soon be available for low-cost computers such as the One Laptop Per Child XO and the Intel Classmate.

Some young Scratchers will hopefully be inspired enough to continue developing their skills and eventually become professional programmers. However, the software's creators have much more wide-ranging goals in mind. "Our ultimate goal is for Scratch to become the standard way that people are introduced to creating and controlling dynamic, interactive media, whether they are controlling animated stories on the screen, robotic creations in the physical world, or a character in a shared, immersive world like Second Life," says Resnick. "We'd love for Scratch to become the standard language that people learn to help express themselves with technology." ●