

# CODE CLUB: THE NEXT GENERATION

Nine-year-olds are getting the chance to learn programming – and they love it. But for everyone to get a chance, more volunteers are needed, finds Richard Smedley.

If you're reading this magazine, then you most probably know the value of code, of people being able to code, and – perhaps most importantly – of understanding that coding is a creative activity, bringing frustration and joy, and the chance to fail safely. Now, imagine every child getting the chance to find that out at a young age.

Coding in schools became a hot topic a couple of years ago, famously with Google chairman Eric Schmidt giving the 2011 MacTaggart lecture at the Edinburgh Television Festival, where he said: "I was flabbergasted to learn that today computer science isn't even taught as standard in UK schools. Your IT curriculum focuses on teaching how to use software, but gives no insight into how it's made. That is just throwing away your great computing heritage."

This gave a valuable boost to campaigners in the tech industry who'd been saying the same thing for

more than a decade, but with a much more limited audience. Campaigners such as Clare Sutcliffe and Linda Sandvik, who came up with an idea for giving "every child between the ages of nine and 11 the opportunity to learn coding": Code Club.

The essence of Code Club is an after school club (in school, or another safe environment like a library), for

nine and ten year-olds, with a volunteer programmer using freely-licensed teaching materials.

Code Club is an organisation that's in the

right place at the right time, and its rapid growth has been in large part due to word-of-mouth advertising of how well kids take to its lessons. They're designed to draw children in, and get them being creative, learning the coding side by osmosis as they have fun.

To check this theory we asked a ten-year-old Code Club participant what she liked so much about it. She told us: "It's fun. You get to make games, like Flappy

**"Imagine every child getting the chance to find out about the value of code at a young age."**



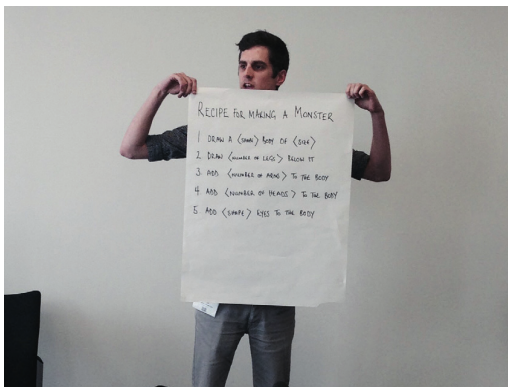
Soho Parish School and volunteer Simon Wharton, who started one of the first Code Clubs.

Bird. You get to learn lots of new stuff. There's lots of stuff to explore and it's fairly easy, because anyone can start it." She actually used the phrase "it's fun" several times, so we're happy to take Code Club at its word on this point.

### Growing Up

Code Club's growth has been rapid – passing 2,000 schools by its second anniversary this spring – but it's matched by its ambition for the future. "One of Code Club's missions is to get Code Clubs into 25% of primary schools by the end of 2015, which is a huge target," says Sam Milsom, Code Club's General Manager. The demand is there, with 700 schools signed on that are still waiting for a volunteer. In response to this, Code Club has accelerated the release of all of its teaching materials under a Creative Commons licence: "which will allow teachers to use them themselves; it will allow parents to use them to teach their kids at home, and so on."

Terms 1 and 2 use Scratch to teach the basics of programming. Term 3 teaches the basics of web development using HTML, CSS, and a little JavaScript. Term 4 teaches Python. As we go to press, the possible content of term 5 and 6 is still under discussion, as Code Club is in the process of



Code Club Pro trains teachers for the new IT curriculum – but still keeps much of the fun that after-school Code Clubs have put into the subject.

### MIT Scratch

Scratch is a deceptively simple visual programming language and multimedia authoring tool developed at the MIT Media Lab. Platform neutral, and GNU GPL licenced, it enables learners to "mix" chunks of code before they've really learned what they're doing, giving instant results. Colourful graphic sprites and amusing sound effects add to the fun.

Yet this is no dumbed-down language: building on Squeak/Smalltalk roots, it's a fully-featured and powerful language, and as children go through projects, experimenting, they start to pick up code in a similar way to an earlier generation did by typing in program listings from 8-bit micro mags.

As well as all of the open source Code Club projects, the Scratch website hosts over 5,000,000 projects. Any young learner can click a button in the Scratch interface to upload their project and CC-license it – making Scratch perhaps the largest creator

both of new FOSS projects, and new FOSS coders. How many learners will go on to become Free Software programmers is not really the point (although some undoubtedly will); rather, Scratch immerses young people into a community where sharing (and re-mixing) code is seen as natural, and is a great antidote to more than a decade of schools teaching PowerPoint and Excel.



Right from the first lesson, kids are using event-driven, Object-Oriented programming.

appointing a full-time Curriculum Developer: "We are currently improving our web development curriculum and adding some exciting JavaScript stuff in. We are also writing lots more Python projects!" Laura Kirsop, Code Club's Managing Director told Linux Voice.

Materials should also get a rejig to allow less linear progression, so children can join more easily mid-way through term, and, Milsom tells us, "volunteers can pick and choose" what to teach. In fact, volunteers are already generating great material of their own, from those bringing in Arduinos and MakeyMakey boards (with the celebrated banana keyboard [www.youtube.com/watch?v=rfQqh7iCcOU](http://www.youtube.com/watch?v=rfQqh7iCcOU)), to more "unplugged" exercises. One volunteer developed a coding role-playing game, Sam Milsom tells us, where "for one lesson the children didn't even sit at a computer. He developed an RPG and they'd speak out and act out the programming language. And he said it was incredible, because it got them to think about it in a different way, rather than just following instructions, and typing things in, they were really enacting it."

Milsom adds: "Our first two terms of Scratch were sort of crowd-sourced, and our third and fourth terms we had one person working on them. Obviously we use GitHub to host all of our projects, so the community do contribute, and we're hoping now that we've opened up our projects that will happen a lot more. Not just in terms of updates, but suggestions, and a lot of the community create their own projects, so again the opening of the projects will allow this to happen a lot more."

### Volunteer effort

"We've got an abundance of schools wanting Code Clubs," Milsom tells us. The problem "is finding volunteers to go into the schools. We're hoping to get students from Manchester Metropolitan University



Back to school: now it's the adults' turn, as volunteers learn how to train the teachers in the new curriculum at Code Club Pro's first training workshop.

(MMU), and other tech companies – basically trying to get them to volunteer for us.”

We talked to Sam Milsom just before he spoke to a collection of Code Club volunteers, in Manchester: “We’re starting quite a big partnership in Manchester, between companies like CTI Digital, Manchester Digital Development Agency, MMU, and the Council themselves – and, of course, our current volunteer base in Manchester, which is the second largest hotspot of Code Clubs in the UK.”

This is a strong reflection of the tech industry and community in Manchester. London has the large companies, Silicon Roundabout, and Code Club's own offices, but outside of the UK capital, Manchester is the second largest tech city in Europe, with a vibrant start-up culture, and a strong Free Software and open hardware scene. But while Code Club has grown in the UK, groups have started to form in dozens of other countries, from the USA to Ukraine, and Code Club has responded with Code Club World.

### Winning formula

Wherever they set up, Code Clubs follow the same simple formula of a volunteer programmer using the CC-licensed materials, working with a teacher (or other suitable supervisory adult in Clubs in libraries) who, though possibly lacking programming skills, has the experience of educating and controlling pupils that would be an intimidating barrier to many volunteers.

Code Clubs are free of charge for children and participating schools.

For many teachers, supervising the after-school clubs has been a welcome chance to see what all the fuss is about before changes in the UK national curriculum force them to learn something about coding. Milsom says that: “One of the benefits of Code Club – which is a happy accident – is that if you’re a volunteer and you go in, you have to have a teacher from the school present, and we realised that actually this is really a good thing: because it’s not just about the volunteers – industry professionals – teaching the kids. It also enables teachers to brush up on their skills, to get a good look [at teaching coding].”

### Teaching teachers

The abolition of the current UK schools IT curriculum, which essentially taught children how to use MS Office, was announced during the early days of Code Club, whose close contact with schools allowed them to see teachers’ reactions to this, as well as to the announcement of the more rigorous, code-led curriculum being introduced this September.

“One of the reasons that we’ve opened up our projects is for teachers to have a look. I’m not saying our projects are going to be anything like the national curriculum – far from it – but I think, hopefully, it does demystify; they start to realise that coding in Scratch isn’t as scary as you think it is,” Milsom told us.

We suggested to Milsom that press coverage of the new curriculum as being only about “back-to-basics” coding had done it a disservice: “I’d completely agree with that. From day one we never expected that every child who went to Code Club would go off and become some great programmer who’d change the world. Not every child is going to grow into the next Sir Tim Berners-Lee. What’s interesting is that it goes beyond computational thinking: it’s simple problem-solving; it’s trial-and-error; and personally, I think there’s something about failure that is really important. Children aren’t taught that failure is okay, that failure is the key to success. They’re taught that you have to pass exams; you have to pass. And it’s my

## Next, the World!

“We were becoming overwhelmed with emails from people in other countries, saying: ‘Can I set this up in my own country?’” Sam Milsom told us. Code Club World has now become a full-time concern for Code Club founder, Clare Sutcliffe, who told Linux Voice that CCW would: “create a framework to allow other countries to support local volunteers.”

Currently, frameworks of support for volunteers exist in some countries, such as Brazil and Ukraine. In others, such as India, there are several individual Code Clubs, but no national support mechanism. The model is the same everywhere: volunteer programmers, CC-licensed projects, and a

safe environment. Some things do change by country – in Canada there is no model of after-school clubs; pupils go home and eat dinner, then return to school for Code Club. Language is a barrier to growth outside the Anglosphere, but already Code Club’s teaching materials have been translated into eight different languages, and there are six more well on the way on GitHub.

Code Club World defines an active country as one with a team supporting 30 or more volunteers, and there are currently six at this level: Australia, Brazil, Hong Kong, New Zealand, Norway and Ukraine. The ambitious target, Sutcliffe tells us, is to get 100 countries with active communities by the end of 2018.



World domination? This time it's a benign empire of educational volunteers spreading across the globe.

## Volunteering

Before becoming Code Club's General Manager, Sam Milsom was its Volunteer Support Officer. He tells us: "We've got such an amazing volunteer community, we use Google Group forums, and have meet-ups, and some of the projects that the volunteers come up with off their own bat are incredible."

Go to [CodeClub.org.uk](https://www.codeclub.org.uk) and click on "Start a Club" and then the "Volunteers start here" button, and you'll find all the information you need, as well as hearing about the experiences of other volunteers. To work with children in the United Kingdom, you need an Enhanced DBS (formerly known as a CRB) check, and you'll need insurance to go in to schools. Code Club makes it easy to get these for free by linking up with STEMNET's STEM Ambassadors Programme, and encouraging you to sign up through your local STEMNET office. STEM Ambassadors is a volunteering programme for STEM (science, technology, engineering and maths) professionals and enthusiasts. After registering, you get a two-hour induction session on working effectively and safely with young people. After a few weeks your DBS check should be complete, and while you're waiting, as well as taking the time to read through Code Club's teaching materials, you can look on the Code Club website for a local school wishing to start a Code Club.



If coding is the new Latin, then no wonder London Mayor Boris Johnson is getting behind it.

Many of the core concepts are already being taught, adds Deen: "Algorithms – instructions – are taught in English. Sequencing, basic logic and reasoning are taught already." Code Club Pro's materials are about: "Really trying to demystify the language and context of the new curriculum." Teachers are non-specialists, but good at teaching, and coding is no more difficult than music, which non-specialist primary school teachers regularly tackle.

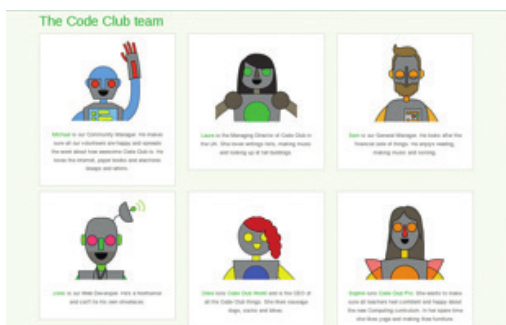
Code Club Pro's materials aim to "demystify language and core concepts," showing that the computer language gives expression to ideas. "We want to help inspire the ideas," and to get teachers enthusiastic about the changes to curriculum. The materials should be online by the time you read this; if you'd like to volunteer to train the teachers, the process is a little more involved than volunteering to run a Code Club, as outlined in the box above. There's an online test, a Skype interview, then a day's training. "We have amazing trainers," says Deen: "Clever, good communicators and well-motivated."

**"Code Club's teaching materials have been translated into eight languages, and there are six more on the way on GitHub."**

experience of seeing Code Clubs in action, that it teaches them that it's okay [to fail]."

The latest offshoot of Code Club is Code Club Pro, sending trained volunteers to teach groups of teachers how to deliver the new curriculum. As we near September's arrival of the new IT curriculum into schools, demand for CPD (Continual Professional Development training) in schools is likely to be immense. We asked Code Club Pro's Sophie Deen about this: "We're just scratching the surface of understanding that demand," Deen told us. "We're present in schools and hear back directly from teachers [who don't] understand coding or knowing how to get there.

Deen wants to show teachers that it's not just about code, but that computational thinking "can be used to enrich the way children think and learn in a cross-curricular way, covering core skills." In the first two months of Code Club Pro's existence, with no publicity, 850 schools signed up. "We know from teachers that when it [officially] launches there'll be a huge demand."



Code Club's quirky robotic graphics are an external reflection of a friendly, easy-to-access service.

### Your turn

Have you always wanted to do your bit with passing on your enthusiasm for coding to the next generation, but been perhaps a little scared of facing a classroom of demanding and unruly children? Code Club's structure, with a teacher present at all times to work with the children, takes away this fear and gives you, dear reader, the perfect chance to spread some programming joy. The great materials mean that even if you are more of a system administrator than a coder, you can still teach – just read one lesson ahead, and you'll be fine.

You are wanted. You are needed. Step up to the task and you'll be appreciated, too. 