

Resources and courses

The following is a list of organisations, known at time of going to press, that provide free and paid-for resources and courses that will help you develop and deliver a broad, balanced and integrated curriculum to your students. The fact an organisation is not on this list in no way suggests anything about the quality of the resources they provide. We strongly recommend consulting the CAS forum for a more comprehensive and up-to-date guide to currently well-regarded resources.

MOOCs (Massive Open Online Courses)

Cambridge GCSE Computing Online MOOC

This MOOC has been created by the Cambridge-based partnership of the exam board OCR, Cambridge University Press (CUP) and the Raspberry Pi Foundation. The course is based on OCR's GCSE Computing curriculum and gives participants an excellent opportunity to investigate how computers work, how they are used, and how to develop computer programming and problem-solving skills. The course has been designed for 14- to 16-year-olds, but is free and open to all and can be used either as a course that teachers can sign their whole class up to or a resource to support teachers. Find out more at: www.cambridgegcsecomputing.org.

Computing for Teachers MOOC

This MOOC is run by the Department of Computer Science at Warwick University. It is aimed at teachers preparing to deliver the new computing curriculum, providing the necessary subject knowledge and programming skills required to teach computing confidently at Key Stage 3 and GCSE. The course provides in-depth coverage across three areas: computing concepts, programming in Python and how to teach the concepts. The course has received support from Google, BCS and Computing At School. Find out more at www2.warwick.ac.uk/fac/sci/dcs/schools/cpd.

Teaching Computing MOOC

This MOOC, which is run by the University of East Anglia, is in two parts and aims to prepare teachers to deliver the new curriculum effectively to children in years 5, 6, 7 and 8 through a mixture of subject knowledge and pedagogical advice. It will be valuable for both ICT specialists and primary teaching non-specialists. Expert 'Master Teachers' from Computing At School have designed the course to make sure that teachers have the most up-to-date information that they can take into their classrooms to teach great computing lessons. Find out more at www.uea.ac.uk/study/short-courses/online-learning.

Partner organisations



AppInventor.org motivates students to learn coding and computer science by teaching them to program the devices they carry around with them every day.

The site is based on the App Inventor visual language, which allows you to code apps by plugging together high-level puzzle pieces. AppInventor.org offers video and text lessons for self-directed students and a course-in-a-box (www.appinventor.org/course-in-a-box2) that has been used as a model for numerous primary school, secondary school and university level courses.



AppShed Academy (appshed.com/academy/appshed-academy) is a free learning resource available to everyone using AppShed. It covers the basics of app creation right through to advanced programming techniques. Lesson plans are available for teachers, whilst students can use the self-paced, step-by-step video tutorials. Image packs, sample code, course notes and videos can be downloaded and used offline. Teachers are able to track students' progress, monitoring and viewing students' apps and controlling the distribution of apps. Students can also provide self-assessment feedback allowing teachers to monitor their proficiency with course materials. This greatly enhances peer-to-peer learning and the ability for teachers to identify areas of weakness.

BBC

BBC Bitesize (www.bbc.co.uk/education) is a free online resource for students and teachers, and includes a range of new content to specifically support the new computing programme of study (www.bbc.co.uk/education/subjects/zvc9q6f).

Megabits (www.bbc.co.uk/programmes/b01kl16t/clips) are a series of short videos that give students an insight into how computers actually work. Filmed in real-life work settings, the videos look closely at what a computer consists of, how the various components work, how it processes data, and how it is used in robotics and software development. And in **Cracking the Code** (www.bbc.co.uk/programmes/b01r9tww/clips), Minna Kane and her team of young hackers explore the world of computer programming in a special compilation of short films for primary aged children.

BCS

BCS is the professional body for IT and is governed by Royal Charter, which includes a primary goal of advancing computing education for the benefit of the public. BCS also promotes wider social and economic progress through the advancement of information technology science and practice. BCS accredits computing degree courses in over 90 universities around the UK.



CAS (www.computingatschool.org.uk) is a grass roots, school-led, organisation and its energy, creativity and motivating force comes from its members. CAS is formally part of BCS - The Chartered Institute for IT.

CAS aims to inspire, equip and support schools and teachers to deliver the computing curriculum with confidence and enthusiasm. It currently has over 15,000 members, of whom about 75% are school teachers, but also includes many computing professionals from global IT companies and academics from world-leading universities. CAS runs over 110 local hubs around the country to nurture peer-to-peer professional communities of practice, many of which are run with support from local universities.

CAS also runs the Barefoot Computing project (<http://barefootcas.org.uk>), which is funded by the DfE. This project is producing exemplary teaching resources for primary schools, to illustrate how teaching computer science can also improve learning in English, maths, science and history within a cross-curricular environment. These resources may also be of interest to secondary school teachers keen to learn what is happening in primary schools or to use as inspiration.



Codecademy is a free online interactive platform for learning programming languages. Founded in the US, it is committed to creating the best possible learning experience for teachers and students. It has seen its user base skyrocket to over 25 million and has now developed free resources to help teachers in the UK prepare for the new computing curriculum. It offers:

1. **Teacher training:** The online courses help teachers learn the fundamentals of programming across multiple languages, including JavaScript, Python and PHP.
2. **Class resources:** The online courses are supported with schemes of work, lesson plans and quizzes, all mapped to the National Curriculum Computing Programmes of Study.

3. Pupil Tracker: Enables teachers to create bulk accounts for students and track individual and class progress through the courses.

Find more at www.codecademy.com/schools/curriculum / @CodecademyTeach.



cs4fn (Computer Science For Fun, funded by the EPSRC with support from Google, www.cs4fn.org) is a national public engagement project from Queen Mary University of London to enthuse school students about computer science. It sends free fun magazines on interdisciplinary computing research, aimed at young people, to schools and home educators. cs4fn also has funding, from the Mayor of London and the Department for Education, to work with King's College London on a sister project, Teaching London Computing (teachinglondoncomputing.org), supporting computer science teachers to deliver the new computing curriculum. It provides CPD courses for teachers, free workshops and free resources to download. The website is full of fun 'unplugged'-style activities to try out in class or at home.



The CS Unplugged project (csunplugged.org) is a free source of ideas for computing activities away from the computer. The activities teach fundamental ideas from computer science using games, magic tricks and puzzles to engage students. Many involve physically running around, which is a great break from online activities. The original Unplugged work was aimed at primary school students, but is widely used in high schools and universities to introduce topics that might sound difficult but can be taught easily using the scaffolding provided (e.g. binary numbers, data compression, searching and sorting algorithms). There is a sister project aimed at high school students, which is an online, open source textbook, called the *Computer Science Field Guide* (csfieldguide.org.nz). This covers topics in a little more depth, and includes videos and online interactive activities. It currently matches the New Zealand computer science curriculum requirements, but will be expanded to cover topics needed in other curricula.



The Digital Schoolhouse is a primary to secondary transition project focused on delivering inspirational computing. Ukie, the trade body for the Interactive Entertainment industry, and the Digital Schoolhouse Trust have established Digital Schoolhouses in ten London secondary schools. Each Digital Schoolhouse aims to grow and support a network of primary teachers to deliver creative and cross-curricular lessons with computing at their heart and offers enrichment days for primary school pupils. Inspirational Key Stage 2 and 3 resources are also freely available for download from the website: www.digitalschoolhouse.org.uk.

Greenfoot



Greenfoot is an educational programming environment aimed at beginners in programming aged 13 to 20. It uses Java as its programming language and is free and open source.

Greenfoot combines a standard programming language – Java – with an engaging interactive environment that makes it very easy to create animated graphical applications. Learners typically develop their first small program within the first half hour, and quickly learn to program simple games and simulations. While the attraction for many learners is the playful, game-like context, Greenfoot is carefully designed to teach fundamental object-oriented programming constructs and concepts that are then directly transferrable to other environments. It is an ideal successor system after block-based languages, such as Scratch.

Many teaching and learning resources are available, both for students and for teachers. Learners find examples and a community at www.greenfoot.org. Excellent support for teachers and extensive teaching material is available at <http://greenroom.greenfoot.org/door>.



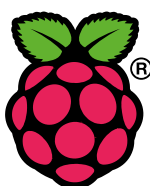
Kodu lets children create games on the PC and Xbox via a simple visual programming language. Kodu can be used to teach creativity, problem solving, storytelling and programming. Anyone can use Kodu to make a game, young children as well as adults with no design or programming skills. Kodu on the PC is a free download and runs on Windows XP, Vista, Win 7 and Win 8 and currently supports 17 languages. For more information, visit www.kodugamelab.com.

Python School

Python School (pythonschool.net) is a website containing many video tutorials and exercises to help teachers learning to teach Python programming in school, from the basics right up to A Level standard. The materials for beginners include how to use selection, iteration and assignment statements in Python. As you progress, there are tutorials on using Python with databases, with server-side applications, using regular expressions and building a complete application to the standard of an A Level project using PyQt. The Python School materials were developed in 2011 to support face-to-face CPD sessions and are used by thousands of teachers each month.

Raspberry Pi

The Raspberry Pi is a low cost, credit-card sized computer that plugs into a computer monitor or TV and uses a standard keyboard and mouse. It enables people of all ages to explore computing and to learn how to program in languages such as Scratch and Python. It is capable of doing everything you'd expect a desktop computer to do, from browsing the internet and playing high-definition video, to making spreadsheets, word-processing and playing games. It is also able to interact with the outside world and has been used in a wide array of digital maker projects, from music machines and parent detectors to weather stations and tweeting birdhouses with infra-red cameras. For more information, go to www.raspberrypi.org.



Raspberry Pi is a trademark of the Raspberry Pi Foundation.



RoboMind Academy (www.robomindacademy.com) trains Computational Thinking: an essential 21st century skill.

By programming a virtual robot in the e-Learning environment, the student is introduced to logic, automation and technology. Logical thinking is directly connected to solving real world challenges. RoboMind is an effective and motivating introduction that is used worldwide with students from age 9. RoboMind Academy makes it easy for teachers. It comes with complete interactive lessons. Courses can be completed at your own pace, thanks to automatic guidance by the virtual mentor. That makes it feasible to lecture large groups of students at the same time. As a teacher you can follow the progress of students at a glance and even share their results in the form of a programming competition on a Smartboard in the classroom. RoboMind works everywhere: from tablets to PCs, online or offline, at home or at school.



ScratchEd (scratched.gse.harvard.edu) is an online community for teachers interested in, or already actively working with, the Scratch authoring environment. With ScratchEd, educators can share stories, exchange resources, ask and answer questions, and find other educators. Since ScratchEd's launch in 2009, more than 13,000 teachers have joined the community, and have shared hundreds of stories and resources.



Delivered across Wales, Technocamps (which was established in 2003 as a schools outreach programme in the Computer Science Department at Swansea University) provides hands-on practical workshops to inspire, motivate and engage people with computational thinking; and to promote computer science as underpinning all

aspects of modern society. All of the resources for our workshops are freely available online at www.technocamps.com.

As part of the Technocamps programme, we offer Primary school engagement through our Playground Computing outreach project, which is designed to teach the fundamentals of computer science to primary pupils, typically without using computers.

Through our Technoteach project we provide Continuous Professional Development (CPD) for Primary and Secondary school teachers to up-skill them in computing and technology and provide guidance on how to apply these skills in the classroom.



What is it?

TouchDevelop (www.touchdevelop.com) is a browser-based, cross-platform development environment. Regardless of the device and operating system you and your students have – iOS, Android, Apple, Linux or Windows – you can use TouchDevelop. It can be used by absolute beginners, supported by fully-guided built-in tutorials, is touchscreen-friendly and has keyboard and gamepad functionality. There are no downloads to install, yet an offline feature is available. This makes it a comprehensive development and coding environment for schools.

TouchDevelop has a simplicity and yet a richness that makes programming exciting, challenging and rewarding. Code can be written directly on any device. You can utilise the device's sensors, like Bluetooth, GPS and accelerometers, or media, including mp3 and video, using high-level APIs. It is easy to create your own apps and to publish them or tweak those published by others. The concepts you learn readily transfer to traditional programming languages such as Java or C#.

Gamification approach to learning

TouchDevelop encourages users to develop their own code and become better developers through a game-centered approach. When a user creates an account their scripts are saved and can be edited and shared. Users can earn points by completing coding activities or tutorials and can be given points by other users. Users have access to a forum where they can exchange ideas and ask for help from the TouchDevelop community. This community element is continuously evolving. Currently in beta, TouchDevelop

will allow users to work collaboratively on the same script remotely, opening up fantastic opportunities for students and schools to develop projects globally.

Creating apps

TouchDevelop embraces the 'Bring Your Own Device' revolution by providing a unified programming environment everywhere. TouchDevelop does not confine you to one platform or store. For example, it is possible to use an iPad to develop a Google app. Signing up for the DreamSpark programme (www.dreamspark.com), which is free to schools who join CAS, will give your students all the high level tools they need to turn their code into an app and a free Windows Store account to publish it. The extensive library of APIs allows students to incorporate cloud services into their apps, giving them a real-world experience of app development.

Connecting to external hardware

TouchDevelop is a great platform to develop for hardware. APIs are available that allow students to design apps that interact with the sensors on their device and, on a simpler level, TouchDevelop enables code to incorporate a gamepad or a keyboard. Commands also link directly to other hardware development platforms. Makey Makey, Lego® Mindstorms and Arduio Esplora can be coded through TouchDevelop, and more hardware will be added in the near future.

Courses and learning

TouchDevelop has an extensive range of tutorials, support materials and courses, ranging from beginners to advanced, available for free. Many have been created by teachers and there is a strong network of support and advice. 'TouchDevelop scheme of work' on the CD-ROM provides a taster of the materials available. You can also build your own tutorials to guide students through completing an activity in TouchDevelop.

Vendor qualifications



Microsoft® IT Academy Program

The Microsoft IT Academy program (www.microsoftitacademy.com) provides resources, including e-learning, digital academic courseware,

lesson plans and teacher certifications, to support the teaching and learning of the latest technology skills.

Within the Microsoft IT Academy program, Microsoft certifications help bridge the gap between the classroom and the workplace, validating skills and knowledge, enriching students' learning experiences and supporting teachers to develop their skills:

- The Microsoft Office Specialist (MOS) (<https://www.microsoft.com/learning/en-gb/mos-certification.aspx>) certifications help build skills across a number of different Microsoft Office applications, including Word, PowerPoint, Excel, OneNote and Office365. Teachers get ten MOS vouchers per year with IT Academy program membership.
- The Microsoft Technology Associate (MTA) (<https://www.microsoft.com/learning/en-gb/mta-certification.aspx>) certifications cover foundational technology skills for both developer and IT infrastructure. Microsoft have mapped their MTA certifications to the GCSE specifications offered by AQA, OCR, WJEC and Edexcel, so you can offer your students the opportunity to gain national recognised professional qualifications alongside their GCSE. Teachers get ten MTA vouchers per year with IT Academy program membership. Prodigy Learning are also offering a free MTA teacher training bundle, worth £164, up until 30 June 2015. This includes MTA online video training, an MTA practice test and an MTA exam voucher. You can find out more here: www.prodigylearning.com/msukteachertraining.

It also provides professional development for educators:

- The Microsoft Certified Educator (MCE) (<https://www.microsoft.com/learning/en-gb/mce-certification.aspx>) certification validates that teachers have achieved the global educator technology literacy competencies needed to provide a rich learning experience for their students, aligned to UNESCO standards. Teachers get ten MCE vouchers per year with IT Academy program membership.

The Microsoft IT Academy Certification Roadmap, which can be found on the CD-ROM, shows you how to choose the right certifications for you and your students.

Microsoft Virtual Academy (MVA) (www.microsoftvirtualacademy.com) offers hundreds of online Microsoft training courses, delivered by experts, for free. Some of these courses also support the MTA certifications and beginners in technology, and provide teachers with an excellent opportunity to fill gaps in their knowledge base.

The mapping documents are on the CD-ROM:

- Microsoft mapping document for AQA GCSE
- Microsoft mapping document for OCR GCSE
- Microsoft mapping document for WJEC GCSE
- Microsoft mapping document for Edexcel GCSE

Cisco Networking Academy and Oracle University

Cisco and Oracle also provide professional vendor certifications, which students could work towards alongside their academic qualifications. More information can be found at www.netacad.com and education.oracle.com.

Recommended books about computing

Members of the CAS community have compiled a list of inspirational yet accessible books about computer science: community.computingatschool.org.uk/resources/199.

And a list of books that are recommended for secondary PGCE students: community.computingatschool.org.uk/resources/1787.

Also recommended are:

- Bird, J., Caldwell, H. and Mayne, P. (eds). *Lessons in Teaching Computing in Primary Schools* (Learning Matters, 2014).
- Williams, L. (ed.). *Introducing Computing: A Guide for Teachers* (Routledge, 2014).
- Hey, T. and Pápay G. *The Computing Universe: A Journey Through a Revolution* (Cambridge University Press, 2014).
- Simons, C. and Hawkins, C. *Teaching Computing*, 2nd edn (Sage, forthcoming May 2015).



CAMBRIDGE

Available from spring 2015, the brand new A/AS Level Computer Science resources from Cambridge University Press are written specifically for the OCR and WJEC/Eduqas 2015 specifications. They equip students with the skills and enthusiasm necessary to apply their computing knowledge in the real world, whilst helping prepare them for Higher Education and beyond. The resources:

- Are written by an author team of practising teachers including Computing At School master teachers

- Have a strong focus on independent learning, computational thinking, programming and problem-solving skills
- Include rich digital assets showcasing the relevance of computer science to the real world
- Support the transition from ICT to Computer Science
- Are differentiated to support all abilities.

For more information, go to: www.cambridge.org/ukschools.



We are a publishing and training company specialising in products to support the teaching of computer science in schools and colleges. Incorporated in 1999, we have brought a range of products and services to the market to support the teaching of A/AS Computing/Computer Science.

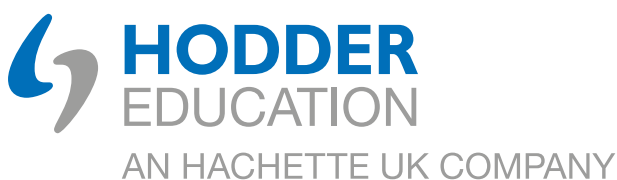
New Publications for 2015:

- AQA A Level Computer Science Unit 1
- AQA A Level Computer Science Unit 2
- AQA AS Level Computer Science Units 1 & 2
- How to Program Effectively in Delphi for AS/A Level Computer Science

New Publications for 2016:

- GCSE Computer Science
- How to Program Effectively in C# for AS/A Level Computer Science

For more information, please go to www.educational-computing.co.uk.



Hodder Education publishes blended print and digital learning resources to support the teaching and learning of computing progressively from Key Stage 3 through GCSE to A level. Key publishing for each range includes:

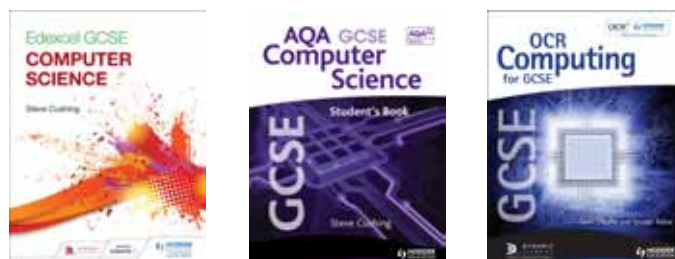
Compute-IT for Key Stage 3

Student's books, teaching packs and a suite of digital teaching and learning resources, delivered through Dynamic Learning, for the new KS3 curriculum. Compute-IT CPD Video Lessons feature over 150 tutorials to support the delivery of key topics in the new Programme of Study.



For more information go to www.hoddereducation.co.uk/compute-it.

AQA, Edexcel and OCR Computer Science for GCSE



For more information go to www.hoddereducation.co.uk/computing.

AQA and OCR Computer Science for the new A level curriculum



For more information go to www.hoddereducation.co.uk/Alevelcomputing.



PG Online produces a complete and comprehensive series of KS3 teaching materials to help support the national demand for resources for the new computing curriculum. The downloadable six-week units each include editable lesson plans, PowerPoint presentations and worksheets and are sold as a lifetime site licence.

They have proved to be a phenomenal hit with teachers nationwide, and especially with those who may be inexperienced in teaching computing rather than IT.

Two exciting new series of downloadable teaching units are now available for GCSE OCR Computing and AQA Computer Science. To accompany these units, PG Online has published new editions of Susan Robson's popular GCSE textbooks, which are also available as downloadable PDF versions.



See www.pgonline.co.uk for more details.

RISING STARS

Educational Publishing Specialists

To get you started if students haven't done any computing at primary school:

Switched on Computing

This scheme for primary schools is published by Rising Stars in association with Computing At School and NAACE. Full details can be found at www.switchedoncomputing.co.uk.



Switched on Computing – take your first easy steps with Microsoft

This free resource has six project ideas each using Microsoft tools. Schools can download this resource at www.switchedoncomputing.co.uk/microsoft. Supporting videos for this resource can also be found here: raychambers.wordpress.com/2014/09/20/switched-on-computing-tutorial-samples.



OXFORD

UNIVERSITY PRESS

Oxford University Press publishes student books and online resources for computing at primary, GCSE and A Level.

Oxford International Primary Computing



For more information, go to: <https://global.oup.com/education/content/primary/series/computing/?region=international>.

AQA GCSE and A Level Computer Science

Our AQA GCSE and A level resources have been written by leading authors to support the latest specifications, focusing on developing programming knowledge, computational thinking and problem-solving skills. AQA A Level Computing is also accompanied by Kerboodle, which includes a wide variety of classroom resources, time-saving lesson presentations and assessment tasks to help track learning.



For more information, go to: <https://global.oup.com/education/secondary/subjects/ict/?region=international>.

Other sources of inspiration

- STEM Ambassadors: www.stemnet.org.uk/topboxes/stem-ambassadors.
- Code clubs: www.codeclub.org.uk.