SWITCHEDON

CAS SCOTLAND:
BUILDING FOR THE FUTURE

Call me an optimist, but I think it's actually quite a good time to be a Computing teacher. Since last summer, when Google chair Eric Schmidt turned his guns on the teaching of computing skills in the UK, there have been several positive moves that are now highlighting the importance of a strong Computing Science curriculum in schools. Indeed Michael Gove has announced wholesale changes to the 'boring' ICT curriculum in England, and a recent Royal Society review gave backing to a major shakeup of how IT skills are delivered in the UK.

Even our own Mike Russell got in on the act. You might have missed it though, buried in a statement about teacher numbers. Oor Mike reckons we need to train more Computing teachers in Scotland. I see this as a positive endorsement that – as far as the government are concerned – our subject does indeed have a future.

So what about CAS Scotland? The organisation came about when it was decided to join the SIoCE with CAS in England. Why? Quite simply, despite our different education systems, we have many of the same issues to address on both sides of the Border.

Make no mistake though – CAS Scotland, just like CAS, is a grass-roots organisation. We are driven by the members, providing a central, representative voice on computing issues in Scotland.

At an open meeting in December a number of short-term objectives were identified, and these were reported on in the CompEdNet group. These start fairly simply: encourage our colleagues to join CAS Scotland, raise the organisation's profile, take stock of where we are with CfE and put CPD in place to ensure the new courses are a success.

Longer term objectives remain to be set, and ultimately that's where CAS Scotland needs you! What do the members of CAS Scotland see as most important? Make sure your opinion is represented: attend a local – or national – meeting; set up a CAS hub; become an active member if you can spare a little time.

I hope you enjoy the first Scottish edition of SWITCHEDON. If you haven't already done so, please join us today (full details on back page), and encourage your colleagues to do likewise.

Mark Tennant
Editor

COMPUTING
AT SCHOOL
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In collaboration with BCS. the Chartered Institute for IT

CAS SCOTLAND CONFERENCE
OCT 27

CAS Scotland are thrilled to announce that our first conference will take place on Saturday 27th October 2012.

The day will start with a keynote by Muffy Calder, Chief Scientific Advisor for Scotland. Quintin Cutts from Glasgow University will then talk to us about pedagogy of teaching computational thinking.

If you fancy trying out a different programming language then Jeremy Scott, Michael Kolling and Steven Whyte will be presenting sessions covering Scratch, LiveCode, App Inventor and Greenfoot.

There are two practical sessions planned. Chris Martin from Dundee University will be doing an introductory session on using Arduino electronics. Colin Maxwell from Carnegie College will be showing us how to use Blender for teaching the NPA Computer Games Development units.

Hardware-wise, Duncan Smeed from Strathclyde University will be discussing the Raspberry Pi. Sue Sentance from Anglia Ruskin University will be talking about .NET Gadgeteer.

We also have Judy Robertson talking about using mobile apps to improve the health and fitness of pupils, Charlie Love showing how to teach web development using Thimble, and Ollie Bray on teaching internet safety.

To sign up for the conference go to http://bit.ly/cassconf12 Tickets cost £20 including refreshments and lunch.

Kate Farrell

I was very fortunate to see a demo of a prototype Raspberry Pi last year. This is a small credit-card sized computer that the Raspberry Pi Foundation plan to sell for $25 (or $35 for the version with Ethernet). The power and potential of this device are incredible! We were shown a blu-ray quality video clip playing on the Raspberry Pi - stunning quality from a device so tiny.
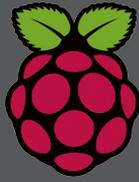
There is composite video and HDMI out on the board, so you can hook it up to an old analogue TV, a digital TV or a DVI monitor. You can plug in speakers through a standard 3.5mm audio socket. It's powered by micro USB but will also run off AA batteries.

Raspberry Pi will use Debian or Fedora Linux but you can replace this on the SD card. Python will be installed as the main programming language but others can be added.

The Raspberry Pi Foundation want to see cheap, accessible, programmable computers everywhere. They want owning a truly personal computer to be normal for children.

RPi are currently available to order from Element14 or RS Components.

Kate Farrell

APP INVENTOR INFO

With the release of Mobile Applications Development as support materials for the N4 course, a lot of us are asking what is App Inventor and what do I need to do to use it with my classes?

App Inventor is a mostly web based graphical programming language for creating mobile applications for any phone that uses the Android OS.

You need to have Java 6, the App Inventor Setup software package, installed the drivers for the phones you have and have access to IE 7 or better. The phones can be sourced second hand and don't have to have a Sim card. Finally pupils currently need to have a google account to login with.

More details from: http://bit.ly/casssep9 and http://bit.ly/casssep10

EXEMPLIFYING CfE LEVEL 3 OUTCOMES WITH THE RSE

Implementation of Curriculum for Excellence and the development of new national qualifications has presented a timely opportunity to revise the way computing science is taught in schools and to provide a vastly more interesting, up-to-date, and engaging experience for both teachers and students.

In August 2011, the Royal Society of Edinburgh (RSE) and the BCS Academy of Computing seconded Jeremy Scott, Principal Teacher of Computing at George Heriot's School in Edinburgh, on a half-time basis to develop materials that will exemplify a subset of the computing science-related outcomes of CfE at Levels 3 & 4.

A project advisory group consisting of representatives from the RSE, the BCS Academy of Computing, industry, school and higher education, has also been established to provide ongoing advice and support to Jeremy during the period of the secondment. The breadth of knowledge and expertise on the group means that it is well-placed to raise awareness of the exemplification materials among computing teachers and the teaching profession more generally in Scotland and across the UK.

Given that the National Curriculum in England is being reviewed and the Royal Society, London recently had a major investigation into the way in which computing is taught in schools, there is scope for the RSE/BCS exemplification development to have UK-wide applicability and the project advisory group has membership from CAS.

The exemplification, through the development and dissemination of teacher and student material resources, will map out curriculum plans, practical experiences and the breadth and depth of treatment appropriate at each stage, and will identify the stages at which fundamental computing science concepts should be introduced and developed. It will examine how best – and at what level – the principles of computing science might emerge, and how cross-disciplinary linkages might be created.

The exemplification will also explore how the curriculum could best prepare and serve those who will not specialise in computing but for whom knowledge and understanding of the discipline is necessary to prepare them as informed citizens.

These aims will be realised by introducing students to Computing Science – and therefore promote computational thinking – through a series of educational resources. The first three packs are:

Resource 1: Introduction to Computer Science
This provides an introduction to computer science and basic Computing concepts and gives students a grounding in computer programming.

Resource 2: Intermediate Computer Science
This resource will explore further Computing concepts, with a focus on abstraction, modularity and hierarchy within programming.

Resource 3: Mobile App Development
This resource seeks to consolidate previous concepts through the medium of mobile app development. In addition to providing a course in programming for

mobile devices, it explores new paradigms in Computing e.g. mobile technologies and new interfaces, and provide ample opportunity for inter-disciplinary linkage.

Whilst the exemplification will support teachers' thinking about how they might go about translating the intentions of the curriculum into classroom activity, it will not prescribe what should be taught or when but, rather, stimulate innovation and offer teachers the flexibility and opportunity to deploy their creativity and teacher skills in meeting the needs of learners.

In addition it is intended that aspects of the developments will support the new national qualifications in Computing Science and the project advisory group has been liaising with Education Scotland to this end.

With help from Charlie Love, Jeremy has set up a discussion group around the project on the CompEdNet website -http://www.compednet.com/groups/c-is-exemplification-project/.

This already has over 140 members, most of whom are computing teachers in Scotland and has proved a useful source of information as Jeremy has set out his plans for the development work. It's clear that the teaching profession is clamouring for materials of the kind that are being developed.

As Jeremy says: "New environments such as Alice, Scratch, Kodu and App Inventor mean that, compared to just five years ago, we're really spoiled for choice. These new tools provide a fantastic opportunity to deliver computational thinking in an engaging way that resonates with students' own digital lives."

To find out more about the project, or to feedback directly to Jeremy, sign up to the group on CompEdNet.

(Note that CompEdNet is a private site with vetted membership, so non-members must apply to the site administrator by email).

AND NOW FOR THE NEWS...
COMPUTING SCIENCE STYLE

Computing Education researcher Craig Steele aims to produce a new set of web-based video resources that will bring core concepts of Computing Science into high school classrooms across the UK. He's looking for your feedback and comments now.

With the recent government announcements regarding the future of Computing in schools, alongside the Next Gen Skills campaign for a better high-tech education, this is an ideal opportunity to introduce Computing Science topics into your classroom.

While many gadget touting young people are aware of the "digital world" we live in, they are not as informed about potential careers in the technology sector, or the benefits of further study in Science, Technology, Engineering and Maths. This web-based video resource will help promote the further study of these areas, while educating them on key topics in Computing Science.

Each weekly bite size episode (between 5 and 7 minutes in length) can complement existing Computing lessons

or spark interest and discussion about other areas of this exciting subject. The episodes will showcase both current research in Computing Science as well as give a platform for schools themselves to share their own work. Episodes will also look at what has been going on in the real world that week, and relate those stories to the core Computing Science behind them - a real up-to-the-minute resource!

It is hoped that this web series will raise the profile of Computing Science with young people across the UK, while providing teachers with a free weekly education resource to enhance their own lessons. The resource is available to all teachers in the UK, if you have an interest in receiving it please sign up via http://bit.ly/casssep3

Craig Steele

NPA DIGITAL MEDIA

I've been having a whale of a time teaching this new academic year. We started teaching the new NC in Games Development as well as the NC awards in Digital Media Computing and we've turned our classroom into an open plan office, which is actually having a great effect on behaviour and attainment. ...but most importantly, I'm having FUN teaching!

To see what we've been up to this year go to: http://bit.ly/casssep7

Don't Forget Bobby Elliott from the SQA will be at the CASS conference to help 'demystify' the NCs and NPAs!

CAS HUB CONCEPT COMES TO NORTH-EAST

Scotland's first CAS hub continues to meet regularly. Organiser Claire Griffiths thought that CAS' hub concept would provide a useful forum for local people enthusiastic about Computer Science and Education.

June's meeting took place at Hunted Cow studios in Elgin and involved an informative tour by Andrew Mulholland. Andrew was educated in Elgin and went to Abertay to study game development before starting Hunted Cow Studios with a fellow graduate, Glenn Murphy.

Hunted Cow work with local schools providing a number of work experience placements for secondary students. The students are mainly involved with game testing, a vital part of the design process for all online games.

For more information about the CAS north-east hub, contact Claire Griffiths on claire_griffiths3@btinternet.com

SET UP A CAS HUB

CAS hubs are fully supported by CAS and the BCS who will cover expenses and give other support as needed.

CAS Scotland is eager to see more hubs like the one featured above, so please get in touch if you think you could help organise one. Lots of support is available, and you can read more from CAS in the document at http://bit.ly/casssep5

JOIN CAS SCOTLAND

At the moment, the procedure for joining CAS Scotland is as follows:-

Create an account at Compednet.com and put CAS Scotland then the school or organisation you work for in the "School/Establishment Name" field.

Sign in to Compednet with the username and password you chose, click on Groups, find the CAS Scotland group and then click on the Request Membership button.

We'd also recommend signing up to the UK-wide CAS group: full information available at: http://bit.ly/joincasscotland

TOO MUCH DOING, NOT ENOUGH UNDERSTANDING

Computing educators tend to spend more time speaking about the *content* of their courses than they do about the *pedagogy* used to deliver that content.

We get exercised about the language we use – VB, Scratch, GameMaker, and so on - but we seldom deviate far from our old instructional designs. For many learners however, *we know those designs don't work*. They simply perpetuate the belief that some learners can't learn about programming. No wonder that teachers are concerned about the increased programming content in the Nationals.

I've been exploring recently the major focus in our teaching on problem solving and program writing. We often use an assessment of the artifact produced as a measure of the learner's level of understanding, while knowing that many of our learners get programs working through a process of trial and error – they are quite unable to explain their code. We should regard this as a failure; instead, our learning designs and assessment methods regularly pass such students.

In the same way that we promote reading literature before writing it, so program writing should not be a major goal of our courses. Yes, it's important for a learner to have the thrill of seeing his or her efforts come to life. But the creation of artifacts should be primarily a motivation and a vehicle for learning; an understanding of computation should be the fundamental learning objective.

A pre-cursor to program writing should therefore be demonstrations of program understanding. In some classrooms, students are already using a technique called *Peer Instruction* to discuss multiple-choice questions concerning aspects of code fragments, programming problems and their solutions. In small groups, they discuss their reasoning for the answers they chose, and it is this effortful practice to explain their understanding that marks

When does a party happen?

A. If any of the objects is near the palmtree
B. If all of the objects are near the palmtree
C. Something else (e.g. multiple parties…)

transition from programming as *magic* to programming as *logic*. A sample question from an Alice course is shown here. Critics suggest that pupils in the early secondary years are not ready for such logical argumentation. However, there is now extensive research to refute this.

If students develop their understanding using discussion practices, can they also be assessed this way? Large-scale oral examinations are expensive, but students can be asked to *write* about their understanding instead. Finding ways of helping teachers to help students do this accurately is my current focus, and I hope to be able to report on it here, soon.

I have posted a number of papers on my website that describe aspects of this new pedagogy in more detail: http://bit.ly/casssep6 Your comments on this would be welcomed.

Finally, we are not alone in struggling to find better pedagogy. Writing this on a return flight from the US, where significant resource is being invested in computing education, they are very keen to see how our new curriculum and our new qualifications fare.

Quintin Cutts

Read the full UK issue of SWITCHEDON along with lots more info:
www.computingatschool.org.uk