The Network of Teaching Excellence in Computer Science – Empowering Teachers

Sue Sentance
National Academic Coordinator
Computing At School, UK
Session plan

- Curriculum change in England
- Network of Excellence project overview
- Master teachers
  - Who they are
  - What they do
  - Examples
- Training the master teachers
- Evaluation of the programme
- Questions
Eric Schmidt (Google) tells us we should be educating our children in CS!

Computing at School is formed and campaigns for Computing in school

Shut Down or Restart Report by Royal Society

Pre-service teacher training in Computer Science starts

Draft new curriculum for Computing

Computing in new National Curriculum for England (5-16)

None of this would have happened without CAS
… started in 2008 with 5 members

… in July 2014 has over 13,000 members …

There is no THEM, only US!
Simply a group of individuals, concerned about the state of computing education in our schools

Including:
- Teachers
- Industry (eg. Google, Microsoft)
- University academics (incl. CPHC, UKCRC)
- Members of exam board (eg. AQA)
- Members of professional societies (eg. BCS)
- Parents
- Local educational advisers
- Teacher trainers

Varied backgrounds, with common concerns
United Kingdom

Scotland

Already had Computer Studies in the curriculum at secondary school

N.I.

New curriculum in Computing in September 2014

England

Wales

New 14-16 qualifications in Computer Science

Across the UK

COMPUTING AT SCHOOL
EDUCATE · ENGAGE · ENCOURAGE
In collaboration with BCS, The Chartered Institute for IT
CAS believes that …

Computer science is a proper, rigorous school subject discipline, on a par with mathematics or chemistry, that every child should learn from primary school onwards.

NB. It is not about computers, nor is it about programming
CAS in the early years

Computing At School

- Influencing national policy
- Directly support teachers “on the ground”
Computing
Programmes of study for Key Stages 1-4

Aims

The National Curriculum for computing aims to ensure that all pupils:

- can understand and apply the fundamental principles of computer science, including logic, algorithms, data representation, and communication
- can analyse problems in computational terms, and have repeated practical experience of writing computer programs in order to solve such problems
- can evaluate and apply information technology, including new or unfamiliar technologies, analytically to solve problems
- are responsible, competent, confident and creative users of information and communication technology.
Aims

The national curriculum for computing aims to ensure that all pupils:

- can understand and apply the fundamental principles and concepts of computer science, including abstraction, logic, algorithms and data representation
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For children 5 – 16 yrs old

Focus on computational thinking
CAS’s activities

1. Policy impact

2. Supporting computing teachers

CAS’s new mission: support and equip teachers to deliver the new computing curriculum with confidence and enthusiasm
Content of curriculum: KS1 (5-7)

Key stage 1

Pupils should be taught to:

- understand what algorithms are; how they are implemented as programs on digital devices; and that programs execute by following precise and unambiguous instructions
- create and debug simple programs
- use logical reasoning to predict the behaviour of simple programs
- use technology purposefully to create, organise, store, manipulate and retrieve digital content
- recognise common uses of information technology beyond school
- use technology safely and respectfully, keeping personal information private; identify where to go for help and support when they have concerns about content or contact on the internet or other online technologies.
Key stage 2

Pupils should be taught to:

- design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts
- use sequence, selection, and repetition in programs; work with variables and various forms of input and output
- use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs
- understand computer networks including the internet; how they can provide multiple services, such as the world wide web; and the opportunities they offer for communication and collaboration
- use search technologies effectively, appreciate how results are selected and ranked,
Key stage 3

- use two or more programming languages, at least one of which is textual, to solve a variety of computational problems; make appropriate use of data structures [for example, lists, tables or arrays]; design and develop modular programs that use procedures or functions

- understand simple Boolean logic [for example, AND, OR and NOT] and some of its uses in circuits and programming; understand how numbers can be represented in binary, and be able to carry out simple operations on binary numbers [for example, uses in circuits and programming; understand how numbers can be represented in

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Computing At School Areas of Activity

- Annual conference
- Network of Excellence
- Switched On Magazine
- Hubs
- Community Website
- Barefoot Computing
- Quick Start
A national programme of professional development for teachers of Computer Science
The Network of Teaching Excellence in Computer Science (NoE):

– Collaboration between universities and schools
– Has provided CPD for over 6,700 teachers since March 2013
– Includes over 1050 schools as ‘institutional’ members
– Supported by 80 universities, including Cambridge, Imperial, Manchester, UCL, Edinburgh, Oxford, … etc.
– Currently has 130 teachers in the ‘Master Teacher’ training programme

Run by

Funded by
How does the Network of Excellence work?

• Through the Network of Excellence we will train 400 Master teachers who will offer training (at a low cost) to other teachers in their local area.

• **Master teachers** are experienced teachers who receive funding for some release from school in order to support and train other teachers in their area.

• The Network of Excellence also includes universities who are committed to supporting schools and teachers in developing subject knowledge.

• Schools which wish to be leaders in their area for the teaching of Computing can apply to be **Lead Schools**.
If you can answer 'YES' to the following then the Master teacher programme is for you!

- Are you a primary or secondary teacher in a state maintained school?
- Would you like funding to develop your skills and knowledge of computing in the new National Curriculum?
- Are you an experienced teacher with good or outstanding teaching seen in your recent lesson observations?
- Can you confidently engage with your peers in a professional environment?
- Do you have the ability to design and deliver practical and interactive workshops for teachers with appropriate course material?
- Do you have a passion about sharing best practice in teaching and learning?
Master teachers

- Run low-cost training events for teachers
- Speak at events
- Visit teachers in schools
- Active members of CAS Community
Selection criteria

1. ‘Good with outstanding’ or ‘outstanding’ lessons
2. Level of subject knowledge
3. Number of years teaching experience
4. Geographical location of candidate in relation to existing master teachers and other candidates
5. The demographics of the members of CAS and schools registered for the NoE.
6. Experiences of mentoring and support
7. Experience of running CPD
8. Profile and presence in the community
9. Teaching school
Relationships in the Network of Excellence

Universities → Master Teachers → Hubs

Training courses
Support
Networking

Teachers

Provide
Can access

Work together
Provide
Provide
Provide
Provide
Can access
The Network of Excellence model of CPD
Examples of master teacher activities
Events are advertised on the Community CAS website

<table>
<thead>
<tr>
<th>Event Title</th>
<th>Date and Time</th>
<th>Organiser</th>
</tr>
</thead>
<tbody>
<tr>
<td>Embedding e-safety into the primary school curriculum (KS1 and 2)</td>
<td>Jul 15 from 9:00AM to 12:00PM</td>
<td>Yvonne Walker</td>
</tr>
<tr>
<td>Decrypting Computer Science, KS3 (Years 7, 8 and 9) and KS4 - 15-17 July</td>
<td>Jul 15 9:00AM until Jul 17 4:00PM</td>
<td></td>
</tr>
<tr>
<td>Implementing Algorithms using Scratch (KS 1-2)</td>
<td>Jul 15 from 9:00AM to 1:00PM</td>
<td></td>
</tr>
<tr>
<td>Get going with Computing: an introduction for NQTs and Recently Qualified</td>
<td>Jul 15 from 9:00AM to 4:15PM</td>
<td>Emma Asprey</td>
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<td>Teachers at Key Stages 1 and 2</td>
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<tr>
<td>Computers Society and the future-an event for Year 10,11 and 12 girls</td>
<td>Jul 15 from 9:45AM to 4:00PM</td>
<td>Kevin Yeun</td>
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<tr>
<td>Mid-Kent CAS Hub Meeting</td>
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Examples of master teacher training events

Computing for Primary Teachers

24 October 2014
Charford First School, Charford Road, Bromsgrove, B60 3NH

During this whole day event we'll cover three main topics - data representation, algorithms and programming.

PROGRAMME (STC)

We're going to cram a lot into this day and give an detailed introduction into the programme of study for Computing at Primary Level. The plan is to look at data representation - how do computers store numbers, text, images and sound; algorithm design - flowcharts and pseudo code; and programming - with logo and scratch. There'll be lots of hands on tasks and lots of suggestions for you to take back to your school to try out in the classroom.
Computational Thinking – Representation & Algorithms

02 July 2014
Richard Hale School, Hale Road, Hertford, SG13 8EN

This course will give you the ability to interpret and apply various Computational algorithms e.g. linear search algorithm. It will provide you with the ability to explain different Computational data representations and apply conversions. It will also help you demystify binary, denary and hexadecimal.

PROGRAMME (STC)

By the end of the course you should be able to:
• Explain different searching and sorting algorithms;
• Distinguish different data representations;
• Interpret and convert different number representation;
• Network with other colleagues developing computing in other schools.
Creating Web Sites using HTML, CSS and Raspberry Pi

09/07/2014

Soham Village College, Sand Street, Soham, CB7 5AA

Google coder is a fantastic new platform for developing web applications using HTML, CSS and Javascript. The platform runs on a Raspberry Pi and features an engaging and intuitive interface for building basic web software.

http://googlecreativelab.github.io/coder/

Using the Google Coder platform students can learn what a webserver is and about the nature of the web. Using this webserver they can develop an understanding of what goes into making a web site.

The content presented in this course are suitable for students at KS2 & KS3 and could be used to support literacy at KS2.
Local, face-to-face, peer-to-peer support
Resources on CAS – shared by teachers and Master Teachers

Resources

Filters (AND)  (Clear all)

- English Curriculum
- Scottish Curriculum
- Language/Platform
- Resource Type
- Uncategorised

View by popularity  View by latest update

Create resource

Primary computing keywords posters
Key words from the 2014 computing curriculum for KS1 and KS2 in pupil speak.

Created by Pete Dring, Feb 08 2014 - last modified by Pete Dring, Feb 08 2014, 19 comments

Progression Pathways Assessment Framework KS1 (Y1) to KS3 (Y9)
The purpose of the Progression Pathways Assessment Framework is to support teachers in assessing their pupils’ progress in computing from Key Stage 1 (Year 1) through to Key Stage 3 (Year 9).

Created by Mark Dorling, Jan 21 2014 - last modified by Mark Dorling, Jan 21 2014, 32 comments

OCR A451 GCSE Computing Theory and Homework Booklet
GCSE Computing Theory and Homework Booklet

Created by Tamsin Laber, Jul 03 2013 - last modified by Tamsin Laber, Jul 03 2013, 54 comments

OCR GCSE Computing: An Unofficial Teacher’s Guide
An unofficial (but OCR endorsed) collection of notes
Teach Programming with Python (from Year 7)

last edited May 18 2013 by Alan O'Donohoe

Created by Alan O'Donohoe. Other contributors:

This resource is public; the short and full description below are publicly viewable, as are the files (but not the comments)

Short description:
A series of lesson plans for teaching Python to children as young as 11

Full description:
This is a guide to teaching a series of lessons to pupils from Year 7 upwards. The materials have been tried and tested with classes and evaluated by a number of teachers including non-specialists and Python developers.

The lessons start with no previous experience of Python and then build up to creating a text-based game with some basic artificial intelligence. A second unit is currently being developed to follow on, for teaching from Year 8 with progression.

For some background, read my blogpost about teaching Python to Year 7 and this
jQuery - zero to hero

last edited Aug 16 2012 by Laura Dixon

Created by Laura Dixon. Other contributors:

Short description:

A booklet taking you through from zero HTML to jQuery ninja (sort of)

Full description:

A booklet covering the basics of HTML, CSS, JavaScript and jQuery. Contains a tutorial for making a sliding box and a Mr T quote generator.
Resources on CAS – shared by teachers
Program your teacher to make a Jam Sandwich (Sandwich Bot)…
Benefits of the Master Teacher programme

• For Teachers
  – They can access training locally, perhaps only a few miles away
  – They have somebody to turn to who has direct classroom experience
  – They feel supported on a peer-to-peer basis
  – The Master Teacher can be a role model, in that they represent realistic achievement

• For Master Teachers
  – They are empowered to support others
  – They gain skills in training/supporting others
  – They become known and have other opportunities to contribute to the CAS agenda
  – Career opportunities increase
Training the master teachers
Level 1 programme is for “trainee” master teachers
Mechanics of Level 1 programme (for good teachers needing subject knowledge boost)

- Teachers receive funding for release from school & travel/accommodation
  - Primary teachers £1350 (5 days training)
  - Secondary teachers £2700 (10 days training)
- Schools invoice NOE Admin as they incur costs
- Teachers are allocated to universities
- Universities receive £1000 per L1 teacher trained = £10,000 + funding for 12 hours 1-1 training per teacher
Mechanics for L2 master teachers (from L1 or direct entry)

- Master teachers apply for programme and are appointed according to a range of criteria
- Master teachers receive funding in their first year for half a day off timetable.
- Receive training on how to deliver effective CPD
- Use time off timetable to plan and deliver at least 3 CPD events during the year
- Regional coordinator advises and supports during planning phase
- Master teachers also offer services to teachers in terms of advice, visits to local schools, visits from teachers to their own school
- All activity is local, peer-to-peer and primarily face-to-face
Training the Master Teachers – practice time

PHOTOS REMOVED
Effectiveness of the Network of Excellence/
Master Teacher Training
Evaluation of master teacher sessions

- Trainer was well informed: 84% Strongly agree, 16% Agree
- Trainer was well prepared: 79% Strongly agree, 20% agree
- Good range of activities: 67% Strongly agree, 30% Agree, 2% Disagree, 2% Strongly disagree
- Good balance of activities: 69% Strongly agree, 28% Agree, 2% Disagree, 0% Strongly disagree

BCS Academy of Computing
Programme Evaluation

Teachers’ comments on their sessions/work with master teachers

*Our local Master Teacher is outstanding, he runs fantastic sessions, is very supportive of new-to-computing teachers and regularly contacts us about CAS events happening locally and nationally*

*I thought the course was really useful with some great ideas for lessons. I thought the course itself was really well-organised and the resources provided were of a high standard.*

*ABSOLUTELY FAB!! Thanks SO much for offering this training, I am very grateful for your advice and support.*

*He was very good and patient at explaining and putting across how to utilise Python (4 day course)*
Impact of training (early days)

What is the impact on your ... ?

<table>
<thead>
<tr>
<th></th>
<th>Significant impact</th>
<th>Moderate impact</th>
<th>A little impact</th>
<th>No impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge and Skills</td>
<td>48% 36%</td>
<td>26%</td>
<td>4%</td>
<td>2%</td>
</tr>
<tr>
<td>Practice</td>
<td>44% 26%</td>
<td>26%</td>
<td>4%</td>
<td>2%</td>
</tr>
<tr>
<td>Organisation</td>
<td>42% 28%</td>
<td>18%</td>
<td>6%</td>
<td>14%</td>
</tr>
<tr>
<td>Learners</td>
<td>32% 20%</td>
<td>14%</td>
<td>12%</td>
<td></td>
</tr>
</tbody>
</table>

Significant impact  Moderate impact  A little impact  No impact
Summary

• The new curriculum in England this September will include Computing

• Computing will be taught from ages 5-16

• **Computing At School** is the UK Teachers’ Association for Computing (13,000 members)

• The Network of Excellence is a holistic professional development programme

• Master Teachers offer face-to-face, local, peer-to-peer support