HOW TO RESCUE OUR KIDS

FIXING THE ICT CRISIS AT SCHOOL SESSION CODE 8842

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Microsoft Research
and
The Computing at School Working Group

What is going on?

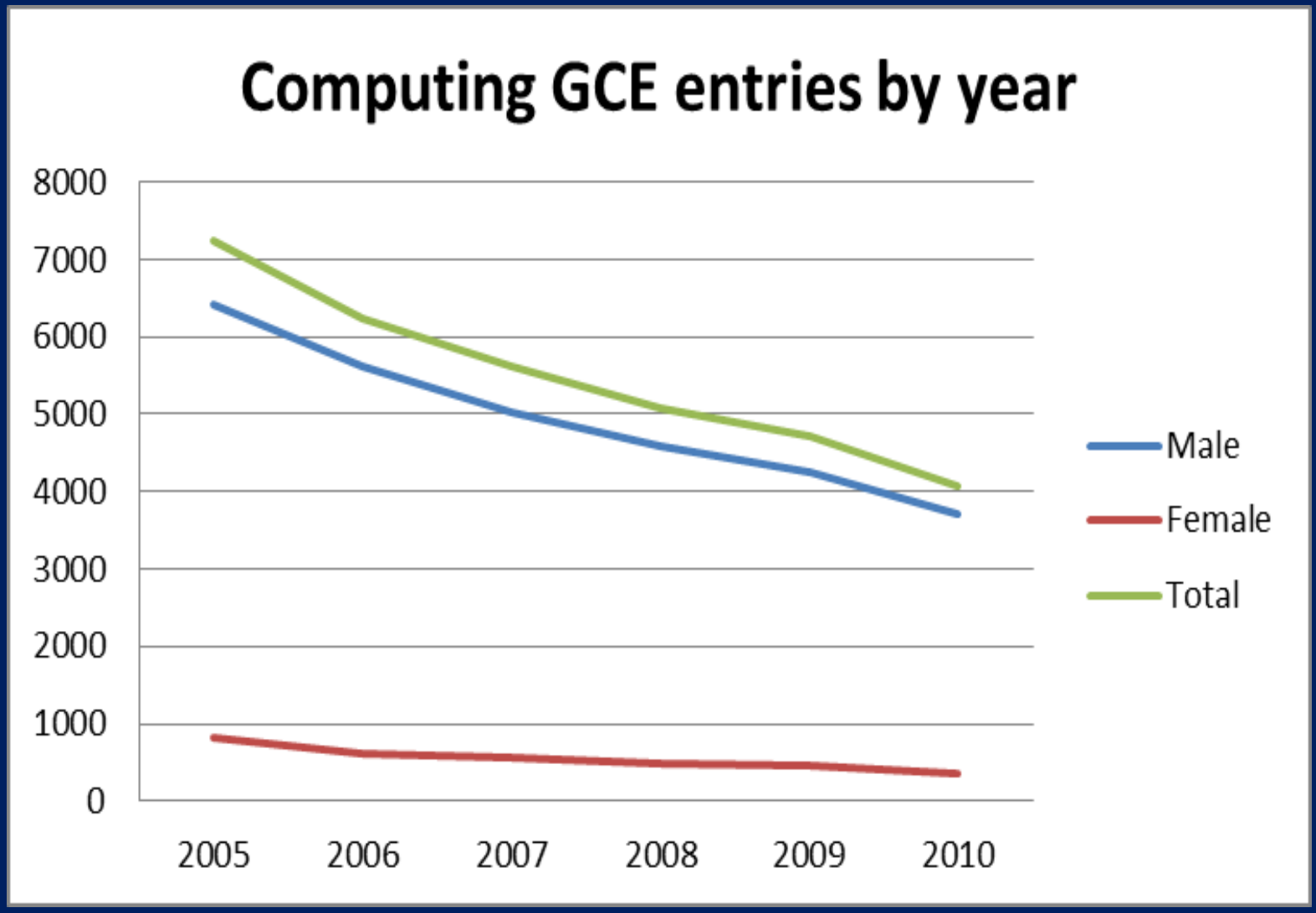
- An increasing sense of unease about the way we teach our kids about computing. Something here is Not Right

Information and Communication Technology

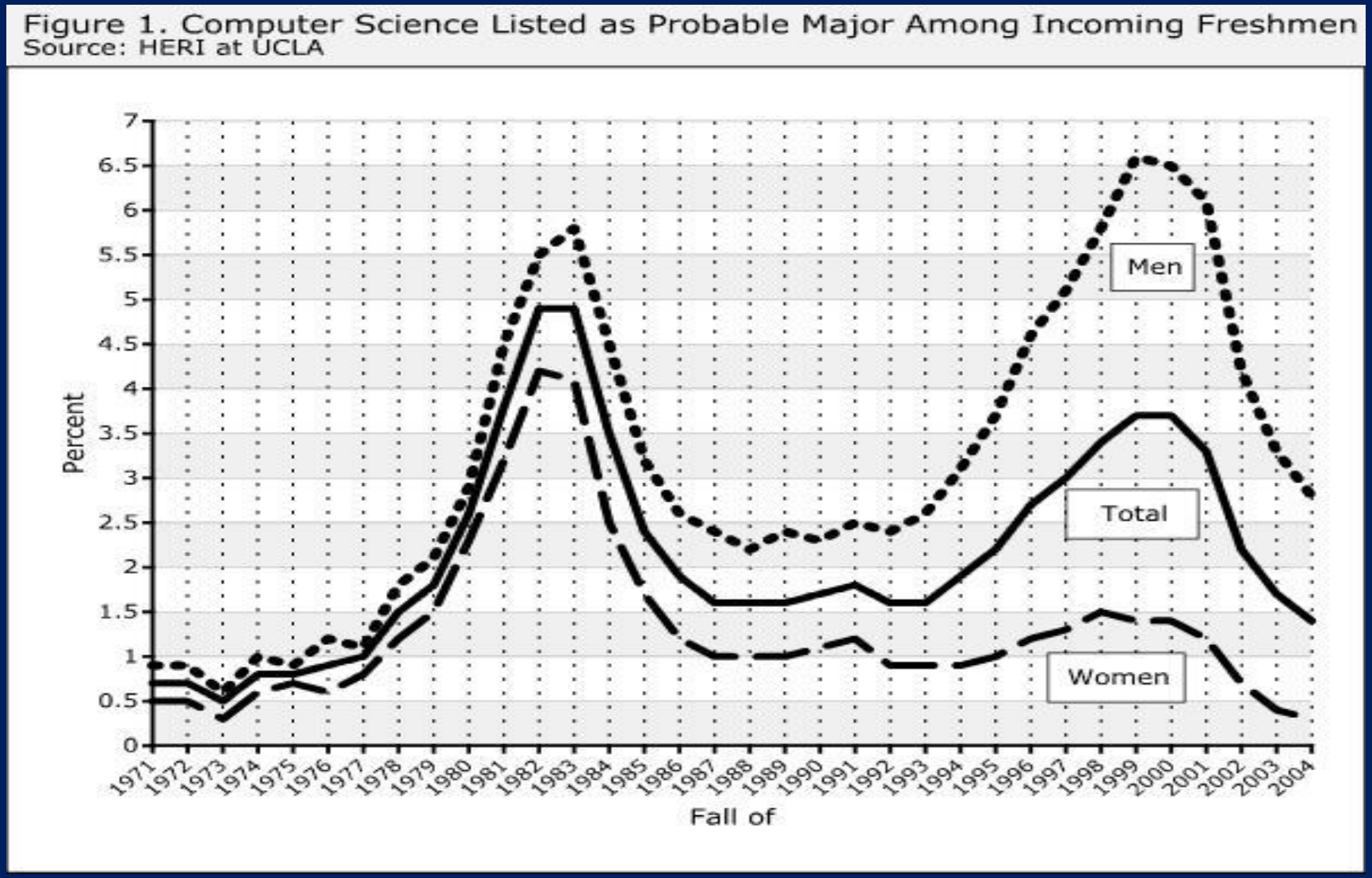
ICT is failing our kids

- **The most exciting discipline on the planet comes over as dull and de-motivating**
- *"**The image of IT-related degrees and careers was that they would be repetitive, boring, and more-of-the-same**; for example use of IT office applications such as word processing, spreadsheets, and databases"*. The next bullet says *"**The ICT GCSE had a major part to play in creating their (negative) impressions**"*. [2008 "IT & Telecoms Insight Report" published by Eskills UK]
- *" The assessment requirements of some vocational qualifications may actually be limiting students' achievement. In many of the schools visited, higher-attaining **students were insufficiently challenged**....much of the work in ICT at Key Stage 4, particularly for the higher attainers, often involved consolidating skills that students had already gained proficiency."* [2009 Ofsted report "The importance of ICT"]

A-level Computing decline



University trends 1970-2005



Source: CRA, May 2005

What is going on?

- An increasing sense of unease about the way we teach our kids about computing. Something here is Not Right
- 2008: let's fix this. Birth of the Computing at School Working Group.

The Computing At School working group (CAS)

- Simply a group of individuals, concerned about the state of computing education at school in the UK
- Varied backgrounds, common concerns
  - 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
- Now fully part of BCS, the Chartered Institute for IT
- No staff, no money, no office. All volunteers

Diagnosis

Disciplines

- Principles, ideas
- Knowledge, laws
- Techniques, methods
- Broadly applicable
- Dates slowly

Physics, chemistry, mathematics, English

Skills

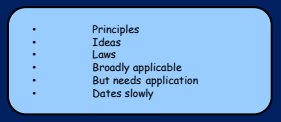
- Technology, artefacts
- Machines
- Programs
- Products
- Organisations
- Business processes
- Dates quickly

Budgeting, presentation skills, metalwork, textiles

Diagnosis

Computer Science
(discipline)
Barely taught

ICT
(technology focused)
Dominant



- Spreadsheets
- Databases
- Powerpoint
- Using the web
- Safety on the internet
- Plan communication projects
- Analysing and automating processes

No KS4 qualification at all
(2009)

Range of 14+ different
KS4 qualifications

Headline messages

- Computer Science should be **recognised in school as a rigorous subject discipline**, like physics or history, quite distinct from the (useful) skills of digital literacy.
- Just as every student needs to learn a bit of chemistry, even though few will become chemists, so **every student** should learn a bit of computer science (including some elementary programming) because they live in a digital world.
- From **primary school onwards** (like science).
- **Re-introduce the thrill and excitement of computational thinking and creation.**

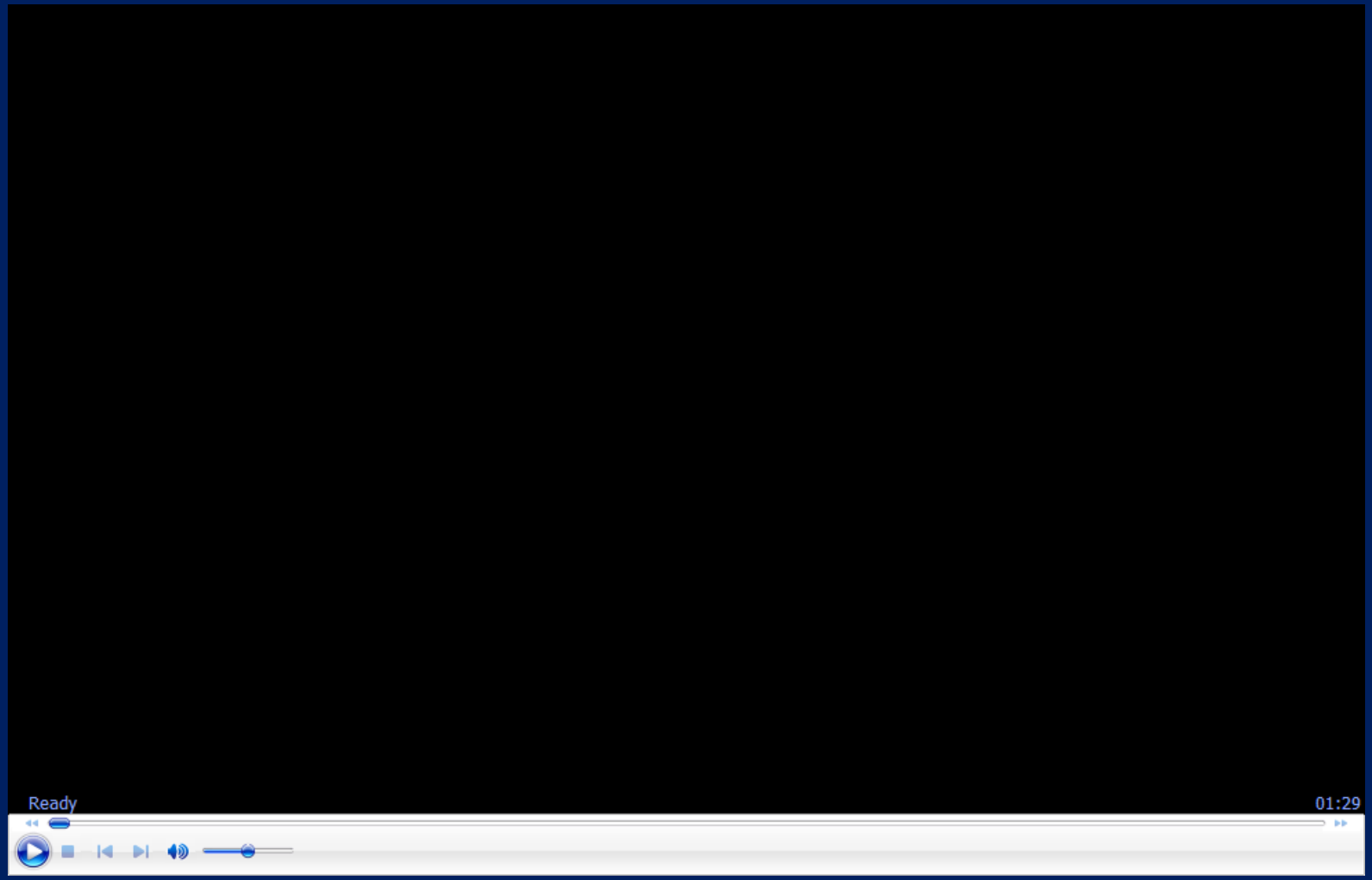
What is "Computer Science"?

- **What students should know**: languages, algorithms, data structures and representation, architecture, programs, communication and coordination.
- **What students should be able to do**: **computational thinking**, abstraction, modelling, design, problem solving, programming.

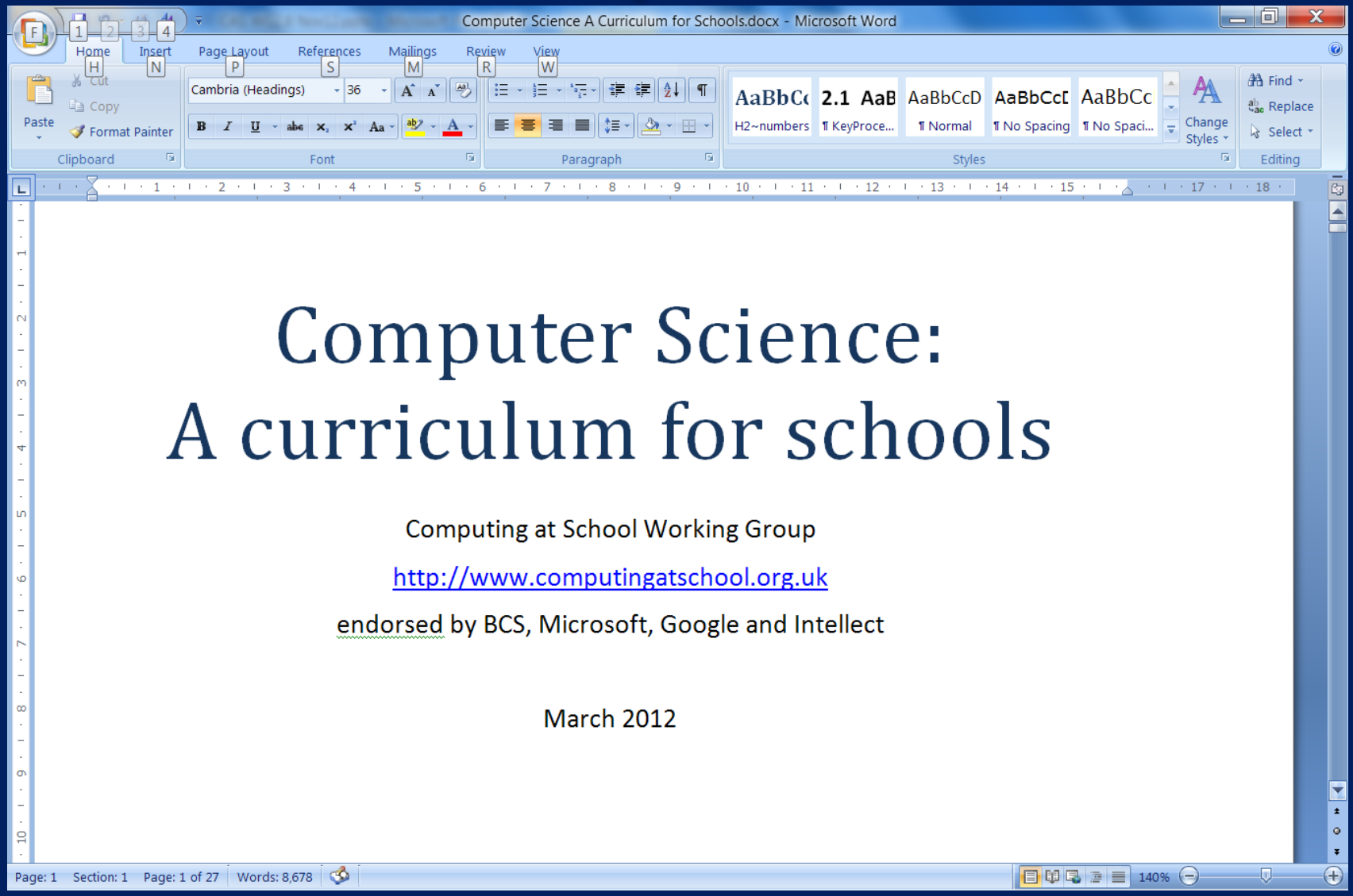
What is "Computer Science"?

- Foundational
  - Not just "coding" (although that too)
  - Not just to get a good job (although that too)
- Ubiquitous, like maths: biology, ecology, engineering, astronomy, medicine…
- Rooted in **ideas** not **technology**
  - e.g. CS Unplugged

What is "Computer Science"?



What is "Computer Science"?



What is CAS doing?

Influencing national policy

Computing: a curriculum for schools

Directly support teachers "on the ground"

Teachers: the myth

- ICT teachers are not very good
- They are happy with the status quo
- They couldn't teach computer science even if we wanted them to

So: we are stuck at Square 1

Teachers: the reality

- Most teachers live and die for their students: they work nights
- Few are happy with the status quo
  - It's the biggest sales environment ever. Always going for figures, always going for gold, always going for 100%. ICT is purely there to boost the results in my school, that's all it's there for.
  - I'm afraid I've done enough dragging students through qualifications, it's demoralising and it's morally wrong, so I'm moving on
  - Half the year group choose ICT because they enjoyed it so much at KS3, but then KS4 just squeezes the creativity out, it sucks the life out of the subject and they hate it
  - The exam is just so easy compared to the silly amount of effort they have to put into doing the coursework in order to get basic grades… my kids do no work for the exams and do really well at them

Teachers: the reality

- Many teachers are longing to introduce computing, but they feel
  - isolated (seldom more than one ICT specialist in a school)
  - under-qualified (even specialist ICT teachers seldom have a computer science degree)
  - under the gun for results (a Computing GCSE will be demanding)

But they are keen. Very keen. Very very keen.


Londonderry
Derry
Letterkenny
Belfast
Sligo
Dundalk
Isle of Man
Irish Sea
Ayr
United Kingdom
York
Hull
Blackpool
Dublin
Ireland
Carlow
Limerick
Kilkenny
Waterford
Cork
Crosshaven
Leicester
Exeter
Plymouth
Torquay
Brugge
Lille
CAS HUB

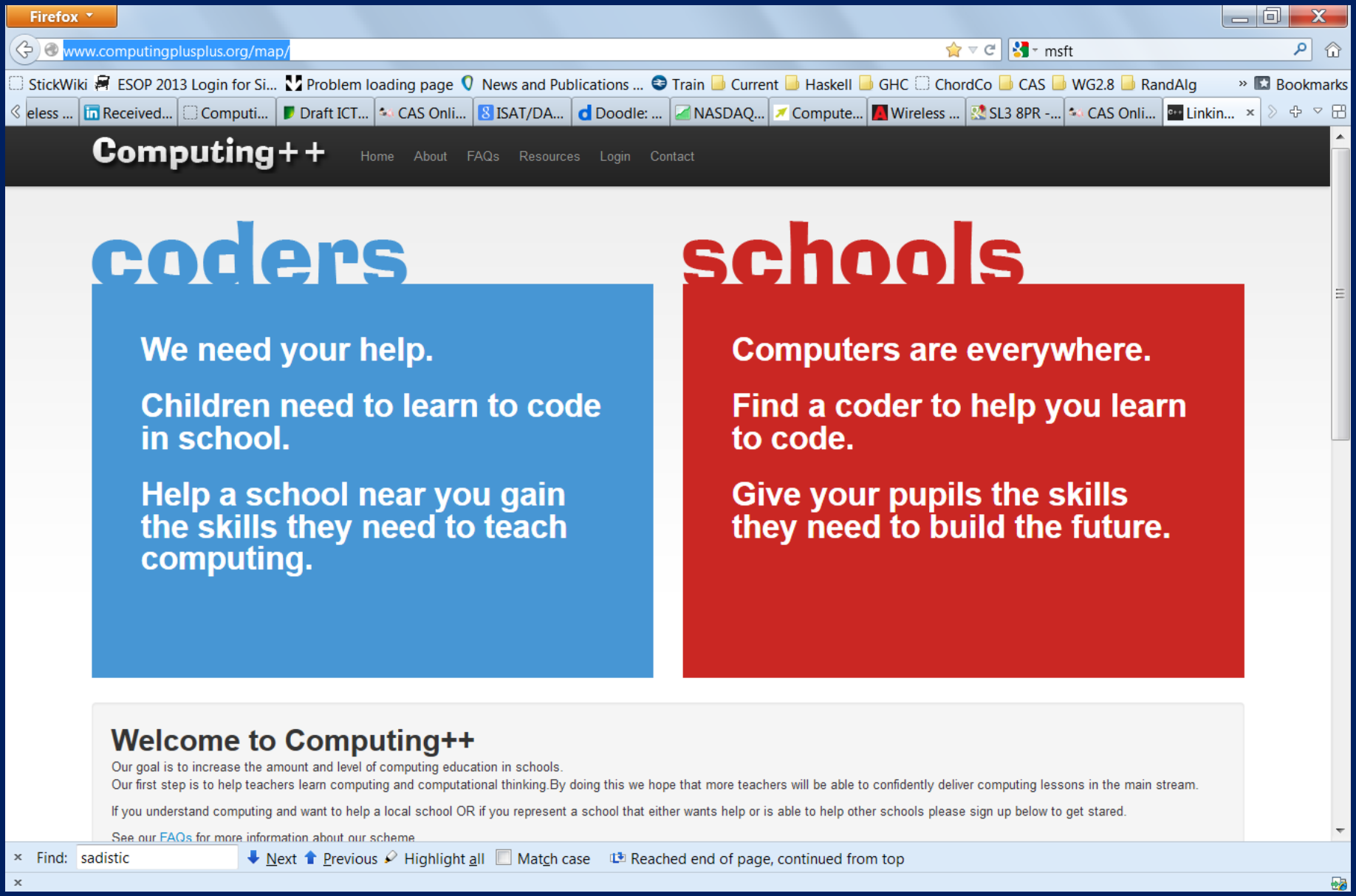
Teacher Conference 2012 (Birmingham)

Over 230 people attended the 2012 CAS Conference in Birmingham on July 15th. They enjoyed more than 30 different talks and presentations and was an excellent opportunity to catch up on the current issues and demands facing teachers as they approach a new term with changes to their curriculum being encouraged by central government.

"Computer Science is a rigourous, fascinating and intellectually challenging subject". So said Michael Give, Minister of Education in his speech at BETT 2012. He went on to give a clear steer to all schools to introduce computer science into their curriculum whilst announcing a consultation to disapply the current programme of study for ICT.

Against this backdrop our 2012 conference provides examples, resources and ideas for all teachers to carry this through in their schools. All slides, video and audio can be found below.

"As always an amzing conference with tons of valuable ideas, inspiring speakers delivering exciting keynote lectures ... so much better than any paid conference I've ever been to"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Haskell
GHC
ChordCo
CAS
WG2.8
RandAlg
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Home
About
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Login
Contact
coders
We need your help.
Children need to learn to code in school.
Help a school near you gain the skills they need to teach computing.
schools
Computers are everywhere.
Find a coder to help you learn to code.
Give your pupils the skills they need to build the future.
Welcome to Computing++
Our goal is to increase the amount and level of computing education in schools.
Our first step is to help teachers learn computing and computational thinking.By doing this we hope that more teachers will be able to confidently deliver computing lessons in the main stream.
If you understand computing and want to help a local school OR if you represent a school that either wants help or is able to help other schools please sign up below to get stared.
See our FAQs for more information about our scheme
Find: sadistic
Next
Previous
Highlight all
Match case
Reached end of page, continued from top

Which leaves the problem

2012: blam!

January 2012: breakthrough

We're encouraging rigorous Computer Science courses

The new Computer Science courses will reflect what you all know: that Computer Science is a rigorous, fascinating and intellectually challenging subject. Computer Science requires a thorough grounding in logic and set theory, and is merging with other scientific fields into new hybrid research subjects like computational biology.

Although individual technologies change day by day, they are underpinned by foundational concepts and principles that have endured for decades. ***Long after today's pupils leave school and enter the workplace – long after the technologies they used at school are obsolete – the principles learnt in Computer Science will still hold true****."*

Michael Gove, Jan 2012

High profile reports

- Feb 2011: The Livingstone/Hope report
  - Bring computer science into the National Curriculum as an essential discipline
- 2011: Ofsted report on ICT
- Jan 2012: Royal Society Computing in Schools Report

  - The current delivery of Computing education in many UK schools is highly unsatisfactory
  - Computer Science is a rigorous academic discipline and needs to be recognised as such in schools
  - Every child should have the opportunity to learn Computing at school

Qualifications

	Awarding bodies	Number of GCSEs in Computer Science
Sept 2009		0
Sept 2010	OCR	1
Sept 2012	AQA, Edexcel, WJEC	4
Sept 2013	CIE	5

New dirt-cheap hardware platforms

BBC Mobile

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29 February 2012 Last updated at 07:59

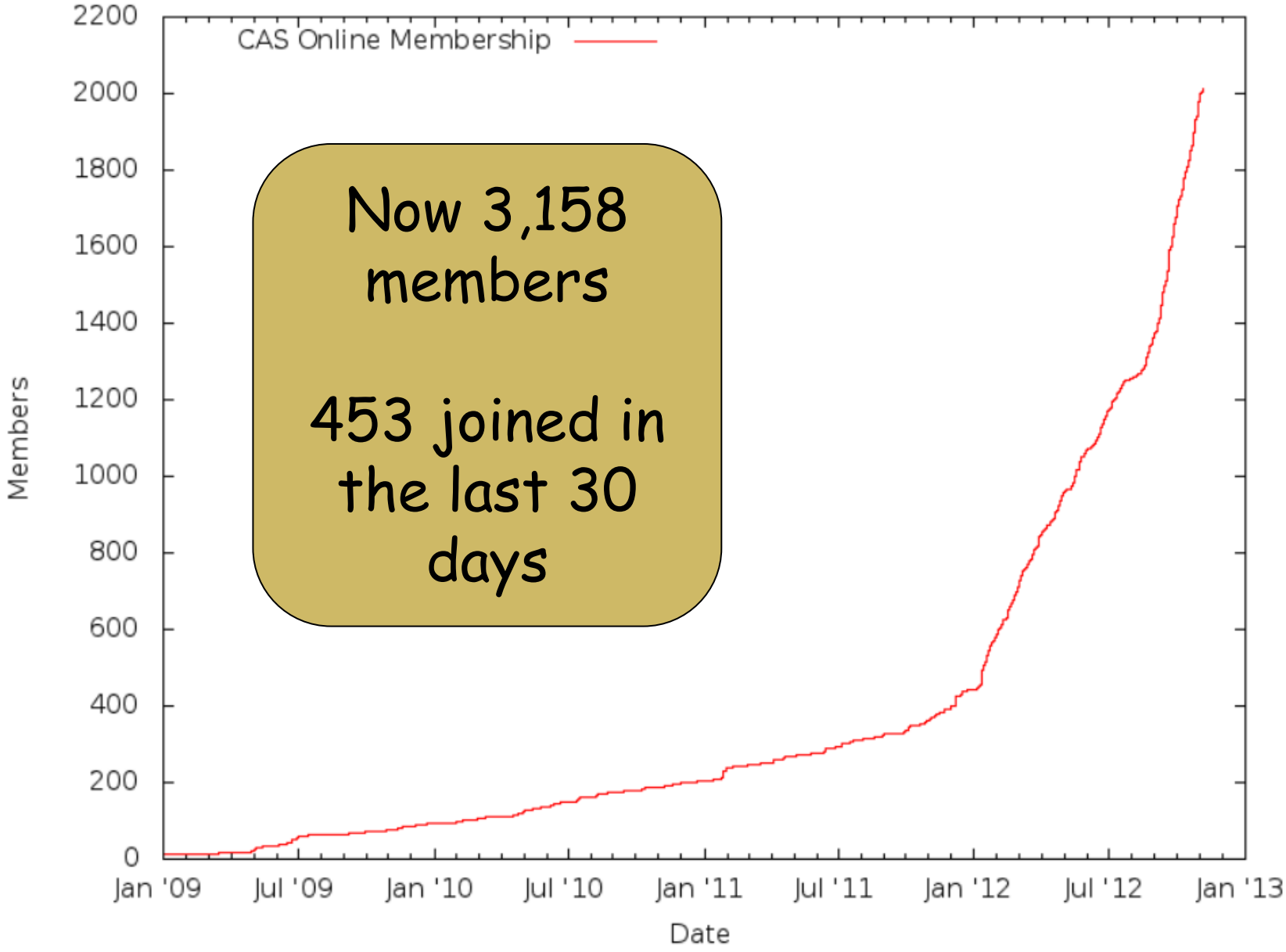
829 Share

Raspberry Pi computer: Can it get kids into code?

By Julian Joyce
BBC News

Amazing media coverage

e.g Observer 1 April 2012


CAS Online Membership
Members
Date
2200
2000
1800
1600
1400
1200
1000
800
600
400
200
0
Jan '09
Jul '09
Jan '10
Jul '10
Jan '11
Jul '11
Jan '12
Jul '12
Jan '13
Now 3,158 members
453 joined in the last 30 days

Curriculum

Review of the National Curriculum in England

- June 2012: Secretary of State Gove withdraws the National Curriculum for ICT (although ICT will remain compulsory).
- Sept 2012: SLPJ asked to chair group to write the new National Curriculum for ICT (!)
- Jan 2013: Drafts (for all subjects) to be published; launch Sept 2014.
- Jan 2013: **"ICT" re-titled as "Computing".**
- Jan 2013: **Computer Science in the EBacc!!**

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.

Air battle

Ground war

Opportunity – and danger.

Opportunity – and danger

- Opportunity: **to make a decisive lasting change that establishes computer science a proper school subject, on a par with maths or chemistry**.
- Danger: raised expectations not met, enthusiasm leaks away, teachers discouraged, system reverts to the mean

It's not enough to hope that someone else will do it.
We have to.
There is no "them".
There is only us.

Our friends... we love you

Apps for Good

cs4fn

Technocamps

Raspberry Pi

Code Club

Hack to the future

YouSrc

Codeacademy

Coding for kids

Young Rewired State

Games Britannia

NextGen skills campaign

THE challenge: training teachers

- **Medium-long term:** initial teacher training for computer science teachers

Training teachers

Late summer 2012, Gove announced

- **All** PGCE courses for ICT must include "Computer Science" in their title
- £20,000 scholarships for would-be Computer Science teachers, just like Physics

THE challenge: training teachers

- **Medium-long term:** initial teacher training for computer science teachers
- **Short-medium term:** existing ICT teachers are under-qualified; but many are eager to learn. Major CPD programme is required.
  - 3,500 secondary schools
  - 20,000+ primary schools

THE challenge: training teachers

- **Medium-long term:** initial teacher training for computer science teachers
- **Short-medium term:** existing ICT teachers are under-qualified; but many are eager to

Who is going to do this?

We cannot wait for the DfE to do it:
(a) it won't happen, (b) they'll do it wrong

We have to do it

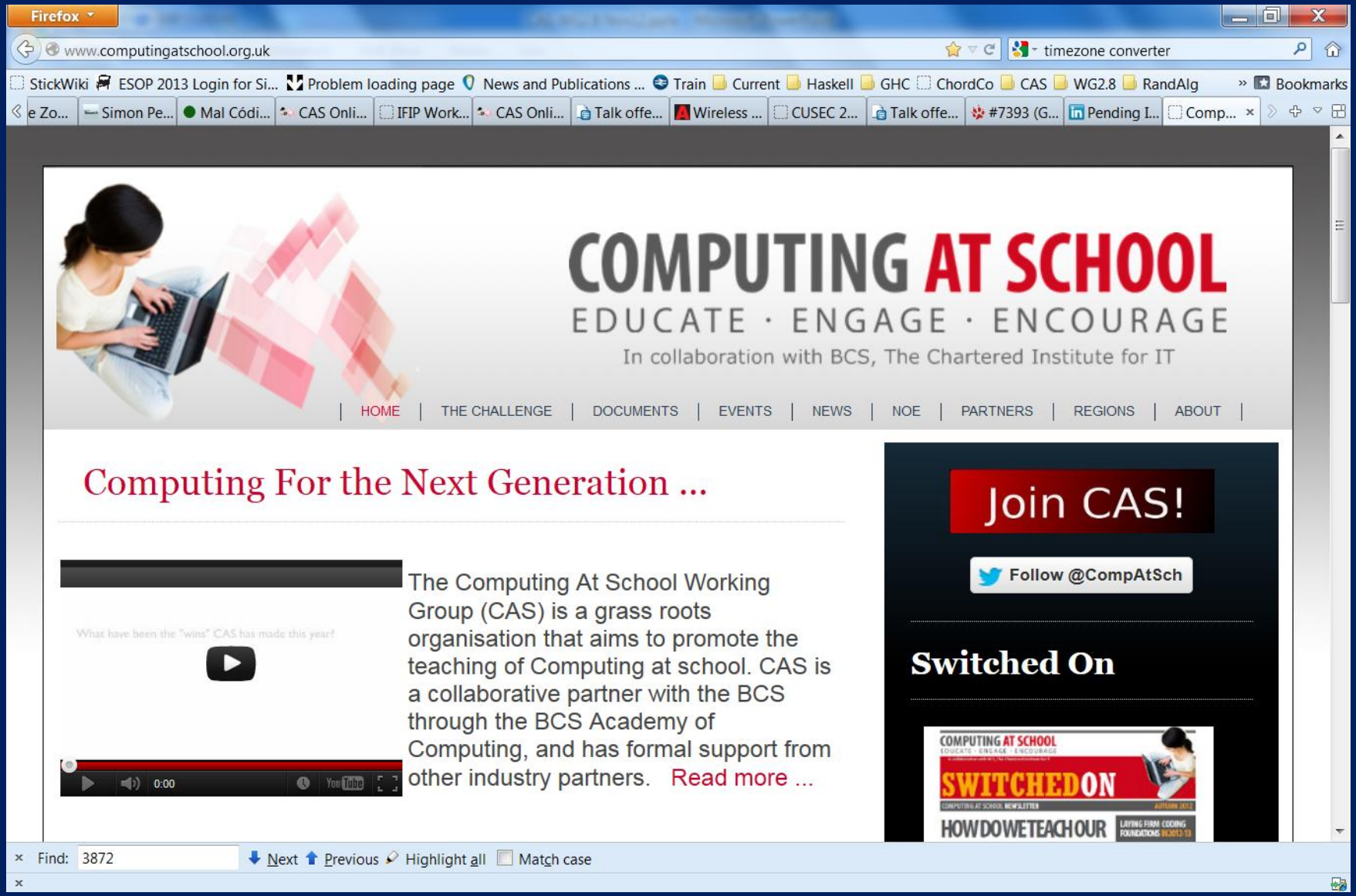
CPD and the Network of Excellence

- CAS has launched a national Network of Excellence and CPD programme
- 500 schools signed up in six weeks
- Master Teachers seconded 1 afternoon/week to put on local CPD courses
- Universities deliver CPD to their local schools
- Modest £150k DfE funding

What individuals here might do

- Join CAS – lurk on the mailing list
- Give a talk at your local CAS teachers hub
- Help with after school clubs
- Help mentor a teacher; help them over the fear factor
- Talk to school governors about whether computing is on their curriculum radar
- Contribute to infrastructure: Raspberry Pi, Gadgeteer, web presence
- Help fix the School Infrastructure Problem ("I can't teach programming because the network is mission-critical")

www.computingatschool.org.uk



What your company can do

- Be a visible corporate champion for computer science [not just programming] as a school subject, and help to explain what that means
- Help to create a sense of optimism, possibility, and unstoppable momentum.
- Play a pro-active role in the Network of Excellence. Actively think "What can we do?" rather than wait for CAS to say "Can you do X?".

Strike now!

This will take Real Work

But we have a once-in-a-generation opportunity to establish CS, once and for all, as a school subject from primary onwards.

Every other country is looking at us with crazed envy.

Let's grab it.

www.computingatschool.org.uk

What have we learned?

Lessons

- Broadly based; not just teachers
- Simple message, emphasis on CS as a discipline, like science
- CAS Curriculum immensely helpful
- Realisation that the status quo is undefended
- Many, many stakeholders => many meetings
- Partnership, not competition with other groups

Lessons

- Civil servants, and even politicians, are trying to do the Right Thing
- You can turn from a guerrilla group into a group that the government looks to for policy advice, in a blink
- Networks matter. One meeting leads to another.
- Luck has played a part; notably the change of government.
- Centralised nature of UK education has helped

Not just the UK

- This stuff is happening all round the world
- UK has leapfrogged into the lead
- Tim Bell speaking in CL, noon this Weds 14 Nov

Your turn

www.computingatschool.org.uk