

The landscape for computing and ICT

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Cover slide

Who and I? I am a teacher like you....

Hands up/down for:

- * CAS Members
- * Primary/Secondary

In such times of change the landscape will be challenging.... But inspiring and once in a life time opportunity to create and define a new subject...!

Slide 1

Image is a mixed picture... some areas parts of the puzzle are more resolved than others! I'm not going to speak about specific areas... challenges or solutions.

Introducing the curriculum VS embedding the curriculum?

Every region and community in the country is struggling with its own challenges and developing their own solutions... much depends on whether they are introducing the curriculum or embedding the curriculum? It also depends upon the stakeholders (and the complex politics that goes with them).

It is impossible to have a top down implementation of the curriculum. It would be wrong for me to stand here and say that you must do it like this or like that.... CAS is about building communities of practice i.e. teachers working together to develop their own solutions to the challenges their communities face.

However, I have picked out a few themes nationally for you to consider... and can highlight a few CAS projects (and one personal) that will support you with meeting these challenges.

Common myth lead by popular media that the new curriculum is all about coding!!! They are WRONG!!!

"A high-quality computing education equips pupils to use computational thinking and creativity to understand and change the world."

At Key Stage 2 (age 7-11) pupils should be able to (amongst other things): "... solve problems by decomposing them into smaller parts." and "use sequence, selection, and repetition in programs; work with variables and various forms of input and

output.” and also “... detect and correct errors in algorithms and programs.” ([4], p. 189).

At Key Stage 3 (ages 11-14) pupils should be able to: “... make appropriate use of data structures [for example, lists, tables or arrays]; design and develop modular programs that use procedures or functions.” and also “Understand simple Boolean logic [for example, AND, OR and NOT] and some of its uses in circuits and programming...” ([4], p. 190).

For primary educators there is no specification in the programme of study to teach either a graphical or text-based language, instead the emphasis is placed on teaching concepts and principles. In contrast, the programme of study for secondary education, Key Stage 3 makes it explicit:

Pupils should be able to: use two or more programming languages, at least one of which is textual, to solve a variety of computational problems ([4], p. 190)

Of course – this affects your choice of language at KS4/5 – Watch the QuickStart videos to know what to do...

PRIMARY

The demands on primary schools – 30% of schools doing Control units according to an OFSTED report a few years back – these schools only have to introduce variables plus networks/Communications. However, reality is that 70% school weren't so a massive challenge getting them up to speed with Algorithms/programming plus networks and communications.

Communications and Networks is a big part of the new computing curriculum but a CPD survey we do for our master teachers show that Primaries don't know what they don't know about networks and none of them see it as a priority? Probably because they are focusing on programming – but such a gap in subject knowledge could add in my experience at least an extra 8 – 10 lessons on this topic in KS3 before you can teach them what they need to know...

In teaching computing there is a change of pedagogical approach. However, Primaries are specialist in pedagogy from other subjects and the feedback is very positive. However, there is a need for subject knowledge support and confidence building.

Secondary's need to support primaries/feeder schools... If they don't then the implications shortly for the skills that Y7 pupils will bring with them to secondary school.

ON THE OTHER HAND – We know that in some areas primaries love the new computing curriculum are making massive steps forward so much so that the local secondary's are worried that they are keeping up with the change and could do with doing "remedial" teaching of KS2 concepts whilst they get up to speed...

Supporting the transition from graphics to text is another major challenge...? What should primaries be doing? The national curriculum doesn't actually specify!

You need to have a vision that matches your learners' future educational and work needs. You can't just copy someone else's computing policy... you need to make choices about the balance of your curriculums... The breadth and depth of content... choice of assessment... the resourcing of your department e.g. my biggest change was a shift to having computing lessons without computers ie in other classrooms that frees up ICT rooms for Technology enhanced learning. All of this requires both staff and learners buy in to it so that your vision can be turned into reality by setting measurable milestones for its implementation.

I would argue that technology enhanced learning will take place in computing. Therefore, Technology enhanced learning isn't an excuse to teaching computing across the curriculum nor is it an opportunity to dump the responsibility of digital skills onto the computing department. Your school need a digital leader in your school (I think that shouldn't be the head of computing) looking at the needs of subjects for digital skills by doing something like a survey. Then working with the school's CPD coordinator who organises inset to ensure the staff's CPD needs are met whilst looking at how the experience and expertise in computing departments can be utilised to provide foundations. Digital Literacy should be a whole school challenge and solution not just left to ICT department.

Change management in schools is key. It takes time. In my school it took 3 years to ensure a good uptake at GCSE in days before e-bacc etc. and we went with the GCSE pilot. If you use the change management process described in CAS QuickStart funded by DfE then you should have a good uptake a GCSE.

Again change management is key around the introduction of new curriculums (even if you buy in a scheme of work). Where are the gaps in the curriculum? What are the gaps in the teachers' skills sets? How are you going to train your staff? I looked toward extracurricular clubs... How are you going to engage girls and learners from ethnic minorities without positively discriminating against other groups? When updating existing schemes of work how you going to ensure that computational thinking is present in lessons and consider will this have an effect of the teaching approach employed in the classroom e.g. a constructionist approach to learning, and initially the inevitable side effects on assessment and progression?

Interestingly, OFSTED are looking for schools to have a plan and be working towards that plan. They recognize that change takes time in schools. However not knowing where you are as a school is not acceptable should they visit.

Have you been trying to recruit a computing specialist teacher? If so, you're probably finding it very difficult and expensive. Perhaps an alternative approach is to invest you're your staff's continued professional development. However, what Im hearing is that schools are investing in resources not teachers and this can't be right!

Are middle and senior leaders who perform lesson observations being trained in how the computing curriculum has changes and the emphasis on computational thinking and a constructionist approach in lesson? How are you planning to reflect this in the professional development appraisal process and integrate this into your computing policies and Self Evaluation Frameworks and subsequently the School Development Plans?

Interesting challenge around offering a IT/Computing qualification at KS4... if students don't take them do you still need to teach the PoS at KS4 as a non-qualification subject like say PE? What constitutes offer? However, whatever it looks like... the offering at KS4... and foundation at KS3 MUST meet the future educational and work based needs of their pupils...

Currently a 1/3 to 1/2 of the KS4 specs are covered at KS3 but after the GCSE is reviewed – this will change but good news is you have time to get up to speed.

GCSE and A-Level Specs is challenging... you need to ensure that you are focusing on the elements of the Progression Pathways that provide foundation for KS4 spec of your choice. You also need to ensure that you know subject knowledge gaps between your choice of GCSE and A-Level.

Major challenges around KS4 is providing solid foundation at KS3 and the required prior learning. Therefore assessing the NEEDED breadth and depth is key to ensuring a successful transition. CAS Computing Progression Pathways is fast becoming the de facto standard in schools and is designed to provide this solid foundation. How are you going to assess computational thinking and how are you planning to audit the computational thinking that sits at the center of the new computing curriculum?

>>>> LIFE AFTER LEVELS????

* Look out for DfE guidance coming in July... "Assessment after levels".

Slide 2

CAS Computing Progression Pathways

The purpose of the Computing At School (CAS) Computing Progression Pathways is to support teachers with planning and assessing their learners' attainment and progression in computing.

The CAS Computing Progression Pathways contains 152 (high level) learning statements covering a commonly agreed interpretation of the breadth and depth of the subject of Computing.

The column headings are aligned to the topics found in the CAS's '[Computer Science: Curriculum for schools](#)' and Teaching Agency's '[Subject knowledge requirements for entry into computer science teacher training](#)' documents. The learning statements and defined progression has also been aligned to the CAS [Primary](#) and CAS [Secondary](#) guidance documents.

The progression through each topic (column) of computing is broken down into rows. The rows are colour coded (like karate belts) to help the teacher to assess whether learners are showing competence at different levels and recognise achievement or attainment. It is suggested that:

Primary teachers focus on the learning statements from the Pink to Purple row.

Secondary teachers focus on the learning statements from the Purple to Black row.

The white row overlap with the KS4 qualification specifications.

The learning statement within a given topic colour (column/row) are not weighted. The emphasis is on skills and knowledge, and the dependencies and interdependencies between learning statements. The topic colours (rows) e.g. Algorithms Blue, are not allocated to particular key stages or year groups; the emphasis of this on 'continued learning' and meaningful progression through and across all the strands of computing. The relationship is between individual learning statements and the National Curriculum programme of study statements.

The use of Blooms Taxonomy in the wording of the learning statements is designed to provide a steer to teachers on the granular learning outcomes required to complete a given learning statement within a particular topic colour.

It is not intended that schools use the order that the learning statement are presented within a topic colour or the assigned Blooms Taxonomy value to attribute

a weighting to the learning statements to use them as attainment values or sub-levels. Schools can however choose to assign arbitrary values (e.g. levels) to the topic colours if they would like to use them with existing reporting systems.

School reporting systems will take time to change and adapt to new and innovative ways of assessing and reporting learners attainment and progression. The CAS Computing Progression Pathways will help provide a learning profile of learners attainment and progression, by six computing topics or the three 'unofficial' strands of the curriculum outlined in the Royal Society Report '[Shut down or Restart](#)'; using this assessment information to make a judgment about the learners overall attainment and progression across the subject in a format that suits their school reporting systems.

If you plan to use the CAS Computing Progression Pathways with your existing assessment/reporting system then you can agree the benchmark 'level' for the learners entering a particular key stage and assign the arbitrary benchmark value (level, colour, symbol, shape, character or number) to the appropriate progression statements for each strand.

If your school uses a system to set targets for Computing based on performance in other subjects then the flexibility of the CAS Computing Progression Pathways grid is that it allows you to adjust the values (levels) you choose to assign to the coloured rows.

You may decide that learners entering a particular key stage have prior learning to suggest that they are on the yellow and orange rows for the various strands shown in the grid. If this is the case then you would start your teaching at the appropriate level of learning statement and assign the arbitrary assessment/reporting values accordingly.

Use with Digital Badges (optional):

Each topic heading (column) can be assigned a different Digital Badge, for example, a rubics cube might represent the 'Algorithms' topic. As learners progress through the topic colours, the Digital Badge design "could" remain the same but the colour of the Digital Badge would change to reflect achievement and progression. For examples of sets of Digital Badges created by the community visit the [CAS Community website](#).

Using this system of Digital Badges, if learners are working between two colours (rows) for a particular badge e.g. Orange and Blue, then it is suggested that a two-tone badge is available so that you can record and reward sub levels of progress and attainment.

Alternatively, you might choose to combine learning statements from different topic colours into a custom Digital Badge that relates to a curricular or extra-curricular

project or challenge with a greater emphasis placed on the 'why' of the learning i.e. the challenge, rather than the 'what' i.e. the knowledge and skills from the Computing Progression Pathways. For more details read [page 5 of CAS Switched On Spring 2015 newsletter](#). For examples of these types of Digital Badge projects can be found at the [Makewav.es website](#).

There are currently no Digital Badge designs for the topic (column) headers. The authors of the CAS Computing Progression Pathways believe that the teachers and learners who would be using the Digital Badge system would be much better placed to design and create them. It is hoped that the process of designing and creating the Digital Badges will engender a greater ownership of the rewards system by your learners, in your school.

Feedback

If you would like to provide feedback to this work, the authors would welcome your thoughts and specific suggestions for improvement. Please email them to: mark@progression-pathways.co.uk

Slide 3

"A high-quality computing education equips pupils to use computational thinking and creativity to understand and change the world."

Understanding the relationship between skills and knowledge is a challenge.

Understanding how thinking skills fit into the curriculum based on concepts and principles. Do we assess thinking skills?

Computing is a subject focused on the why questions – yet teaching tends to focus on 3 learning objectives which is the "what"...? Problem is marketing methodology says people (including children) by "why" not "what".

This is a massive shift in pedagogical approach to teaching...

To engage all pupils (particularly girls) you need to be teaching cross curricular and real life changes. This approach does help to ensure a good uptake at GCSE of Girls.

Need to encourage a constructionist approach (enquiry based learning) in to classroom. Getting things wrong is normal and we shouldn't be scared by the prospect of getting things wrong. In computing we get things wrong a lot and that is why we test and debug... failing is only failure when you give up.

Developing this approach to teaching and learning takes time. It doesn't happen overnight and relies on departments developing a vision for their curriculum... This should be reflected in their computing policies and SEF etc.

Slide 4

Wild west out there... lots of commercial organisations and support groups trying to support teachers with implementing the new curriculum...

Some of this advice is good – but there is a lot of Snake oil being sold.

This is why you need to look to CAS and help build a community of practice...

There is no them only us!

Slide 5

No commentary

Slide 6

CAS can support your range of CPD needs!

The Computing At School model is loosely based on the transformative CPD model described by Kennedy (2005). It consists of six strands:

Community of Practice – CAS Hubs, QuickStart computing

Training – Master Teachers and Universities training, Barefoot Computing, UEA Mooc

Modelling – Master Teachers and Digital Schoolhouse

Cascade – Lead Schools, University partners, Hub meetings

Accreditation – BCS CAS certificate

Action Research – Currently being worked on...

You can provide an overview of the different projects below...

Network of Excellence

You can register your school with the Network of Teaching Excellence in Computer Science (NoE). By doing this, your school is saying, loud and clear, that:

- Computing, as a subject, is important.
- Computing, as a subject, is part of the school development plan.
- Our staff has access to suitable training.

* Master Teacher 330+

* Lead Schools 440+

BCS Certificate

The BCS Certificate provides teachers with professional recognition that they are competent teachers of the computer science elements of computing. It is accredited by BCS, the Chartered Institute for IT.

The BCS Certificate is a roll-on, roll-off programme that teachers can join at any time. It is evidence-based certification, whereby teachers gather evidence from their own teaching and professional development to demonstrate three areas of competence:

- Ability to take responsibility for their ongoing professional development by participating in and reflecting on CPD.
- Technical subject-knowledge skills appropriate to teaching in either primary or secondary schools.
- Ability to develop and extend their pedagogical content skills in computer science in a reflective manner.

Barefoot Computing

For primary teachers the CPD pack will work best if they also register for the Barefoot Computing resources <http://barefootcas.org.uk/>. These are funded by the Department for Education and are entirely free for teachers. They provide a rich set of exemplary computer science materials for primary school, which also help to improve learning in English and maths as well as other subjects like science and history.

QuickStart Computing

QuickStart will provide teachers with the resources necessary to put together a CPD course tailored to their own school that covers:

- Getting started with the new curriculum
- A road map for managing the transition to Computing from ICT
- Teaching Computing in the classroom
- How to create innovative classroom teaching resources
- Assessment and progression
- Essential Computing subject knowledge for primary teachers (which may also be useful for secondary teachers)

The purpose of the QuickStart project is to provide a teacher with the resources necessary to successfully run a Computing CPD course for their colleagues. The aim of the course is to help teachers design, develop and deliver the computing curriculum tailored to the specific needs of their school.

The CPD course is split into two parts, one focused on primary and one focused on secondary, although teachers may well find both are useful for them and both are free for teachers in primary and secondary.

Hard copies of the QuickStart toolkit will also be distributed for free through local CAS Hubs across England, and also through CAS Lead Schools and universities in the CAS Network of Excellence. In total 40,000 free hard copies of the QuickStart resources will be distributed throughout England, including printed materials and a DVD containing all the resources as well as videos covering the main CPD topics. Note digital copies of all the resources are freely available to download for teachers anywhere in the UK.

UEA 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.

Secondary Guidance

Free download sponsored by Raspberry Pi and DfE

CAS Progression Pathways

Breadth and depth of the subject endorsed by CAS and fast becoming the de facto standard in schools with over 22k download.