

Quantum: tests worth teaching to

April 2016

This invitation seeks your participation in a series of workshops to develop the constructs of the computing curriculum.

Quantum is a new national project by
Computing at School (Simon Peyton-Jones)
Cambridge Assessment (Tim Oates and Tom Bramley)
CEM Durham (Rob Coe and Kate Bailey)
Diagnostic Questions (Simon Woodhead)

Background

The new Computing Science National Curriculum has been hailed as a major step forward. As excellent as it is, it is still only a curriculum framework – a list. How do teachers – many of them facing a change from ICT to Computing Science – understand the detail of what is required? What should be the depth of treatment of each idea and topic? This is where assessment can really help. If we can get a clear set of questions that pupils should be able to answer, then we get a much clearer picture of scope, depth of treatment, standards etc.

The [Quantum project](#)¹ seeks to support computing teachers by providing a body of high-quality assessment items, hosted in an online platform. But however good the platform is, the project will stand or fall by the quality of the assessment items that it contains.

To write good questions, we must understand what it is that we are trying to assess. For example, the curriculum includes

- *can understand and apply the fundamental principles and concepts of computer science, including abstraction, logic, algorithms and data representation*

This contains reference to a whole series of separate ‘constructs’. By ‘construct’ we mean concepts, principles, fundamental operations and core knowledge. In the statement above we have: abstraction, logic, algorithms and data representation. Even one of these eg logic – can cover an enormous field. So, we need to spend time determining what we mean by ‘logic’ in this context – and that helps with scope and context. Once we have the list of constructs (the term ‘logic’ could contain a whole series of constructs – logical relations, entailment, expression etc) we can begin to formulate and work up lists of questions.

Purpose of workshops

We plan a series of workshops to address these questions. The workshops have two purposes:

- Identify the “**key constructs**” in the Computing Science National Curriculum specification; that is, **the things we want students to learn**.
- Develop a range of valid, probing questions, or “**assessment items**”, to enable effective formative and continuous assessment.

Neither part will be conclusive or comprehensive, but both will give us a decent starting point: an initial set of constructs, and an initial set of assessment items to test them.

The focus is on low-stakes formative assessment, not on high-stakes summative assessment like GCSE or A level.

¹ <http://community.computingatschool.org.uk/resources/4382>

Plan of action

Workshop Part 1

Groups to be allocated to work on specific segments of the Computing Science National Curriculum specification and identify within these segments the 'key constructs' – such as 'algorithm', 'debug', 'abstraction' – looking at both the explicit content and the implied content.

This to result in a list of constructs, with accompanying text for each, explaining the meaning and scope of the construct – focussing particularly on what pupils are expected to learn and demonstrate.

Workshop Part 2

Groups to take specific constructs and assemble 'Key Stage appropriate' questions and tasks to put to pupils to establish whether the constructs have been understood and acquired to an appropriate depth and security – looking at whether pupils can define, apply and generalise both ideas and practices

Timings

9.30-10.00	Arrival and coffee – networking for all
10.00-10.30	Outline of overall project and Q&A – Simon Peyton Jones, Tim Oates, Kate Bailey
10.30-12.00	WORKSHOP 1 – Resources: National Curriculum in Computing
12.00-12.45	Lunch
12.45-3.00	WORKSHOP 2 – Resources: pre-existing examples of questions
3.00-3.15	Coffee break
3.15-4.00	Discussion, wrap up session – Simon Peyton Jones

Dates and Venues

18th May – Cambridge (Microsoft Research)
24th May – York
25th May – Durham
10th June – London (BCS Covent Garden)
17th June – Birmingham

Participation, and how to sign up

If you are willing to help shape assessment for computing, please come to one of these workshops.

We seek input from

- Classroom school teachers (what will work in the classroom?)
- University academics (expert in the subject discipline)
- Awarding organisations (expert in assessment)

[RSVP here to sign up](#)²

Please also join the Quantum Content email group, which we will use to make arrangements, discuss the content, and keep you up to date with Quantum

[Sign up for the Quantum Content email group](#)³

² <http://goo.gl/forms/8Wer06qnLm>

³ <https://groups.google.com/forum/#forum/quantum-content>