**BCS, The Chartered Institute for IT, Academy of Computing Board
School Curriculum and Assessment Committee**

Notes of the meeting held on Wednesday 7 July 2021 at 11:00
Online meeting

Present

Prof Dame	Muffy	Calder	MC	Chair, University of Glasgow
	Julia	Adamson	JA	BCS Director of Education
	Miles	Berry	MB	University of Roehampton
Prof	Tom	Crick	TC	Swansea University
	Sharon	Cromie	SC	Wycombe High School Academies Trust
	Pete	Dring	PD	Fulford School
Dr	Helen	Harth	HH	Royal Society
Dr	Peter	Kemp	PK	King's College London
	Samina	Kiddier*	SK	Department for Education
	Robert	Leeman	RL	Arm
	Mark	Martin	MM	Urban Teacher
	Niel	McLean	NMcL	BCS Head of Education
Dr	Bill	Mitchell	BM	BCS, Head of Policy
	Nicola	Mounsey	NMo	Calday Grange Grammar School
	Sarah	Old	SO	Ofqual
Prof	Simon	Peyton Jones	SPJ	Microsoft Research
	Jane	Waite	JWa	Raspberry Pi Foundation/QMUL
	Liz	Walters	LW	Ofqual
Dr	John	Woollard	JWo	University of Southampton

In attendance

Prof	Quintin	Cutts	QC	University of Glasgow
	Fiona	Bowditch*	FB	Department for Education
	Clare	Horrocks*	CH	Department for Education
	Maxine	Leslie	ML	Meeting Secretary

*Item 5 only

Apologies

	Beverly	Clarke	BCS National Outreach Manager
	James	Donkin	Ocado Technology
	Kerensa	Jennings	BT
Dr	Saima	Rana	GEMS World Academy, Dubai
Dr	Sue	Sentance	Raspberry Pi Foundation
	Marc	White	Ofsted

1. Welcome, apologies, declaration of conflicts of interest & Chair's Report

The Chair welcomed all attendees. There were no conflicts of interest reported.

In advance of the meeting, SK flagged that the DfE curriculum guidance went live on 2 July and has a section on computing, which DfE worked on with NCCE (NMcL) and Ofsted. See https://www.gov.uk/government/publications/teaching-a-broad-and-balanced-curriculum-for-education-recovery.

2. **Actions from previous meeting held on 15 March 2021 [SCAC/2021/03]**

Members APPROVED the notes from the previous meeting, for posting to the website.

3. **A "for-all" perspective on computing in schools: modelling, problem-solving, and alignment with mathematics** (Guest speaker: Quintin Cutts) – see slides
[NB: this section of the notes includes all of the chat comments]

The Chair welcomed and introduced Quintin Cutts, who leads a centre in computing education at the University of Glasgow and is an expert on all aspects of computing education from primary to HE.

QC explained his argument for mandatory computing and maths at school. It's useful to keep in mind how different maths and computing are: maths has always been mandatory to age 16, whereas computing has been optional. It is mandatory now but without much coverage and an overwhelming focus on numeracy.

Computing and maths include the key systems for undertaking problem solving, using them to model and achieve things that we want to achieve. They are both subjects for everyone that address issues in the real world and systems that can be used to make a difference in all disciplines. Computing in schools is a bag of conceptual and modelling tools, rather than a science.

The curriculum framework has three key learning outcomes which see problem domains through modelling concepts:
A: Problem domains amenable to maths or computing solutions
B: Domains of maths or computing systems
C: Model real-world problems using the modelling system

SPJ noted that the article link posted in the chat makes a lot of sense. The Chair expressed regret that MM was not yet in attendance to explore C, which is likely to have relevance for his Culturally Responsive Curriculum WG.

QC presented the observations on a grid in the slides. The use of tools for maths is understood and we don't think beyond this, as it is mandatory. For computing, how do we generate interest for students to take it up? Maybe by trying to make it exciting with cool graphics etc.

SPJ asked whether there is a connection between A and C. QC replied that A is not just about understanding modelling domain, it's about appreciating that there are mechanisms in domains that we are interested in. In maths there is not much real world problem solving (column C). How can we become aware of hidden mechanisms? The ability to investigate a system often happens accidentally and can be through unplugged activities as well as looking at natural settings that children are familiar with.

MC noted that statistics is an area in which we do real world modelling but this is not taught as much at school and there is often difficulty in interpretation – difficulty in mapping from real world description into the maths.

MB indicated that from a young age, students have a good awareness of all sorts of technology in different contexts. When they get to GCSE there is perhaps too much emphasis on the tools of the trade, whereas there is no real emphasis on real world problem solving. Perhaps there is more of this at lower secondary and primary though.

QC noted that schools should refer to the breadth of knowledge, not boiler plate regurgitation. Need to properly understand the tools, if not can't do effective problem solving.

Members asked QC questions and made comments, mostly via the chat function:

- (SC) I agree re the insufficient grounding in the languages. Recent focus in schools via Maths Hub and a focus on technical literacy / fluency has paid dividends.
- (JWa) my PhD Looks at this topic in detail - but from the CS view of "problem solving" and specifically about design/modelling. Thomas's view of system theory and undergraduate difficulties in design looks at threshold skills in design and my research on design in primary reveals the lack of CS rigour on vocabulary and concepts/ threshold skills on design but I write about the similarities with the teaching of maths.
- (PD) one thing maths teachers do very well is focusing on all sorts of variations of solving similar abstract problems (column B?). Students are trained to plug in the numbers rather than understand the wider problem. In Computing, perhaps the lack of timetabled time means that there's more of a focus on the big picture problem solving rather than having the time to know how to adapt the tools of a programming language/system to solve the problem.
- (PK) if we expand out the idea of computing *domain* to other areas of computing, eg, UX design, presentational techniques, media creation, then I'm with Miles on this.
- (JWa) agree with PD, do you think as teachers we struggle with explaining problem solving - do we have lots of great examples of analysis and design in our projects/ tasks? Or do we just zoom to coding - and miss out the design/analysis (problem solving?) or we look at concepts outsides of application?
- (NMcL) this model is very helpful. Is there a big debate about how much B to do before C? QC indicated that work is in progress to illustrate this. It is a spiral curriculum making use of A, B and C at any one time. Definitely not A then B then C, but need to do A/B before C. If teachers aren't aware of the different learning outcomes/domains thinking about, then they will be lost.
- (JWa) the research in this area is fragmented. Interested in teachers' practice and how include design work and systems theory. Interested to talk more later.
- (QC) lots to do in column C including how to go about problem solving but doesn't make sense if don't have understanding of A and B.
- (JWa) links to semantic waves, linking subject to practical activities, systems theory and threshold skills.
- (NMo) with A-Level I notice that there is a tendency to jump straight in with the coding before they start to work out what they are trying to solve.
- (JA) do you believe that early year experiences do include significant rules/sequencing? Storytelling, independent living...etc. in much the same way that children experience number as part of mathematics?
- (MB) see pp 9-12 of [Development Matters]
- (SC) really like the computing and maths for all. We've moved to computational thinking. Sold on this model, seen it in the hubs – going back to basics, working backwards to introduce technical literacy and numeracy from day 1. Core maths at L3 all about column C.
- (MC) what are the next steps?
- (QC) to explore synergies and the ways of looking at this which are useful to pupils and teachers. Not a proponent of pushing maths and computing GCSE as the latter

would be subsumed, but can we get more engagement? For how many is computing baffling? Synergy where start off thinking about exciting computing domains and use maths, bringing it closer together. Is this useful for teachers?

- (SPJ) one difficulty: **everyone** says they teach generic skills like "problem solving" and "teamwork". We need to explain the distinctiveness of the computing view of "problem solving".
- (JA) The compulsory nature of the two subjects is an important factor - in terms of long term compulsory right up to a qualifications point – SC has reformed the offer in her school but this isn't typical yet...
- (QC) could speak to maths/computing teachers to brainstorm on the possible value of this. If so, could try to run a pilot, encouraging teacher training institutions to see if they can use it.
- (NMcL) Paul Blake did it in the 80s for science and technology education.
- (SC) staff CPD seems to be needed. Your statement that 'if we don't understand the tool or the concepts, we can't do real problem solving' has resonated. It seems essential, teachers are on board and understand, across all subjects, because computational thinking can often transcend subjects.
- (JWa) agree with SPJ that there is much difficulty in establishing what we mean by problem solving. The generic approach may be less useful than specific approaches for different contexts... There is much to do still to establish the related vocabulary, threshold concepts and skills related to design/analysis (modelling) in my view. And when we show examples we must provide the design stage - not just to the coding.
- (PD) primary teachers are better at the rounded approach. There is a lot of research on the drop in understanding from Y6 to Y7 on maths. Perhaps if can persuade schools to do an applied maths in computing lesson, then computing gets benefit of real world applications. This could be celebrated and promoted for others to use.
- (QC) agree, this was the pilot: one lesson a week.
- (SPJ) Wolfram CBM stuff has a very similar model [Define/Abstract/Compute/Interpret story for mathematics](#), which he calls "Define/Abstract/Compute/Interpret"
- (MB) ... from Polya's How to Solve It, I think?
- (JWa) this links back to Solo taxonomy too and how we move from uni-structural to extended abstract - and how we support. And variation theory and semantic waves and many other theories that link concepts to activities.

The Chair thanked QC for his thought-provoking input, indicating that the SCAC will come back to QC over the next few months.

QC thanked members for their input and invited any further comments via ML.

ACTION: Members to provide further feedback to QC via the [secretariat](#)

4. **SCAC Working Group Chair updates** – see [slides](#)

- **A Culturally Responsive Curriculum** (MM)
  The plan is to set up mini streams to produce tangible outputs in the next couple of months, including one stream which aims to celebrate students' school work.

  MM had been unable to attend for QC's talk. NMcL undertook to chat this through with MM later, as there are strong links with QC's column C, although QC noted that MM has been talking about column A, but it would be good for MM and QC to liaise offline on this.

ACTION: NMcL to facilitate MM's liaison with QC to learn more about the "for-all" perspective on computing in schools: modelling, problem-solving, and alignment with mathematics

- **Digital Literacy** (NM)
  The WG is in a "divergent" phase at moment, establishing key principles and stepping back from the overall issue. Historical areas have been trawled and the DL WG Chair has posed the question: how far does the SCAC want to take this? One suggestion was a white paper around Xmas?

  SPJ suggested there had not been enough focus on qualifications. It would be good to have one low stakes qualification at age 16 for all students to take. The question is what would it look like? Is there anything already in existence? If not, we could sketch out what it might look like and bring it into sharp focus.

- **GCSE CS subject specification** (RL)
  There had been an interesting first session and a lot of work is planned offline in coming months. NMcL indicated that a draft scope of study will be produced that will be shared with SCAC.

- **Four Nations** (JA)
  There have been a couple of meetings, the first was to agree the purpose of the WG. This WG is a bit further on than the others as this area of work has been underway for the two years since SCAC was originally convened. It is building on the great work by MB and PK and across the UK and the Republic of Ireland. With the help of the consultant Simon Gallacher, there will be a report on the formal route and also a September report on VQs. It will be difficult to stack up the different metrics into one column (as the Chair had originally wanted a one sheet summary). The two reports were originally commissioned for SCAC, to give a landscape view, but further work is needed to clarify the audience. S Gallacher will look into this and the key challenges identified further down the line.

The Chair thanked all of the WGs as the progress made was impressive and looks forward to future updates.

5. **Priorities for computing education** (DfE)

Members discussed future priorities.

6. **Agreed actions and AOB**

See Actions below. It would also be helpful to think about university CS requirements.

ACTION: Discuss what is needed to encourage universities to desire/require CS qualifications for entry at the next meeting

The Chair thanked Members for their participation and closed the meeting at 12:58.

7. **Date of next and future meetings**

The next meeting will be held on Tuesday 9 November 2021 (14:00-16:00)(F2F/online TBC).
Meeting dates for 2022 are: Monday 14 March 2022, Wednesday 6 July 2022 and Tuesday 15 November 2022

Actions - responsible people in red

July2021.1 A "for-all" perspective on computing in schools (guest speaker)
Members to provide further feedback to Quintin Cutts via the secretariat.

July2021.2 SCAC Working Group Chair updates
Liaise with Quintin Cutts for MM to learn more about the "for-all" perspective on computing in schools: modelling, problem-solving, and alignment with mathematics NMcL/MM

July2021.3 AOB
Discuss what is needed to encourage universities to desire/require CS qualifications for entry at the next meeting ML to add to agenda

March2021.1 Meeting planning
Add plenary session every four SCACs to the process (commencing July 2022) ML

March2021.2 WG kick off
Anyone interested in participating in 'expert evidence sessions' to contact NM/ML Members

March2021.3 WG kick off
Identify any possible future work for consideration by SCAC Committee

March2021.4 WG kick off
Draw up a registry identifying work of each WG for adding other work so it is easy to identify overlaps and potential gaps BCS staff

March 2021.5 DfE Pupil, Parent, Carer Survey
Report back to SCAC July meeting on careers research being commissioned by DCMS SK

March 2021.6 DfE Pupil, Parent, Carer Survey
Ensure that making choices is including in the purposes of each WG, especially *A Culturally Responsive Curriculum* WG Chairs

March 2021.7 AOB
Liaise with SCAC Chair on a long term plan for SCAC and its Working Groups BCS staff

November2019.5 Parents brochure
Test the updated draft brochure with key people. MC
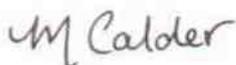
Signed: _____

Prof Dame Muffy Calder
Chair of School Curriculum and Assessment Committee