BCS, The Chartered Institute for IT

in association with the Computing At School group

Consultation Response to:

National curriculum review: new programmes of study and attainment targets from September 2014

Dated: July 29 2013

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BCS, The Chartered Institute for IT

The Institute promotes wider social and economic progress through the advancement of information technology science and practice. We bring together industry, academics, practitioners and government to share knowledge, promote new thinking, inform the design of new curricula, shape public policy and inform the public.

As the professional membership and accreditation body for IT, we serve over 70,000 members including practitioners, businesses, academics and students, in the UK and internationally. We deliver a range of professional development tools for practitioners and employees. We also accredit the computing degree courses in ninety eight universities around the UK.

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Computing At School

Computing At School (CAS) is a membership association within BCS, The Chartered Institute for IT. The Computing at School Working Group (CAS) is a grass roots organisation focused on developing computer science as a proper, rigorous school subject.

CAS has 5,400 members, with new members currently joining at a rate of over 400/month. Our members include school teachers, university academics, parents, school governors, members of professional societies, and IT professionals. We are supported by Google, Microsoft, ARM, and a range of other IT employers in the UK.

http://www.computingatschool.org.uk/

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1. BCS response to consultation

This section contains the BCS response to the DfE consultation document[1]. The relevant questions from that document have been inserted verbatim annotated with our responses.

1.1 DfE Consultation Response Form Questions

Please mark the box that best describes you as a respondent.

	Maintained primary school		Maintained secondary school		Special school
	Academy/free school	X	Subject association		Governing body
	Parent		Young person		Higher Education
	Employer/business sector		Local Authority		Organisation representing school children
	Organisation representing school teachers	X	Other		

Here at the Department for Education we carry out our research on many different topics and consultations. As your views are valuable to us, please confirm below if you would be willing to be contacted again from time to time either for research or to send through consultation documents?

X	Yes		No

1.2 Q1 Do you have any general comments on the draft Order?

Our comments are confined to Q7 on Computing

[1] https://www.gov.uk/government/consultations/national-curriculum-review-new-programmes-of-study-and-attainment-targets-from-september-2014

1.3 Q7 Do you have any comments on the revised draft programmes of study or attainment targets for computing?

Overall

We are broadly happy with the revised Programme of Study. We are grateful that DfE has taken on board most of the "nips and tucks" proposed in our response to the February draft. There are a few points to think about with respect to the latest draft, given below.

Most important point

- **KS3** binary. There are now *three* bullets mentioning binary/Boolean stuff. There is a serious risk of teachers spending far too much time on binary. We urge you to consider combining the "Boolean logic" bullet (bullet 4) with the new "binary digits" bullet (bullet 7), to read:
    - **understand simple Boolean logic (such as 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, such as binary addition, and conversion between binary and decimal.**

Purpose of study

These opening sentences are terribly hard to get right because they are so compressed

- Sentence 1 reads "A high-quality computing education equips pupils to understand and change the world through logical thinking and creativity, including by making links with mathematics, science, and design and technology." Here are some things that concerned us:
    - The opening sentence is terribly clumsy "…including by making links to…"
    - It's a bit weird to speak of "changing the world through computational thinking"; shades of levitation though meditation. (This poor wording is ours, from an earlier response.)
    - "logical thinking" would better be "computational thinking" in this context; computation thinking includes being able to design algorithms to solve problems which is not really part of "logical" thinking.
    - The revised draft omits our phrase "More broadly, it provides a lens through which to understand **both natural and** artificial systems". This phrase carries an important message: *computing is about more than computers*! Eliding that observation narrows the subject, and is a real loss.

  With all that in mind, here's another attempt at the opening sentences:

  > A high-quality computing education equips pupils to use computational thinking to understand and change the world. Computing has deep links with

mathematics, science, and design and technology, and provides insights into both natural and artificial systems.

We'd be happy to think more about this wording, but we don't want to waste time if in fact you have decided it won't change.

- Sentence 3 in your draft reads: "Computing equips pupils to use information technology to create programs, systems and a range of media.", but this fails to explain that pupils should learn how to **apply the principles of computing through programming** and does not guarantee pupils will have to write programs for themselves. It would be better if we added the programming aspect to the *previous* sentence (sentence 2) so that sentence 2 and 3 read:

  The core of computing is computer science, in which pupils are taught the principles of information and computation, how digital systems work, and how to put this knowledge to use through programming. Buildings on this knowledge and understanding, pupils are equipped to use information technology to create digital artefacts.

Here is what the opening sentences would look like:

> **A high-quality computing education equips pupils to use computational thinking to understand and change the world. Computing has deep links with mathematics, science, and design and technology, and provides insights into both natural and artificial systems. The core of computing is computer science, in which pupils are taught the principles of information and computation, how digital systems work, and how to put this knowledge to use through programming. Buildings on this knowledge and understanding, pupils are equipped to use information technology to create digital artefacts. Computing also ensures that pupils become digitally literate – able to use, and express themselves and develop their ideas through, information and communication technology – at a level suitable for the future workplace and as active participants in a digital world.**

Smaller drafting points

- Put the e-safety bullet consistently last, because it's rather different to the others. (eg in KS1 and KS2 it is second to last, but last in KS3).
- To us it isn't clear that the e-safety bullets have a clear progression; i.e. KS2 does more than KS1, KS3 more than KS2. E.g. to take one part of the sentences we have
  - KS1: use technology **safely** and **respectfully**
  - KS2: use technology **safely**, **respectfully** and **responsibly**
  - KS3: understand a range of ways to use technology **safely**, **respectfully**, **responsibly** and **securely**

This sequence does exhibit an apparent progression, but is it the *right* progression? Does "responsibly" connote more than "safely and respectfully"? What does "securely" connote? Maybe so! It's just that we have not been part of that thought process.

Another example:

- KS1 has "keep personal information private" (presumably including other people's personal information),
- KS2 has nothing
- KS3 has "protecting online identity and privacy"

We are not the experts here, but since these bullets are new, we'd suggest specifically checking them with Naace.

- KS2 In our April response to the February draft we propose the following additional bullet in KS2:
  - **Design, create, and evaluate digital artefacts for a given audience**

  saying that "We received very strong feedback about the lack of emphasis on design (graphic design, human-computer interface, fitness for purpose, attention to the audience), and creativity, especially outside the realm of programming".
  Perhaps this proposal did not find favour with ministers, but we re-raise it here in case it was missed by accident.
- KS3 Intellectual property has disappeared from the "create, re-use …" bullet in KS3, although it seems quite relevant to that activity. Is that deliberate or accidental? We would suggest adding it back in thus

  create, reuse, revise and repurpose digital artefacts for a given audience, with attention to trustworthiness, intellectual property, design and usability

Typography

- KS2 "use search technologies effectively". This bullet has two extra spaces immediately preceding commas.
- Some, but not all, "such as" clauses are in light grey. Is the inconsistency significant? (eg. KS3 bullet 2.)