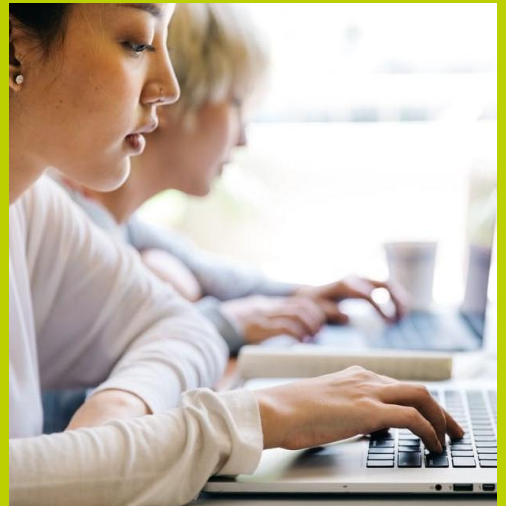


Advanced British Standards Proposals BCS Statement



Executive Summary

BCS, The Chartered Institute for IT, welcomes the government's focus on increasing breadth for students aged 16-19. The current need to specialise prevents many students from studying computing and we see the increased flexibility as an essential means of ensuring all young people have the knowledge and skills needed to participate in a digital economy and society.

Our response is firmly aimed at ensuring that the Advanced British Standard squarely addresses this need, otherwise there is a real risk that the standard lags rather than leads developments in society and the economy. The last ten years have seen unprecedented changes in digital technology. This will continue and jurisdictions around the world are giving real thought to what this means for the knowledge and skills all young people will need.

First, the ABS should unequivocally embrace computing as a foundational subject discipline that, alongside mathematics and English, all children should study from primary school onwards. And yet the ABS consultation says a lot about maths, but almost nothing about computing (Section 1).

More concretely, the ABS should address the complementary needs of three groups:

- Future specialist computing professionals, who will create new digital products and services (Section 2).
- Future professionals in other fields, understanding how to use digital technology in their sectors (Section 3).
- Digitally literate citizens with the knowledge and skills to use digital tools and drive the creation and innovation of high quality, ethical and effective digital products, and services (Section 4)

The needs of each group and what this means for the design and implementation of the ABS are discussed below.

Computing as a foundational discipline: context

The National Curriculum, launched in 2014, re-envisioned computing as a foundational discipline, that all children should study (initially at an elementary level) from primary school onwards, just as they do mathematics and natural science. Why? Because this foundational knowledge is critical to equipping children to make well-informed choices in their lives, and to become masters of their fate rather than servants of opaque and mysterious technology.

Britain is a world super-power in computing education: no other country articulates this vision as ambitiously and explicitly as we do.

How ABS addresses the context

It is disappointing that the ABS consultation document has thousands of words on mathematics as a foundational discipline, the importance of mathematical fluency, and of studying maths through to age 18; but it says nothing at all about computing as a foundational discipline. Even the word “digital” occurs only twice in the document, and even those occurrences are about digital educational technology, which is an important but very different matter.

Here is one concrete example: on page 13 the ABS document says “More specifically, many young people are leaving compulsory education without the essential numeracy and literacy needed to get on in life and work”. Surely it should say “...without the essential numerical, linguistic, and digital literacy needed to get on...”. It is no good if our students leave school knowing their 7-times table, but unable to make well-informed choices about the digital world that surrounds them so ubiquitously.

Recommendations

The entire ABS document should be reviewed. Where it identifies the importance of mathematics, thought should be given as to the inclusion of “computing” or ‘digital literacy’.

Future computing professionals

The profound shortfall in meeting the economy’s need for computing and IT specialists is well documented. (See for example the Government’s report [Quantifying the UK Data Skills Gap](#) published 18 May 2021, or the [Forbes’ IT Skills Gap Report 2023](#) based on a survey of 500 employers.) To meet this need without undue dependence on outsourcing or migration we must double the number studying computing at university and taking higher level vocational qualifications.

The growth in applications for computing degrees is welcomed, however, at present the vast majority have not studied Computer Science at A level. This means that degrees in computing have to assume a lower baseline of knowledge and understanding than other comparable STEM degrees. This takes up valuable time in the first year of a computing degree, reducing the opportunities for HEIs to teach innovative content such as machine learning. Moreover, students may transfer to other courses at the end of the first year either as a result of a lack of academic grounding or discovering that the degree programme was not what they expected.

How ABS addresses the context

We welcome the increased flexibility within the ABS and believe that this will:

- Allow more 16-18-year-olds to study a major in computer science, increasing the numbers moving on to further study or taking higher level vocational courses
- Help ensure that those that follow these routes will be better prepared as they leave school, as a result of studying a major in computer science as part of the ABS.

However, the current content for the A level in computer science will need updating. Most significantly, it pre-dates the growth in artificial intelligence and the data-driven approach to programming enabled by machine learning. It will be essential that the new major in computer

science does not simply replicate the existing A level.

Recommendations

Ensure that the content of the major in computer science is fit for purpose by commissioning a curriculum group to establish the core content. Developing this new content will take time, especially as it will be essential to take experienced A level teachers through the necessary steps to develop these newer aspects of the discipline.

Give thought as to whether a data science major should be developed with content drawn from mathematics/statistics/probability and computer science.

Professionals in other fields: context

Digital innovation has been identified as a significant enabler of growth across all sectors of the economy. Achieving this growth depends on a wider understanding of digital across the economy as a whole. (See for example the [World Economic Forum's Global Competitiveness Report](#) and the [Digital Riser Report](#) produced by The European Centre for Digital Competitiveness at ESCP Business School in Berlin). For example:

- **Business leaders** need to understand the implications of digital for innovation and increased productivity for their sectors.
- **Policy makers** need to understand how best to enable digital innovation through a real understanding of how digital technology can contribute to increased productivity and growth, and what this means for economic and skills policy and regulation.
- **Funders and lenders** need to understand the opportunities and risk around innovative digital products and services.

However, the Digital Riser Report ranked the UK 15th in the G20 countries for the factors that enable digital competitiveness. Ensuring that all professionals have the necessary understanding of how the power of digital can be harnessed within their sectors will be essential if the UK is to deal effectively with the challenges of low productivity and growth.

How ABS addresses the context

The opportunity for more students to study a minor in computing irrespective of their next steps provides a significant mechanism to increase the number of professionals in other fields (such as finance, retail, manufacturing and government itself) with an understanding of computing. This includes students studying an ABS humanities programme who may go on to study humanities, business, politics or law degrees leading to careers as policy makers, business leaders, or in finance, and those following vocational paths into a wide range of professional occupations.

Recommendations

The content of the new minor in computing should reflect the needs of these students. Simply dividing the major in half, if that were even possible, would not meet the needs of this group who should be provided with a rigorous understanding of how computing can be applied to meet business and societal needs rather than too much emphasis on the foundational understanding that those following a specialist route will need. Much of the understanding of computing applications is missing from the current A level in Computer Science as is other requirements such as AI, big data and cybersecurity. For example, business decision-makers need to understand the challenges created by distributed data bases and accounting software, how these can be addressed and any residual risks. The specifics of database normalisation and structuring data in 1st, 2nd and 3rd normal form (which is included in the current A level) is only important for the specialist.

Because computing impacts on so many walks of life we believe that a strong representation from industry, specifically industries like retail which are significant users of technology, will be essential to get the content of the minor right.

Digitally literate citizens, students and employees: context

Digital technology will be a key part of the lives of all future citizens, members of the workforce, participants in society and future learners. All citizens will need the knowledge and skills to engage effectively and critically with the digital world. To take one specific example, undergraduates studying history degrees will be accessing research literature through research portals on the internet, writing and redrafting essays using a word processor, engaging in tutorials via video conferencing, submitting work electronically through the institution's learning platform, receiving electronic feedback from tools that monitor for plagiarism, monitoring their progress towards their degree and choosing modules through the HEIs online services. Yet the majority of young people's education contains no support for the development of the knowledge and skills of how to navigate the digital world beyond the age of 14. This means they are inadequately prepared for the next stages in their lives.

How ABS addresses the context

As presented the need for all young people to leave education digitally literate (which will be even more pressing in 2034) is not recognised within the proposals. We believe this is a serious omission

Recommendations

Digital literacy should form an important component of the standard for all students, and the appropriate level of competence should be developed in consultation with employers.

How will we find the teachers?

The ABS provides a once-in-a-generation opportunity to ensure all young people can participate in the digital world, improving their life chances, while contributing fully to a modern society and economy. The UK has the potential to become a world leader in digital technology, but unless all young people actively contribute this potential will not be realised.

It goes without saying that the existing model of teaching will be inadequate to meet the demand created by the ABS, and that recruiting additional computer scientists into teaching will always be a challenge. Innovative models should be explored including industry support, online learning and using video conferencing to extend the reach of great computing teachers beyond their own institutions. All of these currently exist in some form or another, what is needed is a systematic approach to scaling these innovations to provide a nationwide solution. This systematic approach must address the challenges around 16-18- year-old's access to learning via technology. The teaching model will inevitably include face-to-face teaching, remote teaching and online learning, and a significant component of supported self-study both to meet the aspirations of breadth and depth within the ABS and to prepare them for digitally enabled further study. All students must have the digital access needed to participate and our work through the BCS Foundation indicates that this is not the reality for many students.

BCS and its members are committed to creating a society where ethical professionals develop products, services and solutions that address the needs, challenges and opportunities offered by digital technology, and all citizens have the digital literacy to make best use of those products, services and solutions, driving quality through a virtuous circle that places the UK in the vanguard of digital developments. The ABS offers a real opportunity to get this right in schools and colleges. BCS would be delighted to work with government on ensuring the ABS really meets the challenges of 2035.

Yours sincerely



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