

Education, statistics and the big data future

The RSS and its members have a vital role to play in ensuring that 'computing education' in schools provides a sound foundation that enables responsible data analysis, says **Tom King**

With widespread recognition that 'data skills' are becoming ever more important, many are questioning how best the schools curriculum can meet that need. Utilising the opportunities of big and open data will require statistics skills beyond those currently taught in schools.

Failing to meet this challenge will have serious consequences. Not least, we may face a proliferation of misleading and incoherent messages as those trying to exploit the data are unaware of the principles underlying data analysis.

Two reports published in January 2012 provide insights into the future of statistical education in British schools. [The Future of Statistics in our Schools and Colleges](#) (pdf format, opens in new window) produced for the Royal Statistical Society and the [Actuarial Profession](#) revisited some long held concerns. It concluded that a major overhaul of the teaching of statistics and a change in policy makers' appreciation of statistics is essential if advantage is to be taken of the increasing economic importance of data-driven technologies.

The second report, [Shut down or Restart? The way forward for Computing in UK schools](#) produced by the Royal Society said that the Department for Education must address the lack of specialist ICT teachers. It advocates a radical overhaul of the curriculum to provide a sound foundation for further study in computing and a focus on what is really important in the purpose of computer systems.

ICT and statistics

Computers are networks for storing and processing data – and computing education is essential to society's realisation of the potential of data. Many of the professional opportunities cited in Shut down or Restart? are in data science, data mining or statistical modeling. Thus it is vital that statisticians provide input to the redevelopment of ICT in schools.

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This will be all the more important as some parties are advocating a diminished focus on maths in computing, despite the extensive use of quantitative data made by many applications. How can users and programmers produce robust analyses if they do not understand the uncertain origin of their data?

The Royal Society has taken a nuanced perspective, suggesting that computing in schools should be split into digital literacy, computer science and information technology. Basic office applications would form the core of digital literacy and be complete by age 14.

Computer science and information technology are all about data processing and data structures respectively. Elementary experience in programming simulations or bootstrap resampling would be useful to many science students; experience working with large datasets or metadata likewise for social science.

Statisticians know well that our discipline is more than just a subset of maths with some applications to real data. However, many people do not grasp the breadth of the subject. While we need to intensify our efforts to promote the understanding of statistics, a different approach in schools may be appropriate.

A relatively new GCSE programme in Computing means that there should be a base of engaged schools and students to work with. Many of the staff teaching computing also teach mathematical topics. But the question of how to proceed remains.

Varied opportunities

Soon all students will continue to study maths post 16, so there is scope for new ideas within the curriculum. The Guardian newspaper is promoting digital literacy in much the same way that the RSS's getstats is campaigning for statistical literacy. The Government is promoting open data and armchair auditors. We have plenty of potential partners, but need to decide the best way forward.

[Deborah Nolan](#) and [Duncan Temple Lang](#) espouse [six components for teaching computational statistics to undergraduates: fundamentals, visualisation, advanced, IT, computation and IDEs](#). While this approach focuses on computing rather than statistics, the fundamentals and computation components could form a very good introduction to what modern statistics is really about.

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The development of a new Free-Standing Mathematics Qualification (FSMQ) in statistical/mathematical/scientific computing would not be controversial. But just as there is a debate about what 'data science' entails, there is potential for wider implementation and development within the computing curriculum.

A good curriculum in schools focused upon the ability to utilise and synthesise available data must be the priority. But statisticians need to make sure this goes hand in hand with respect for data and a critical attitude towards its provenance. For this to happen, the RSS and its members must take a leading role.

Tom King is an RSS Fellow and independent researcher in public statistics who studied social statistics at Southampton University.

The computing profession's stance

In March 2012 the BCS Academy of Computing sent an information pack teaching [Computer Science in schools](#) to every head teacher of a state maintained secondary school in England explaining the strategic opportunities they would have from September 2012 to develop Computer Science as a rigorous academic component within a reformed ICT curriculum.

The information pack is designed to "help head teachers and school governors make the right decisions". The Academy asserts that "identifying the right strategies to ensure success is of paramount importance".

The Academy's remit is to ensure that, as 'champions' for the global IT profession, "future BCS has a coherent strategy for advancing computing as an academic discipline".

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