Australian Council of Deans of ICT

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ACARA
Maths and Science Consultation 20 July 2012

ACDICT Position on Maths and Science for ACARA

Following on from our submission with respect to the Draft Shape of the Australian Curriculum: Technologies, the Australian Council of Deans of ICT (ACDICT) – the peak university academic body for ICT in higher education – is pleased to make a brief submission to the Australian Curriculum, Assessment and Reporting Authority (ACARA) with respect to the Draft Shape of the Australian Curriculum: Maths and Science.

As stated in our previous submission, we support the national curriculum and the need for ICT to be part of the curriculum. Insufficient numbers of talented students are choosing ICT courses at university relative to Australia's needs for skilled ICT professionals. Schools and the curricula need to play a role in encouraging talented students to choose ICT.

We believe there is an essential place for informatics/computer science/computational thinking within the Maths and Science curriculum. This is currently missing from both the maths curriculum and the science curriculum. Innovation within Australian society will depend on topics such as computational thinking, algorithms, processes, and handling large data sets safely and securely. Yet the topic is missing from being explicitly mentioned in such important documents as the Chief Scientist's recent reports.

We note that Australia hosts teams in five high school international Olympiads – physics, chemistry, biology, mathematics, and informatics. Only the latter is not covered explicitly in the national curriculum. We ask that algorithms and computational thinking be included in the maths curriculum and thereby support the development of informatics knowledge within Australia.

We attach an op-ed piece from *The Australian* that is relevant to our submission.

Yours sincerely

Professor Leon Sterling
ACDICT President
Dean, Faculty of Information and Communication Technologies
Swinburne University of Technology

Attachment – 2 pages

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How can schools get kids engaged in IT

Date posted: Friday 13 Jul 2012

Writing in The Australian, Professor Leon Sterling, Dean of the Faculty of Information and Communication Technologies at Swinburne University of Technology says we are living in an age of data, but schools are not managing to inspire and engage students in computing and all it embraces.

We are living in an age of data. New medical and scientific equipment is generating massive amounts of data. Groundbreaking analysis is being used to transform data to make new discoveries in areas ranging from astronomy to genetics. The possibilities for science and evidence-based policy, building on these advances in science, are immense.

While the opportunities arising from more sophisticated applications of information and communication technologies are significant, there is also a critical shortage of educated professionals in Australia who can effectively manage and analyse data to create new knowledge.

New techniques are needed to deal with huge quantities of data that characterise this emerging research environment, as decades-old methods that work with small amounts of data typically do not transfer to larger data sets. Highly specialised knowledge is needed to ensure that data is managed safely and securely and transmitted reliably.

Within Australia there is an education and training gap in these vital areas. There are more jobs in ICT that are important for innovation than there are skilled professionals to fill them. What we have seen, over decades, has been a gradual deterioration in the attention that our primary and secondary schools give to computational skills - a long term issue that was compounded by the burst of the dotcom bubble in 2002, which saw many thousands of students turn away from careers in ICT.

The promise of ICT technologies is so great that we need a national effort to reinvigorate interest in these fields - starting with our schools.

Promoting computing concepts in schools is noticeably absent from national discussions. The Office of the Chief Scientist has recently produced two reports, 'Health of Australian Science and Mathematics' and 'Engineering & Science in the National Interest'. The first report considers enrolments in ICT courses at university and investment in ICT research. It notes that interest in ICT courses has dropped substantially over the past decade, offset by modest improvement over the past two years.

The ICT courses also have the highest percentage of international students - a direct reflection of the shortage of Australian students emerging from our schools with interests in these areas.

The second report makes almost no mention of computing and the importance of promoting ICT in schools has also been overlooked. While it could be argued that information and communication technology fits within the broad rubric of science, the reality is that ICT is not linked with mathematics and science education in our schools.

Getting the national curriculum right is a vital first step if we are to address knowledge and skills deficits in information and communication technology. We need to ensure that computing concepts and ICT are seriously considered within the renewed emphasis on mathematics and science education.

To be blunt, too much of the current focus on ICT literacy in secondary schools is in using word processing and spreadsheets. There needs to be a design and technology subject in the national curriculum to increase visibility of ICT and provide greater opportunity to teach more complex concepts rather than simple literacy.

At the same time, we need to make efforts to direct more of our entrepreneurial and scientifically inclined students towards these powerful new information technologies.
One place where computing concepts can be promoted in schools is through the Australian informatics competitions which focus on skill in using computers to solve difficult problems where knowledge of computational thinking and programming is paramount.

Australia has been sending teams to the International Informatics Olympiads since 1999, and is hosting the international competition in 2013.

However the informatics competitions are not well promoted within schools, and have struggled for visibility with the mathematics competitions. Yet the graduates have been impressive. Indeed one Australian team member contributed to an Australian startup company in improving backup storage of data in the cloud.

The 'Mathematics, Engineering & Science in the National Interest' report made several recommendations, including the need for inspiring teachers for mathematics and sciences. The need for inspiring teachers is perhaps even more pronounced for computing and ICT due to the rapid growth and technological advances in the field.

We need to ensure that the federal government's focus on mathematics and science raised by the Chief Scientist's reports extends to ICT, so that more students will study computing in schools and universities and in turn this will contribute to building the economy.