National computing studies summit

Open Learning Approaches to Computing Studies: An ACCE Discussion Paper

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BACKGROUND

In 2005 the Australian Council for Computers in Education (ACCE) was successful in obtaining a grant from National Centre of Science, Information and Communication Technology and Mathematics Education for Rural and Regional Australia (SiMERR) to undertake the Computing Studies Teachers Network Rural and Regional Focus Project. The project comprised the following five components:

1. **Computer Education Group (CEG) Rural and Regional Projects**
   Each ACCE member CEG was granted funds to undertake professional learning activities for senior secondary computing studies teachers in rural and regional areas within their state/territory.
2. **National Portal**
   A national portal of resources for computing studies teachers to be established comprising information about the sites and resources of existing networks and resources from the rural and regional projects hosted by the CEGs. It is expected that the portal will be available in early 2008.
3. **Exploration of New Technologies**
   The establishment of a new server hosting Open Source applications and services, and online tools and environments to use for personal professional learning or to explore new ideas with classes, particularly when their system or school is not yet offering such services.
4. **National Computing Studies Survey**
   An online survey was undertaken late in 2006 to profile the state of the teaching of Computing Studies in secondary schools in rural and regional areas and consider the needs of Computing Studies teachers in these areas. The survey gathered data about the teacher's school, the teaching of IT in their school, the profile of the teacher and their professional learning needs. A total of 343 computing studies teachers from across Australia completed the survey. Results from the survey will inform any future actions that ACCE may undertake as a result of the National Summit and this Discussion Paper.
5. **National Summit**
   A National Computing Studies Summit held in Adelaide on 4, 5 October 2007 with the theme Open Learning Approaches to Computing Studies.

NATIONAL COMPUTING STUDIES SUMMIT - *Open Learning Approaches to Computing Studies*

Goals of the Summit

The goals of the Summit were; increased awareness and understanding of how to ensure equity of learning outcomes for students of computing studies regardless of school or location, and: the publication of a discussion paper and recommendations for the future in relation to the issues around the use of technologies and appropriate pedagogies to deliver quality computing studies program to all students, particularly in rural and regional Australia. The goals were achieved by scoping the existing territory in relation to open/distance learning, sharing existing teacher exemplary practice, exploring relevant online delivery systems and appropriate pedagogies to support open/distance learning, showcasing possibilities for the future and, identifying and sharing resources.

The Summit ran over 2 days and comprised a range of sessions including:

- A pre-Summit industry visit to South Australian Partnership for Advanced Computing which provided participants with eye-opening insights into the possibilities provided by high performance computing and visualisation. This partnership between three universities demonstrated what is possible with cooperation and the benefits of using open source software were extolled. The IP-based videoconferencing possibilities with the Access Grid were especially of interest to teachers and teacher educators, as was the information about projects already being supported in schools.
- Keynote address by Alan Noble, Engineering Director, Google Australia
- Scoping the Territory – a look at the current practice of education systems – a panel session with Dave Heggie (Digital and Virtual Environments, NSW), Richard Kelly (Stanthorpe State High School, QLD) and Peter Ruwoldt (Grant High School, SA)
- Pedagogical issues in relation to open/distance learning, Brenda Frisk (Nextspace, NZ)
- Exploring future possibilities – a presentation of Second Life by Lindy McKeown (University of Southern Queensland)
- Current Exemplary Practice – Richard Kelly and Peter Ruwoldt
- Sharing of ideas and teaching resources – outcomes and lessons learnt by state and territory CEG projects
- Plenary Session – Janine Bowes (Department of Education, Tasmania).

The Summit was attended by more than 45 computing studies teachers and other educators from every state and territory. In addition, 41 computing studies

teachers registered to participate in the Summit online from around Australia via Centra – an internet based conferencing and meeting tool. Access to Centra was provided courtesy of the South Australian Department of Education and Children Services.

The Summit opened with a keynote address from Alan Noble, Engineering Director, Google Australia. Alan discussed a range of Google projects and internet services and described the philosophy behind the company. The key messages from his address were that the number of computer science graduates is not sufficient to meet the industry demand; there are difficulties for industry in attracting and retaining high quality employees; there are many diverse career opportunities for computer science and related degree graduates, but students generally are not aware of this; schools, and computing studies teachers in particular, have a pivotal role in providing students with accurate and up-to-date information about careers in the IT industry; computing studies in schools has an important role in 'turning on' students to the computing/IT subject area and; a strong computing studies curriculum in schools would go a long way to overcoming the shortfall of qualified graduates needed by industry.

In the sessions that followed, a range of key issues emerged including:

- the need for a more consistent national approach to computing studies curricula
- improved understanding by students (and the community in general) of the nature and diversity of computing studies as a subject
- adequate resources for the teaching of computing studies including qualified teachers, effective professional learning for teachers, engaging and dynamic curriculum and quality infrastructure
- better ways for sharing teaching expertise and curriculum resources through the use of information and communications technology (ICT)
- improved collaboration and consultation between schools, tertiary institutions and industry.

The Issues

An integral part of the program was the opportunity for participants in small groups and at the plenary session to discuss issues raised by speakers and to share ideas and possible actions. An underlying current of the Summit was a concern for falling student participation rates in computing studies and how this may be addressed.

The following is a summary of the major issues and possible actions that emerged during the Summit. They are grouped under the broad areas of Curriculum, Pedagogy and Curriculum Delivery, Resources, Teacher Professional Learning, Links to Industry and Tertiary Sector, and The Technology.

1. CURRICULUM TERMINOLOGY

A common theme that emerged during the Summit related to the confusion that can arise from the use of different terminology when describing the subject of computing studies. From a national perspective it is particularly confusing given that there is no common nomenclature across state and territory education systems. There are situations where the same label is being used in different jurisdictions to describe different (in terms of content) courses/fields of study. Not withstanding the potential for confusion and uncertainty, there was a feeling that the debate about terminology needs to move on and grapple with more important issues. There was support for the development of a national statement about computing studies as a school subject to better define and describe the subject in terms of scope. For example, it may be appropriate to articulate areas such as information systems, programming, applications, etc.

Curriculum Rationale

Following on from the notion that the term computing studies may be too generic is the issue of the rationale for including it as a subject in senior secondary schooling. What is the purpose of teaching computing studies in schools?

Current purposes include:

- providing students with a 'taste' of a range of topics under the computing studies 'umbrella'
- pre-industry training to facilitate student entry into the workforce (eg accredited vocational courses)
- industry standard training (for example industry standard networking courses)
- pre-tertiary preparation
- skills training in specific software applications.

There was some support at the Summit for the view that many current courses are trying to cover too much and so risk diluting their effectiveness. In moving forward work, needs to be done to develop a shared understanding between industry, employers and the community in general, of a rationale for teaching computing studies in schools. This could be achieved as part of a national statement on computing studies as mentioned above.

Curriculum Mapping

Summit delegates almost unanimously expressed their frustration at the lack of information about what is actually being taught in computing studies subjects in schools across the various states and territories. There was strong support for work to be done on a detailed mapping of the current state and territory computing studies syllabi and courses. The mapping could also include data about the use of online tools and online curriculum delivery systems that are being used.

The collation and analysis of data from the mapping would identify common curriculum elements and therefore lead to the facilitation of sharing of ideas and resources across jurisdictions to a much greater extent than currently happens. The mapping could also assist in the development and sharing of new curriculum resources as discussed below. It was noted that such a mapping was undertaken and published by ACCE in 2001 (AEC 2001) and that any new mapping would be an update and expansion of the 2001 mapping.

Curriculum Content

Summit participants raised the issue of the need to maintain curriculum currency to ensure contemporary trends in ICT are appropriately reflected in the content and delivery of computing studies subjects. This was deemed important to not only reflect industry trends and applications but also

to be seen to be up-to-date by students and parents. For example, curriculum content could refer to the use of emerging technologies that, in the current context, might include the use of Web 2 tools and/or games programming. However it was emphasised that there is no need to 'reinvent the wheel' but to build on what exists to expand/enhance student learning and to reflect new technologies and applications. It was also noted that maintaining curriculum currency has implications for teacher professional learning.

2. PEDAGOGY AND CURRICULUM DELIVERY

The issues of pedagogy and curriculum delivery systems were raised throughout the Summit. Not only should the curriculum be up-to-date and relevant it must also be delivered in a meaningful way so as to cater for the diverse range of student learning styles. Emphasis was given to the need for teaching practice in computing studies to reflect exemplary practice in terms of the use of ICT as advocated across all curriculum areas – i.e. ICT being used as an appropriate teaching and learning tool. Computing studies teachers need to encourage students to be creative, to take risks, be inquisitive and not be constrained in terms of the technology or the curriculum. Teachers need to link into technology tools that students are already accessing for informal learning - using these technologies to enhance the curriculum and not distract from it.

Computing studies teachers have the potential to lead the way in the development and use of online and open learning systems. Summit participants were keen to learn more about what is available, what is being used and successful pedagogical models for online learning – for example the Information Processes and Technology (IPT) course offered through the Virtual Schooling Service (VSS) in Queensland. Such information could be included in the curriculum mapping referred to above.

3. RESOURCES

A major issue raised by Summit participants is the need for improved sharing of curriculum resources and the potential for collaborative resource development.

A number of barriers to effective resource sharing were identified including:

- the issue of copyright in relation to teacher developed resources
- a reluctance for teachers to publish their work for fear of negative comment
- the lack of knowledge across jurisdictions about curriculum content and therefore the potential for sharing in areas of commonality
- the lack of a comprehensive portal to publish, share and locate resources.

The following were suggested as possible strategies to overcome some of these barriers:

- make increased use of the online environment to share resources
- promote a culture of sharing that encourages and supports teachers to publish resources
- establish hubs of teachers with similar interests with the view to sharing resource development
- explore cross-school project collaboration between students, classes and between teachers
- investigate the possibility of a single portal for all computing studies resources (it was noted that ACCE, as part of this SiMERR project is to establish a portal of computing studies resources)
- resolve issues of intellectual property and copyright by encouraging teachers to comply with National Education Access Licence for Schools (NEALS) requirements.

4. TEACHER PROFESSIONAL LEARNING

Reference was made to teacher professional learning as an ongoing issue in terms of access to, relevance of and availability of high quality professional learning programs. Clearly there are roles here for teacher professional associations, education systems, teacher training institutions and industry. Participants noted the rapidity of change in ICT, more so than in most other curriculum areas. Not only are there ongoing changes in curriculum content, the introduction of new technologies place significant pressure on computing studies teachers to keep pace. This situation is further exacerbated by the paucity of education authority sponsored professional learning programs specifically for computing studies teachers.

Strategies suggested to improve teacher professional learning included:

- analyse the results from the national survey (see above)
- more targeted computing studies specific professional learning programs
- increased use of online systems to improve access and reduce costs for teacher professional learning
- greater opportunities for computing studies teachers to learn about new systems and technologies on an ongoing basis.

5. LINKS TO INDUSTRY AND TERTIARY SECTOR

There was general consensus that the links between the school sector, industry and tertiary sectors need to be enhanced. For example, there is a lack of information and understanding in schools in most states and territories about career opportunities in the IT industry and some confusion about the plethora of IT subjects offered at the tertiary level.

In addition the Summit revealed some tensions between industry, government and the teaching of computing studies in schools. Examples included:

- industry has successfully lobbied for a ban on schools offering AVC Certificate III
- a recommendation of a recent government report (DCITA 2006) was that programming not be taught in secondary schools

- little or no recognition of the value of computing studies teaching in schools to provide potential workers for the IT industry
- limited articulation from high school to university in computing studies subjects.

To overcome some of these tensions and misconceptions the following actions were suggested:

- ACCE undertake a strategic advocacy role to gain recognition for computing studies as a 'legitimate' course of study in schools and its role in addressing the shortage of workers in the IT industry
- ACCE, through its association with the Australian Computer Society (ACS), seek to establish better links with industry to improve understandings of their respective roles
- ACCE and the ACS take on an advocacy role in promoting the status of computing studies in school education with industry groups such as Australian Information Industry Association (AIIA) and relevant government agencies such as the Australian Department of Education, Science and Training (DEST), the Australian Department of Communications, Information Technology and the Arts (DCITA) and the Ministerial Council on Education, Employment, Training and Youth Affairs (MCEETYA)
- there is a need to work with the tertiary sector in relation to improving the transition from school to university for computing studies students
- in schools there needs to be improved information for students about the range of career opportunities in the IT industry. This could be facilitated through the development of an online community for computing students that includes industry and tertiary sectors
- a recognition of the influential role of computing studies teachers in providing information to their students about IT career and future study opportunities.

6. THE TECHNOLOGY

During the Summit considerable discussion centred around the technology itself and associated systems. In particular, two issues were seen as significant. First there was universal concern about the role of firewalls in filtering internet content. In all jurisdictions the filtering systems in place often block access to legitimate educational tools and sites. For example, most firewalls block teacher and student access to many of the new Web 2 tools. Such tools, if made accessible, could form an important part of computing studies courses both in terms of objects of study and tools to enhance the teaching and learning.

Clearly there needs to be action to address the problem of balancing the need for adequate filtering to protect children from inappropriate information vis a vis blocking out legitimate sites/access to valuable educational tools. Second, concern was expressed about a number of issues in relation to the use of proprietary software including:

- the financial burden on schools to purchase and maintain proprietary software
- the inflexible marketing policies of the commercial software industry
- the policies of education systems allowing and supporting the use of proprietary software only in schools
- the lack of recognition by industry and education systems about the legitimacy and value of open source software solutions.

Considerations for Future Action

The development of a National Statement on Computing Studies to:

- describe the nature of computing studies
- provide a rationale for the teaching of the subject
- include a detailed mapping of the computing studies syllabi and courses being taught in states and territories including data on the use of online tools and online curriculum delivery systems
- explore possible future curriculum directions.

In relation to curriculum resources ACCE to explore ways to improve and facilitate the sharing of resources as appropriate within and across jurisdictions.

ACCE to undertake an advocacy role to:

- improve the understanding of the nature of computing studies both within and outside the education community, particularly with industry and government agencies
- explore the provision of improved professional learning for computing studies teachers
- improve the transition from school to tertiary study for computing studies students.

With education systems, ACCE and member organisations to:

- promote the use of Open Source software as a legitimate alternative to proprietary software
- seek ways to improve internet filtering to enable computing studies teachers and students access to the whole range of web tools.

Responses to the Discussion Paper

ACCE invites your response to this discussion paper. ACCE looks forward to a robust debate concerning the issues raised in this paper and values your expert input. The outcomes of the debate will inform future actions by ACCE to better support the teaching of Computing Studies in Australian schools.

Responses should be emailed to president@acce.edu.au and received no later than August 31, 2008.

Acknowledgements

ACCE would like to acknowledge the following organisations that contributed to the successful conduct of the Summit:

- Google Australia
- Adobe
- South Australian Department of Education and Children Services (DECS)
- National Centre of Science, Information and Communication Technology and Mathematics Education for Rural and Regional Australia (SiMERR)
- Australian Science and Mathematics School (ASMS)
- South Australian Partnership for Advanced Computing (SAPAC)
- the Summit participants (see list below).

Participant List

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