ACCE Position Paper on Computing and Digital Technologies in the Technologies Learning Area, and ICT in the Australian Curriculum
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This paper was prepared for the Australian Council for Computers in Education and represents the views of that Council and its affiliates: CEGSA, ECAWA, ICTENSW, ICTEV, InTERACT, ITEANT, QSITE and TASITE

Consultation
ACCE would like to thank its member associations: CEGSA, ECAWA, ICTENSW, ICTEV, InTERACT, ITEANT, QSITE and TASITE for their contribution to this paper. The position represented here is truly a National Teachers' Association position on a very important issue.

ACCE would like to recognise the committee that coordinated the consultation and developed the paper: Dr Nicholas Reynolds (chair), Paula Christophersen, Bruce Fuda, Dr Margaret Lloyd, Dr Ken Price, Dr Jason Zagami, and Tony Brandenburg (President, ACCE).

Affiliate organisations have been invited to make further contributions with regard to the specific details of the form, content, structure and implementation of the recommendations contained herein

Background

The Melbourne Declaration recognised the importance of information and communication technology ICT) as being 'central to Australia's skilled economy (requiring) crucial pathways to post-school success' (MCEETYA, 2008). It specified Information and Communication Technology and Design and Technology as one of the eight learning areas (Technologies) within the Australian curriculum. The Melbourne Declaration also made mention of the role of ICT in supporting learning in all curriculum areas equating its importance to literacy and numeracy.

The Australian Curriculum as presented by ACARA acknowledges the interdisciplinary role of ICT by defining it as a general capability. The ACCE welcomes this inclusion and believes it formalises much of the meaningful work happening in contemporary Australian classrooms and allows appropriate use of the ICT infrastructure in our schools.

More recently, and in keeping with the intent of the Melbourne Declaration, ACARA has positioned Digital Technologies as a strand (F−8) and subject (9−12) in the Technologies Learning Area. That is, the Draft Shape of the Australian Curriculum: Technologies has described a strand, currently labelled as Digital Technologies, to be conducted in parallel with a Design and Technologies Strand from F-Year 8 and as a standalone subject from Years 9-12.

While welcoming the framing of Digital Technologies as a separate entity, this position paper will argue that Digital Technologies should be a subject from F-12 rather than an F-8 strand and a Year 9-12 subject as proposed in the Draft Shape of the Australian Curriculum: Technologies. This paper proposes that the new subject be called **Computing and Digital Technologies (CDT)**.

ACCE holds that the current status of Digital Technologies as a strand, denies the opportunity to clearly identify the unique characteristics of **CDT**. It forces a compromise regarding aims, overarching ideas and the sub-strand structure, which collectively diminish the capacity of this dynamic area to express and realise its vision and content.

Proposed Solution

ACCE recommends an approach to curriculum that is visionary and acknowledges the uncertain, the unknown, the dynamic, and the exciting nature of computing. Computing and Digital Technologies

extends far beyond the notion of computing as programming, and proposes a curriculum area that is inseparable from human thought, action, interaction and identity.

ACCE proposes the clear articulation of learning pathways within the subject as well as preparing students to actively contribute to a digitally productive, knowledge based society. It supports the notion that ICT as a general capability and CDT as a subject have distinct purposes, each with an essential role in the education of Australian children and young people.

RECOMMENDATIONS

1. One subject named Computing and Digital Technologies (CDT) within the Technologies Learning Area that applies F – 12.

2. That CDT consists of two strands:

- Creating Digital Solutions
- Understanding Networks, Environments and Contexts

3. The curriculum for CDT is based on five key concepts, which all contribute to the creation of solutions using digital technologies

I. The nature of data
II. The nature of human computer interface
III. The creation and development of knowledge
IV. The nature of human multimodal communication
V. The dimensions and dynamics of 'The Digital'

These key concepts provide a framework for curriculum development. They are separate but interrelated. In order to clarify our intent we present some suggestions of our understanding of why they are essential and how they might be implemented:

The nature of data: data are the building blocks for all computing, they are also the basis for knowledge. An understanding of the many forms of data from binary code through simple to more complex programming, to the many representations and articulations of data as words, sounds, images and so on, is essential. CDT offers pathways to understand and to design and create complex systems digital solutions that enable the articulation of human knowledge.

The nature of human computer interface: From key punch cards, to keyboarding, to touch screen and beyond, the way humans interact with computers has changed rapidly and significantly; and continues to do so. Conventions of interface design are constantly changing, how information is stored, presented and accessed is also a rapidly evolving area. CDT seeks the development of deep understanding about the structure, design and creation of digital solutions that connect humans and computers that acknowledge the way humans perceive their environments and how those environments shape human activity.

The creation and development of knowledge: The development of computational thinking skills to support interactions with data and the creation of information is key to the creation of knowledge. The capacity to represent data in readiness for efficient and effective manipulation and the capacity to create new solutions exploiting the capabilities of digital technology is paramount. Knowledge development in CDT is inherently collaborative and contributes to the development of social capital. Collaborative creation of knowledge is demonstrated in CDT in many forms from the simple sharing of projects in (for example)

Scratch, to the deep engagement with programming communities in the development of open source applications.

The nature of human multimodal communication: Human beings interact with the world and with each other in complex and varied ways. Digital Technologies have created and continue to create means of written, verbal and image-based communications that are rapid, rich and ever changing. CDT seeks to equip young Australians with the knowledge and skills necessary to not just access knowledge and information but to build new solutions that can be shared globally in different ways. CDT provides opportunities for the creation of 'text' in new ways that support access and understanding. CDT offers pathways to the development of processes and protocols that enhance communication and collaboration.

The dimensions and dynamics of 'the Digital': Unlike any other discipline, CDT has a brand new history; that history is essential to an understanding of the nature of computing and the digital world. It is a dynamic and rapidly evolving field. CDT offers opportunities to acknowledge the nature of 'the Digital' and to build capacity in young people to learn from the past but to thrive in the promise of the unknown. An understanding of the nature of networks and our existence within them is essential. CDT acknowledges the unique nature of digital technologies and builds an understanding that technological innovation and development is in itself reliant on the very dimensions and dynamics that make it unique.

4. Dedicated writing team

In order to clearly articulate the specific knowledge and skills associated with this dynamic area and the key concepts underlying this proposal it is essential that an expert Computing and Digital Technologies writing team be deployed.

5. ICT Capability as a general capability

ACCE acknowledges that ICT as a general capability is an essential component of the Australian Curriculum. It is critical that the relationship between CDT and ICT is clearly stated.

Concerns with current position

Concerns include:

1. The placement of Digital Technologies as one strand within the learning area – this imposes constraints that inhibit the scope and focus of Computing and Digital Technologies

Specific constraints include:

- The broad definition of technologies as articulated presents a focus on materials and tools, on types of technologies and on processes that do not naturally fit with the key concepts of CDT
- Aims that are limiting and limited
- Articulation of the sub-strands that tie the content of CDT to the broad (and restricting) definition of Technologies.

2. Lack of clarity about the relationship between ICT as a general capability and Digital Technologies. While there is a distinction made between users and developers as key identifiers of the differences, this does not attend to the conceptual frameworks around networks, concepts and environments in which digital solutions are created and applied.

Rationale

The change from the status of strand to subject will allow both Digital Technologies (as CDT) and Design and Technologies to each develop a strand construct appropriate to its own specific knowledge and skills. This notion is not alien to the spirit of the Melbourne Declaration where

History and Geography are presented as standalone subjects within the Humanities and Social Sciences Learning Area. Further, Digital Technologies standing alone as CDT will have a benefit to Design and Technologies in affording it the opportunity to extend its content offering. The body of knowledge provided by CDT becomes the basis to equip students in the use of ICT as a learning tool in all other areas of learning.

ACCE sees this proposal as a unique opportunity to redevelop current educational thinking in a specific subject area in Australia with an approach that is innovative, sustainable and creative. Our current research suggests that this approach, although similar to contemporary developments in other countries, presents a new way of thinking about CDT that is progressive, sustainable and relevant to generational change in students and teachers, and provides the basis for the requirements of a knowledge based society for the 21st Century.