Digital Technologies in the Australian Curriculum

Australian Council for Computers in Education
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Introduction

The Australian Council for Computers in Education (ACCE) has made clear, through a number of forums and in a variety of media, that it welcomes and fully supports the inclusion of the Technologies Learning Area and ICT as a *General Capability* in the Australian Curriculum for all students from Foundation to Year 10 (F-10).

The Council is particularly supportive of the introduction of Digital Technologies as a compulsory subject for all students (F-8). Individuals affiliated with the Council and its member state and territory associations have taken active leadership roles in all stages of this subject's development and review.

ACCE has, through 2014, provided financial support to its member state and territory associations to begin work towards the requisite professional learning that teachers will need for the introduction and successful implementation of this subject.

A thoughtful, well-taught, and well-resourced Digital Technologies subject, together with the interdisciplinary role of ICT in all learning areas, will deliver a world class curriculum, where students have the opportunity to engage in meaningful ways with developing digital solutions to improve their lives, solve problems that increase in complexity over time, and a clear pathway for ICT capability development from F-12.

Developing the capacity of students to generate digital solutions, not only enables them to make considered study and career choices that involve the many facets of digital technologies, be they in information technology, science, the media, service, construction, medicine, arts, entertainment, law, teaching, politics or other careers, but also builds the capacity of Australia to thrive in an increasingly complex world where the mastery and harness of digital technologies is vital (ACCE, 2011).

Technologies/Digital Technologies and the Australian Curriculum

As noted, ACCE welcomes and fully supports the inclusion of the Technologies Learning Area, featuring Design and Technologies and Digital Technologies as compulsory subjects for all students from F-8 (and as electives in later years), and the continued implementation of ICT as a general capability.

ACCE recognises that this is a complex arrangement that presents systems, schools and individual teachers with challenges—some of which relate to the introduction of the Australian Curriculum and the Technologies Learning Area in general, and others that are specific to ICT as a capability and Digital Technologies as a subject, that need to be considered.

Many of these matters have been identified by the current Review of the Australian Curriculum and in the published responses to the Review by the ACCE [1] and many of its state/territory members including Digital Learning, Teaching Victoria (DLTV) [2], and EdTechSA [3].

They include, but are not limited to:

1. A need for greater clarity between *ICT as a Capability*, and *Digital Technologies* as a separate subject within the Technologies Learning Area;
2. A perception that there is a lack of consensus regarding the scope, sequence and content of the current Design and Technologies/Digital Technologies subjects;
3. The lack of endorsement by federal, state, and territory ministers of the Technologies curriculum;
4. Concerns about overcrowding of the curriculum, especially at the Primary level, and about the capacity of the Australian teacher workforce to teach Digital Technologies well; and,
5. Teaching resources to support the Digital Technologies subjects;

Each of these issues is discussed below with a consideration as to how a structured and coordinated approach to teacher professional learning may ameliorate the identified issue.

(1) ICT as a general capability and Digital Technologies a separate subject

As stated, the Council fully supports the inclusion of ICT as a general capability in the Australian Curriculum for all students from Foundation to Year 10 (F–10), and the introduction of Digital Technologies as a separate subject for F–8.

For some, there is still confusion about the dichotomy of ICT as a general capability and Digital Technologies a separate subject.

The Council recognises that this arrangement adds a complexity to the curriculum that some find confusing, including some teachers and parents, and that it requires new pedagogies and new ways of organizing the teaching and learning enterprise.

However, the notion of ICT as a *general capability* across learning areas is well established. There is general acceptance that ICT integrated across the curriculum is an essential component of a modern curriculum and there is little suggestion in the current review of the Australian curriculum that the concept should be abandoned.

Part of the rationale, as expressed by ACCE (2011) for introducing Digital Technologies as a separate subject associated with the Technologies Learning Area, relates to the lack of a succinct pathway for learners to develop ICT competence, particularly in regard to computational thinking. It was held that embedding instances of ICT across the curriculum would not ensure that the knowledge, skills and dispositions associated with ICT would be necessarily developed appropriately.

Embedding also puts at risk the viability of the very concept of ICT as a general capability – how/where do students build ICT knowledge, skills and dispositions in developmentally appropriate and systematic ways, and risks under-developing the critical thinking and digital problem solving capacity of students that is so fundamental to supporting the knowledge economy and our increasingly complex way of life.

The key concepts of the Digital Technologies curriculum include computational thinking, abstraction, data collection, representation and interpretation, specification, algorithms and implementation, and digital systems, interactions and impacts.

The aim is for students to *develop and use increasingly sophisticated computational thinking skills, and processes, techniques and digital systems to create solutions to address specific problems, opportunities or needs* (ACCE, 2011).

From this description, it is obvious that Digital Technologies is much more than a syllabus of digital literacy and/or computer education and more than a general capability.

However, therein lays the challenge, especially from F–6: how do we strengthen the capacity of our schools and teachers, especially our primary division, to deliver such a sophisticated subject that is so crucial to our economic and social well-being as a society?

As discussed later, ACCE believes that this challenge can be met through a structured and coordinated approach to teacher professional learning, and that ICT as a *capability* and Digital Technologies as a separate subject, for all students, are crucial and complementary elements of a world-class curriculum.

(2) Scope, sequence and content

Callil's (Technologies Learning Area expert employed by Australian Curriculum reviewers Donnelly and Wiltshire) analysis of data collected as part of the Australian Curriculum Review (see Australian Government, 2014b) indicated that for the delivery of Technologies, a number of challenges remain, particularly from F–6.

These challenges include: the pedagogical complexity of delivering both *Design and Technologies* and *Digital Technologies*, further refinement of content descriptions and elaborations, fine tuning of developmental stages and language, a bringing together of the "process and production" frameworks used by each subject, and building the capacity of primary teachers to teach the curriculum.

Concerning Digital Technologies in particular, Callil, notes:

Most band levels have appropriate content descriptions with realistic elaborations that provide scope and sound achievable examples for each content description. (Australian Government, 2014b, p.293)

However disagreement among respondents to the online survey is high with respect to the clarity, pitch, appropriateness, progression, and manageability of the content descriptions and elaborations.

Content elaborations for some levels are too high and/or not appropriate and do not provide direction and support for realistic and achievable tasks at each level, suggesting that the content descriptions and supporting elaborations for Digital Technologies have been set too high.

There is further concern that all this complexity combined with primary teachers' lack of specialised content knowledge will …*make it unlikely that any real 'deep' knowledge is achievable and sustainable in Foundation to Year 6.* (Australian Government, 2014b, p295)

Such statements could arguably be made about all Learning Areas in the Australian Curriculum and are not surprising. Debate about the scope, sequence, and content of a curriculum is a natural part of curriculum development.

Disagreement, contestation, robust debate about what is to be taught, how it is to be taught and when, is an essential element of curriculum development in a democratic society.

The eventual outcome is that compromise is made, knowledge and understanding is accumulated, and the curriculum evolves. This is the process that ACARA has instigated and for which it is to be commended.

What is different for Digital Technologies is that it is a relatively new subject especially in the early years of school. It does not have the extensive pedagogic culture that subjects such as Maths and Science possess.

It must build on what has been accumulated over the last few decades and establish its own teaching and learning culture. This is a worthwhile activity that will take time, patience, courage, commitment and resources.

The Council acknowledges this and recognises that the Digital Technologies curriculum is aspirational. Benchmarking this curriculum, especially in the early years of schooling is, not surprisingly, difficult. The expectation now is that further fine tuning will occur

in consultation with ACARA, that the curriculum will be delivered as planned, and given every opportunity to evolve and strengthen.

The key to this will be a commitment to building the capacity of the teacher workforce through high quality professional learning opportunities and the development of high quality resources to support teachers and students.

Discussion later in this document indicates that this is a commitment that ACCE has already demonstrated by financially supporting state/territory association professional learning and resource development initiatives.

(3) Federal, state and territory endorsement

The council of federal, state and territory education ministers have noted, but not yet finally endorsed, the latest version of the Technologies curriculum. [4]

Shifting political fortunes and agendas, and varying degrees of State/Territory hegemony has lead to uncertainty about the future of the Australian Curriculum in its current form in general, and the Technology Learning Area in particular.

This uncertainty is reflected in the following summary of State/Territory implementation plans, as provided to ACARA (August 2014) by various local authorities, regarding the introduction of Technologies (see Table 1).

ACT (all sectors)

2015 - Commence familiarization Technologies

2016 - Consolidate teaching of all Australian Curriculum subjects

2017 - Full implementation of Australian Curriculum K–10.

NSW (all sectors)

2015/16: to be advised

NT (all sectors)

2016: The implementation timelines for the Northern Territory for technologies will depend on when these learning areas/subjects receive final endorsement.

QLD (all sectors)

2015/16: Implement remaining learning areas/subjects by 2016.

SA (Catholic/Independent)

2015/16: Familiarisation

SA (Government)

2015: Teachers Years F(R)-7 become familiar with Technologies

2016: Teachers Years F(R)-10 use all Australian Curriculum learning areas to plan, teach, assess and report student learning.

    *2012/2016

Professional learning and support provided to leaders and teachers by Primary and Secondary Australian Curriculum Implementation Officers.

Additional two student free days for each school each year.

 Ongoing development of online resources.

TAS (All sectors)

2015/16: to be advised

VIC (all sectors)

2015/2017: Initial implementation of new teaching and learning programs incorporating the full suite of learning areas and four general capabilities, to commence from the start of the school year, with full implementation to be in place in all government and Catholic schools from the start of 2017.

Reporting against the new achievement standards in these additional learning areas and general capabilities will be dependent upon the implementation timeline for each school.

AusVELS will be available to all Independent schools

WA (all sectors)

2015: The Authority will begin development of support materials for Phase 2 and 3 subjects and learning areas based on the Western Australian adapted curriculum.

2016: The Western Australian adapted curriculum for The Arts, Humanities and Social Sciences, Health and Physical Education and Technologies will be available to schools for familiarisation.

Table 1: State and Territory Implementation of the Foundation to Year 10 Australian Curriculum (Source: http://www.acara.edu.au/verve/_resources/State_and_Territory_F-10_Australian_Curriculum _Implementation_Timelines_August_2014.pdf)

The current climate of vagueness and ambiguity, and State/Territory posturing, does little to help individuals, schools, and systems prepare, and will retard desperately needed professional learning programs and resource development, especially in Digital Technologies.

The Council urges resolution and endorsement so systems, schools and teachers can get on with the task at hand.

(4) Overcrowding and capacity

Australian Curriculum reviewers, Donnelly and Wiltshire, (Australian Government, 2014a) have described the Australian curriculum as "*…monolithic, inflexible and unwieldy*" and, in particular, call for *"… substantial action to address the overcrowding of the primary curriculum"*.

They have proposed two separate, "preferred" models of the curriculum to deal with this "problem"—the Wiltshire model, and the Donnelly model.

In part, the Wiltshire model (see page 143 of the Curriculum Review) recommends delaying the introduction of Technologies (both Design and Technology and Digital Technologies) to Year 9.

The Donnelly "preferred" model, in part, (see page 145 of the Review) would result in Technologies being introduced at the discretion of the state/territory education authority.

ACCE is disappointed, in particular, with the clear threat that both models present to the proposed design of the Digital Technologies subject (Lloyd 2014).

The Council's position, and disappointment, regarding the two "preferred" models is clearly articulated in recent press releases from ACCE, DLTV, and EdTechSA, as previously cited.

The Council acknowledges concerns about the perception of "*overcrowding*" but advocates the promotion of new pedagogies rather than a return to inappropriate "*…19th and 20th Century curriculum priorities*" (para 4) as the answer.

New pedagogies provide teachers with ways of managing the learning environment so as to minimise perceived overcrowding and take advantage of integrated and amalgamated models of curriculum delivery without compromising quality.

The promotion of new pedagogies requires a structured, coordinated, and well-resourced approach to teacher professional learning as a way of developing new pedagogies and building the capacity of our teachers to do their work well.

An element of this "capacity building" also relates to Digital Technologies, especially from F–6, where responsibility to teach the subject lies with the generalist primary teacher.

This is not to imply that there is little or no capacity existing in the teacher workforce. On the contrary, ACCE recognises that there are many teachers who are quite capable of utilising new pedagogies and delivering Digital Technologies, and taking on coordination and leadership roles in these areas.

The Council regrettably admits that there are just not enough of them. In essence, the Council agrees with Callil's recommendations (#6, 7) that:

> 6.   *If Digital Technologies is to be studied from Foundation to Year 8, the importance of Professional Learning for teachers of Digital Technologies cannot be overestimated. Professional Learning in both Digital Technologies and the ICT capability needs to be ongoing, sequential, systematic and regular.*

> 7.   *To ensure academic rigour and to better prepare and enhance teacher competencies and expertise for secondary teachers of Digital Technologies, additional training in the understanding of the pedagogy of contemporary learning is undertaken.*

 (Australian Government, 2014b, p 285)

Despite this, ACCE recognises the professionalism of our primary teachers and their willingness to participate in professional learning. What they require is access to wide-ranging, and realistic opportunities to undertake effective, high quality professional development.

This raises two questions: (a) What does "building capacity" actually mean and, (b) What does effective, high quality professional development look like?

(a) Building Capacity

Koehler and Mishra's (2008) TPACK model provides a useful framework for thinking about "building capacity".

TPACK represents teachers' knowledge and understanding as knowledge and understanding about what they teach (Content), how they teach it (Pedagogical), and how they use the technology to teach it (Technological) (Koehler & Mishra, 2008).

For the Digital Technologies subject, there is a case to be made that the capacity of teachers, primary teachers in particular, needs building because they lack the specific content knowledge to teach the subject nor would they be likely to have pedagogical models to follow based on their own schooling experience.

For example, there would be a number of primary teachers who are unfamiliar with the concept of computational thinking or how to describe components of a digital system or how particular software is used to represent and analyse data.

Others may lack knowledge about particular pedagogical strategies to teach this content. Yet others may be unfamiliar with particular technologies that support the teaching of this content and, of course, there will be many who need all three aspects of TPACK strengthened.

This indicates that individual needs will differ and that quality professional development will not necessarily look the same for everyone.

Consequently some may benefit from participation in a MOOC such as that provided by the University of Adelaide's School of Computer Science—*Digital Technologies: Implementing the Australian Curriculum learning Area.* [5]

The course is designed to *…explain the fundamentals of digital technology and computational thinking specifically addressing learning objectives of the Australian Digital Technologies curriculum (Foundation-6).* (para 1)

This would appear to be ideal for teachers seeking to improve their content knowledge.

Yet others may find participation in Professional Learning Networks facilitated by subject associations and other agencies to be beneficial especially in developing pedagogical and technological knowledge relating to Digital Technologies.

"Building capacity" is about providing realistic opportunity in timely ways. Opportunity for teachers, school and systems to identify their needs; opportunity for the development of high quality and varied professional learning programs to be provided, and opportunity (and incentive) for individuals to participate.

(b) What does effective, high quality professional development look like?

There are numerous taxonomies that describe the principles that underpin worthwhile professional learning[6] These principles help us to identify quality and effectiveness but often in generic terms rather than terms specific to a particular discipline.

For example, AITSL's *Australian Charter for Professional Development* (AITSL, 2012a) and its *Australian Teacher Performance and Development Framework* (AITSL, 2012b) provide key generic indicators of high quality – *relevant, collaborative, future focused*.

Significantly the Charter also outlined the importance of establishing a professional learning culture and a culture of performance and development within the profession.

Lloyd and Cochrane's (2006) work examined many of these principles as they relate to the field of ICT and concludes, as others do, "*…effective, professional development fosters fundamental changes in deeply held beliefs, knowledge, and habits of practice*" (p. 18).

They identified four elements: *context*, *personal growth*, *community* and *time* as essential elements that underpin high quality professional development for ICT in education. This was explained through the claim that "*professional development has to immerse an individual in his or her community, directly address the context of teaching and learning, add to personal growth, and be both 'over' time and 'in' time*" (p 20).

To be successful, the introduction of Digital Technologies urgently requires a concerted and coordinated effort to "build capacity" through the provision of high quality, timely, contextualised, and varied, professional learning opportunities for teachers, especially primary teachers.

The Council urges government and its agencies, and Higher Education Providers to come together with subject associations and other stakeholders, such as the ACS (Australian Computer Society) to identify gaps and opportunities currently available (or not) for teachers to build capacity.

This process should also include the provision of incentives for the development and delivery of high quality programs and, incentives for participation.

The Council supports AITSL taking a lead role in this activity using the *Australian Charter for Professional Development* and the *Performance and Development Framework* to underpin the task.

(5) Resourcing new pedagogies and Digital Technologies

There is a desperate need to provide teachers with a wide range of quality learning and teaching resources to assist with the learning of new pedagogies and the delivery of Digital Technologies.

It has been previously mentioned that Digital Technologies is a relatively new subject and that it does not have the extensive pedagogic culture of some other subjects. It also lacks the resource base of other subjects.

Resourcing new pedagogies and Digital Technologies presents as an urgent and challenging issue for a number of reasons but particularly because many authorities are intending to begin teaching Digital Technologies in 2015 (see Table 1).

As mentioned, the Council is currently supporting several state associations to develop quality resources and high quality professional learning opportunities in support of Digital Technologies and new pedagogies.

For example DLTV is supporting schools to get Digital Technologies curriculum *ready* with an extensive range of resources and professional learning activities. Over the next few months they will present a series of professional learning opportunities aimed at helping initial teacher education students, eLearning leaders, and school leadership teams prepare for the introduction of Digital Technologies ("DigiTech" in Victoria).

Are you ready to teach in the 21st Century Classroom? is a preservice teacher conference aimed at building confidence incorporating digital technologies into teaching, how to teach appropriate classroom cybersafety strategies, and how to use internet connected devices to empower teaching and learning.

Leading Technologies in Primary & Secondary Schools is aimed at helping eLearning leaders provide pedagogical Leadership for the new DigiTech Curriculum, knowledge and understanding of technical and infrastructure planning, and strategies to take a leading role in the design of professional learning for staff.

DLTV Talks Leadership helps school leadership teams understand the requirements of the DigiTech curriculum, assess whether the school is ready, and explore ways in which the curriculum might be implemented.

DLTV has also used funding provided by ACCE to produce infographics and short videos to provide examples, explanations and definitions of two key terms in the digital technologies curriculum: decomposition and algorithms with a promise of more resources to come.

EdTechSA have just hosted the biennial Australian Computers in Education Conference and the ACCE Leadership Forum,

Both of these initiatives focused on the introduction of the Digital Technologies curriculum and featured, robust debate, practical workshops, and networking. This will be followed up a State Conference [7] in 2015 focusing on designing digital technologies curriculum and refining classroom practices.

They have also sponsored, along with ACCE, 25 South Australian teachers to become Australian Digital Technologies Leaders with the aim of producing resources to support teachers in their teaching of Digital Technologies [8].

QSITE has a similar program in place referred to as "Digital Champions", aimed at developing teacher understanding of the concepts, processes and ways of thinking that are central to the Digital Technologies subject.

Practising teachers (Digital Champions) from across QSITE's five Chapters and two networks were recruited to create resources designed to build teacher capacity in the Digital Technologies subject.

The resources are now available at the QSITE Moodle [9]. At this shared space Digital Technology resources for F–2, Years 3/4, Years 5/6, Years 7/8 and Years 9/10 have been collated[10].

The site is a collaboration between QSITE and ACCE, to provide resources to support the implementation of Digital Technologies in Queensland in 2015.

The resources, developed by the Digital Champions, are suitable for use in teacher professional development and adaptable for classroom use.

Other ACCE association members are rolling out similar resource development and professional learning opportunities across the country. For InTEACT (Information Technology Educators ACT) it was the Byte-Sized Digital Technologies [11] project, which also received Google CS4HS funding.

Assisted by ACARA funding, TASITE commissioned and produced a video, which illustrates the nature and purpose of Digital Technologies from the point of view of a teacher. Final audio edits are being undertaken at present.

We also began an online resource for supporting teachers who may not familiar with the Digital Technologies curriculum and who need a starting point. This is available at digitaltechnology.edublogs.org. At a State level, DoE Tas has not mandated reporting against the Digital Technologies curriculum for 2015 but schools have been encouraged and supported in trialling aspects of the Technologies curriculum (including Digital). The Catholic Education sector focussed on Year 6. Some traction has been lost due to the uncertainty generated by the AC Review process.

InTEACT have been developing the ACT Byte Sized Technologies project. The resulting resources will continue to be added to as new ones are developed following on-going interest sparked by the project. These are available at: sites.google.com/a/inteact.act.edu.au/inteact/resources. We are building a resources library to support implementation of the project ideas in schools.

Clearly there is a considerable amount being done by the Council and its associate state/territory members, especially where implementation is imminent, to help students, teachers, and school prepare for the introduction of Digital Technologies. However it is also clear that there is a need to do more in a concerted and coordinated way.

The Council urges government, through ACARA and ESA, to further fund, fast track, and coordinate the development of quality teaching resources and high quality professional learning opportunities for Digital Technologies. ACCE is well positioned, and willing, to make a significant contribution to the effort.

Concluding Remarks

As stated, the Council fully supports the inclusion of the Technologies Learning Area and ICT as a general capability in the Australian Curriculum for all students from Foundation to Year 10 (F−10) and is particularly supportive of the introduction of Digital Technologies as a compulsory subject for all students (F−8).

There is concern, however, that the successful introduction of Digital Technologies, in particular, will be compromised unless a number of major issues, as described above, are carefully, and urgently, considered.

These issues include delivery, clarity of purpose, resolution of scope and sequence, government commitment, consideration of teacher education curriculum, resourcing, and, most importantly, capacity building through the provision of high quality, timely, contextualised, and varied professional learning opportunities for teachers, especially primary teachers.

Council recognises that these are intricate tasks that must be undertaken in a complex educational landscape that comprises state/territory authorities, and, independent and catholic schools systems.

However they are pressing and require urgent resolution and strong leadership. ACCE is in a strong position to provide that leadership and urges governments, their agencies, and Higher Education Providers to come together with the ACCE, its associate members and other stakeholders to ensure that the introduction of Digital Technologies across the nation is successful. Our future as a nation depends on it.

References

ACCE (Australian Council for Computers in Education). (2011). *ACCE Position Paper on ICT in the Australian Curriculum* Retrieved from acce.edu.au/sites/acce.edu.au/files/ACCE_Position_final.pdf

ACCE (Australian Council for Computers in Education). (2014). *ACCE Reply to Review of the Australian Curriculum* (Press Release): Peak education body concerned with Curriculum Review. Retrieved from acce.edu.au/acce-reply-review-australian-curriculum-press-release

AITSL (Australian Institute for Teaching and School Leadership) (2011) Accreditation of Initial Teacher Education Programs in Australia: Standards and Procedures Retrieved from www.aitsl.edu.au/docs/default-source/initial-teacher-education-resources/accreditation_of_initial_teacher_education_file.pdf

AITSL (Australian Institute for Teaching and School Leadership) (2012a) Australian Charter for the Professional Learning of Teachers and School Leaders Retrieved from www.aitsl.edu.au/docs/default-source/professional-growth-resources/professional-learning-charter-resources/australian_charter_for_the_professional_learning_of_teachers_and_school_leaders.pdf

AITSL (Australian Institute for Teaching and School Leadership) (2012b) Australian Teacher Performance and development Framework Retrieved from www.aitsl.edu.au/docs/default-source/professional-growth-resources/performance-and-development-resources/australian_teacher_performance_and_development_framework_august_2012.pdf

Australian Government. (2014a). *Review of the Australian Curriculum: Final report*. Retrieved from docs.education.gov.au/system/files/doc/other/review_of_the_national_curriculum_final_report.pdf

Australian Government. (2014b). *Review of the Australian Curriculum: Supplementary Material*. Retrieved from docs.education.gov.au/system/files/doc/other/review_of_the_national_curriculum_supplementary_material_0.pdf

Johnson, L., Adams Becker, S., Cummins, M., and Estrada, V. (2014). 2014 NMC Technology Outlook for Australian Tertiary Education: A Horizon Project Regional Report. Austin, Texas: The New Media Consortium. Retrieved from

http://cdn.nmc.org/media/2014-technology-outlook-australian-tertiary-education-EN.pdf

Koehler, J., & Mishra, P. (2008). What is technological pedagogical content knowledge (TPCK)? In AACTE Committee on Innovation and Technology (Ed.), *The Handbook of Technological Pedagogical Content Knowledge.* New York, NY: Routledge.

Lloyd. M. (2014). Review of the Australian Curriculum: Impacts on ICT as a General Capability and Digital Technologies in QUICK , Journal of the Queensland Society for Information Technology in Education.

Lloyd, M., & Cochrane, J. (2006). Celtic knots: Interweaving the elements of effective teacher professional development in ICT. *Australian Educational Computing, 21*(2), 16-19.

Romeo, G.I., Lloyd, M. and Downes, T. (2012) *Teaching Teachers for the Future (TTF): Building the ICT in education capacity of the next generation of teachers in Australia* Australasian *Journal of Educational Technology 2012, 28*(6), 949-964.

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[1] See acce.edu.au/acce-reply-review-australian-curriculum-press-release

[2] See www.dltv.vic.edu.au/response-curriculum-review

[3] See edtechsa.sa.edu.au/2014/10/review-of-australian-curriculum-edtechsa-acce

[4] Seewww.australiancurriculum.edu.au/Curriculum/Overview

[5] See csdigitaltech.appspot.com/preview

[6] See for example:

www.education.vic.gov.au/Documents/school/teachers/profdev/proflearningeffectivesch.pdf

research.acer.edu.au/cgi/viewcontent.cgi?article=1002&context=professional_dev

[7] edtechsa.sa.edu.au/2014/10/7309/

[8] edtechsa.sa.edu.au/2014/03/australian-digital-technologies-leaders/

[9] moodle.qsite.edu.au/moodle/index.php

[10] moodle.qsite.edu.au/moodle/course/view.php?id=5

[11] www.inteact.act.edu.au/cs4hs/byte-sized-digital-technologies