collaboration in teaching & learning
strategic ICT advisory service
Acknowledgements

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Foreword

This report about Collaboration in Teaching and Learning (CTL) focuses on the information and communications technologies (ICT) that enable collaborative learning to happen online and includes school education, vocational education and training and higher education. Collaborative learning is one of the areas of investigation commissioned by the Australian Government's Department of Education, Employment and Workplace Relations (DEEWR) as part of the Strategic ICT Advisory Service (SICTAS) project.

The report briefly describes the theories that underpin collaborative learning, the skills that are necessary for its success, the implications of collaborative learning on teaching practice, on students, and the spaces in which learning occurs.

ICT and collaborative learning provides opportunities to reduce the educational disadvantage experienced by Australians in remote and rural communities, and provide learning experiences that cater to diverse student groups, as well as providing students with the literacy skills needed to function effectively in the digital world.

The report recognises the challenges in enabling collaborative learning including providing professional learning for teachers, knowledge, information and identity management, and managing continual change in tools and technologies.

This paper provides information from major international reports, opinion from teachers and administrators at the chalkface about which technologies are likely to have the most impact on collaborative learning, and examples of collaborative tools and technologies currently used by teachers.

Finally it provides a set of recommendations that could provide a new evidence base and nationally shared infrastructure to support collaborative learning and teaching.

I commend this report and its findings to the reader.

Greg Black

CEO Education.au
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<td>Managed Environment for Research Repository Infrastructure</td>
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<td>Massively Multiplayer Online Games</td>
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<td>MMORG</td>
<td>Massively Multiplayer Online Roleplaying Games</td>
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<td>Personal Digital Assistant</td>
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<td>VLE</td>
<td>Virtual Learning Environment</td>
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<td>Voice over Internet Protocol</td>
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Terminology and references

**Terminology**

The term 'teacher' has been used throughout and incorporates people from any education sector who have a teaching function (ie teacher, trainer, lecturer, instructor).

The term 'classroom' has been used throughout and incorporates any space where learning and teaching takes place (ie lecture hall/theatre, classroom, learning space, computer lab, laboratory, training room, tutorial room, studio, online classroom, virtual classroom), unless otherwise specified.

The term 'student' has been used throughout and incorporates a learner at any stage of their learning journey in any sector and includes learners in informal learning environments as well as those in formal education.

**Spelling**

Australian English spelling has been used.

**References**

Most, but not all, references identified for this project, can be accessed through the delicious social bookmarking service at:

http://delicious.com/girtbysea13/collab_methods
1 Executive Summary

The illiterate of the 21st century will not be those who cannot read and write, but those who cannot learn, unlearn, and relearn

Alvin Toffler, Rethinking the Future

This investigation focuses on collaborative learning as it relates to information and communication technologies (ICT).

The investigation found that effective collaborative learning using ICT is dependent on services and skills that are not specific to collaborative learning, but are essential for the provision of ICT in education more generally.

These were:

- Technical and services architectures to ensure reliable, fast, ubiquitous access
- Professional learning opportunities for in-service teachers and ICT training for teacher educators and pre-service teachers
- Strong inter-jurisdictional interaction and cooperation to ensure the maximum benefit from investments in ICT

The first two of these are included in this report in brief and will be addressed in detail in the Software Infrastructure Report and the Workforce Capability Report to be published through the Strategic ICT Advisory Service in 2009.

The final point is addressed in this report.

Collaborative learning using ICT in Australian education

Collaborative learning is a broad term for educational approaches involving joint intellectual effort by students, or students and teachers together. Considerable evidence has been found for its educational benefits, and the success factors required to support it have been identified.

Collaborative learning approaches are based on a number of different learning theories including social constructivism, cooperative learning, communities of practice, connectivism, and situated learning, amongst others. Many of these focus on the provision of real world and authentic experiences and examples, working with others, and sustained interaction amongst members of a learning community, as necessary for effective learning.

Schools and teachers using collaborative learning tools such as social software have found benefits for students including:

- They encourage student engagement and increase participation – particularly among quieter pupils, who can use it to work collaboratively online, without the anxiety of having to raise questions in front of peers in class – or by enabling expression through less traditional media such as video.
- Teachers have reported that the use of social networking technology can encourage online discussion amongst students outside school.
- Tools can be available anytime, anywhere, which encourages some individuals to extend their learning through further investigation into topics that interest them.
• Students feel a sense of ownership and engagement when they publish their work online and this can encourage attention to detail and an overall improved quality of work. Some teachers reported using publication of work to encourage peer assessment.²

Many technology tools are used to support collaborative learning in all sectors of education. These include tools such as wikis, microblogs, social networking services, virtual worlds, and online games. Appendix 2 provides an overview of the technologies and tools making an impact in education, and provides some examples. Skills developed from participating in collaborative learning through formal education and informal learning have direct relevance to the 21st century workplace where collaborative tools are used for professional purposes.

Large numbers of students use collaborative learning type tools for social purposes, although the frequency of use, and their experience with particular tools and technologies varies considerably.

Students vary in their ability to assess the relevance and importance of information they access through ICT.

Access by staff and students to collaborative learning tools and the enabling infrastructures, such as broadband, varies between jurisdictions and sectors, and between learning organisations.

Professional learning opportunities, focused on collaborative learning using ICT, are limited. Teacher expertise, confidence, and take-up varies considerably.

Teacher education in universities does not consistently integrate collaborative teaching approaches, tools, technologies, pedagogies and assessment methods into the teacher education curriculum. Opportunities for pre-service teachers to develop expertise using ICT tools for collaborative learning is limited, and in many cases the ICT components of teacher education degrees are elective rather than compulsory.

Teachers argue that it takes more time and effort to use collaborative learning approaches and that use of information and communication technology (ICT) requires confidence both in the reliability and quality of the ICT, in their ability to use the ICT, and in their skills in facilitating students’ engagement. That is, effective collaborative learning takes time and effort to implement.

Significant activity is being undertaken in Australia to take advantage of the possibilities of ICT for teaching and learning. A subset of this activity is the use of ICT to support collaborative learning.

These activities include projects under the Australian Flexible Learning Framework³ (Framework), grants provided through the Australian Teaching and Learning Council (ALTC) under their Competitive Grants Program⁴, state education department initiatives such as Connected Classrooms⁵ (NSW), Next Generation (VIC)⁶, and Smart Classrooms⁷ (QLD) and projects that were funded by the Department of Education, Employment and Workplace Relations (DEEWR) through the managed Environment for Research Repository Infrastructure (MERRI)⁸ and the Federated Repositories of Online Digital Objects (FRODO)⁹ focused on the higher education sector.

Through the Digital Education Revolution (DER) important access and infrastructure issues are being addressed. The supply of broadband to schools is being specifically targeted to those that need it most, with an aim of achieving, or being able to scale up to, 100Mps. Professional learning opportunities for school teachers, focused on ICT skills and knowledge, are being enhanced with the provision of funds through the Australian Government Quality Teaching Program.

Other Federal government departments, such as the Department of Broadband, Communication and the Digital Economy (DBCDE) through the Clever Networks initiative¹⁰, are delivering programs that will positively impact on the delivery of collaborative learning opportunities.

Initiatives from the Catholic and Independent schools sectors, and work undertaken through research groups in universities, Technical and Further Education centres (TAFEs) funded by institutional
grants, are also part of a complex and fragmented landscape of collaborative learning initiatives using ICT.

Overall the Australian education sector has an exciting range of projects and initiatives, but the activity is fragmented and uncoordinated.

The Australian ICT in Education Committee (AICTEC) has the role of setting strategic directions for ICT in education across all sectors. There is a role for a national body to be tasked with the practical implementation of AICTEC’s strategic direction. This body would work collaboratively through national partnerships with sectors and jurisdictions on projects of national benefit, bringing together the various initiatives underway. This collaboration would enhance the benefits of investments in ICT in education, enable the development of national consistency in skills and standards related to ICT and collaborative learning, provide and thus support students’ ability to live and work effectively in a digital world.

Further, while the DER will have an impact on the school education sector, it must be expanded to include vocational education and training (VET) and the university sector to ensure students have a seamless experience of ICT in education as they move from one sector to another.

This will ensure that all Australians in formal education have access to 21st century skills, tools and technologies to support their learning.

VET has the Framework which could be extended to deliver a VET-focused DER initiative. What a VET-focused DER might look like would be developed collaboratively in consultation with the sector and industry ensuring that the focus is on providing projects, initiatives and services that provide students with pathways to work, and employers with employees with appropriate skills and knowledge. It may involve a transformation of the VET teacher workforce with greater emphasis of workplace-based collaborative learning provided online, and ICT-supported skills development and reinforcement.

While a conceptual infrastructure for ICT in education exists in VET through the Framework, the university sector has no sector-wide commitment to the provision of world class ICT and collaborative learning opportunities. While there are many exciting initiatives and investments being made, a coordinated sector-wide approach would provide students with consistency of service provision and quality across and between universities. It would also ensure that when students transition from school into the university sector their ICT and collaborative learning skills are enhanced, extended and leveraged to achieve better learning outcomes, higher completion rates and a higher level of student satisfaction with their university experience.

It would also provide an incentive for university teachers to upgrade their skills and ensure that they too develop and enhance their new media literacy skills.

This could be achieved through rewards, awards and grants that focus on the innovative use of ICT for teaching and learning. This is currently one component of the university-focused Australian Learning and Technology Council (ALTC) grants program which would benefit from a higher profile and an agreed focus on priority areas of ICT innovation that should be targeted for funding.

Professional learning for teacher educators in ICT for collaborative learning - those that are educating our pre-service teachers in universities – must be supported, and benchmarking and/or accreditation of skills and knowledge must be implemented across the university sector.

Teaching and learning centres must be tasked with providing professional learning for university teachers specifically around collaborative learning and ICT and this learning must be provided in a way that is proven to be effective in embedding ICT skills into pedagogical practice.

The focus on collaborative learning and ICT in the VET and university sectors through the extension of the concept of a digital education revolution would ensure that students will have 21st century
technology for learning embedded throughout their learning journey modelled by teachers with high level ICT skills in institutions that value and support ICT for learning.

Deliver post compulsory schooling opportunities to remote and regional areas

While two broadband initiatives are underway to support the delivery of ICT in education, one through DEEWR’s DER Fibre Connections to Schools project, and the other through the DBCDE’s Clever Networks project, both of these are focused on enhancing the provision of school education, and in the case of Clever Networks broader service provision in areas such as health and government services.

This investigation has identified that the lack of post-secondary educational opportunities in remote and regional areas is a major equity issue. That is, the level of a person’s post compulsory schooling educational attainment is directly related to their degree of remoteness from major population centres.

The new broadband services provide AICTEC with an opportunity to work with jurisdictions and sectors to develop a method and system to provide VET and university courses online to remote and regional students11. Course provision could be initially targeted towards areas of skills needed by industry and business in remote and regional areas.

The use of ICT and collaborative learning approaches would be implemented to support student retention, course completion and student engagement and satisfaction with their experience of further education.

As many indigenous people live in remote and regional areas this kind of program could have a significant impact on their levels of educational attainment over time, especially if parts of the program were designed to meet their specific educational and ICT needs. If the types of courses made available fed directly into the employment needs of the remote or regional area, then this type of program may assist in achieving the broader Australian Government policy of closing the gap between indigenous and non-indigenous Australians, particularly:

- to halve the gap in literacy and numeracy achievement between Aboriginal and Torres Strait Islander students and other students within a decade;
- to halve the gap in employment outcomes for Aboriginal and Torres Strait Islander people within a decade12.

Alternatively, it would provide remote and regional Australians with qualifications which enable them to move to areas of high demand for their skills, and generally make them desirable employees in a society where it is expected that from 2010 the supply of people with undergraduate qualifications will not keep up with demand.13

The investment in the schools-focused DER and the two broadband initiatives could provide an infrastructure that could be utilised to effect the delivery of these post-secondary educational opportunities.

A national partnership

To eliminate the fragmentation of effort around ICT and collaborative learning, the tasking of a body to implement AICTEC’s strategic directions and work through national partnerships with jurisdictions and sectors would enhance the impact of the investment in collaborative learning using ICT. This body would establish an initial 5-year program and target areas of greatest priority for implementation in its first two years commencing in mid-2009, ensuring that it is working in partnership with existing initiatives and not duplicating current efforts.
From this investigation the priority areas identified would be:

- the provision of professional learning opportunities related to ICT, including teacher education, as this will increase the efficacy of all spending on ICT in education including that expended through the existing schools-focused DER initiative. Further information about what this kind of program might incorporate will be included in SICTAS Workforce Capability Report.

- the delivery of post-secondary education opportunities via ICTs, using collaborative learning approaches, to remote and regional Australia to address serious issues of equity and social inclusion.

- the development of processes and relationships to support the mainstreaming of proven approaches and tools which will ensure we leverage investments made in ICT for education nationally and across all sectors.

New media literacy skills in the National Curriculum: positioning Australia for the future

As evidenced in the body of this report, the idea that people born after 1990 being digital natives while the rest of the population are digital immigrants is not one that is supported by evidence. Research tells us that there is significant variation in competency and usage of ICT amongst young people, and that their information literacy skills are wanting. Further, some young people are entirely outside the education system and will not have access to any ICT or to collaborative learning opportunities. Others attend schools that have philosophies that discourage access to ICT and other electronic media until year 9.

Therefore, assumptions cannot be made about students’ competencies with ICT in general, or with particular tools. Information literacy skills, digital literacy skills, visual literacy skills, and collaborative learning skills are skills that are needed to enable people to effectively contribute to and participate in the digital economy. Evidence suggests that these need to be explicitly taught and modelled.

The development of the national curriculum by the NCB provides an ideal opportunity to explicitly include and embed these new media literacy skills14.

This would provide a consistency of student experience across the jurisdictions.

Recommendations

This report makes four recommendations that complement existing initiatives and priorities of the Australian Government.

These four recommendations are to:

- provide access to post-secondary education options for remote and regional users leveraging the investments being made through existing broadband initiatives

- extend the digital education revolution to the VET and University sectors

- task a national body to work through national partnerships to reduce fragmentation of effort, and make best use of the investments made in ICT in education at a broad level, and collaborative learning in particular

- embed new media literacy skills into Australia’s national curriculum in a consistent way independent of specific technologies.
2 Recommendations

This investigation focuses on collaborative learning as it relates to information and communication technologies (ICT).

The investigation found that effective collaborative learning using ICT is dependent on services and skills that are not specific to collaborative learning, but are essential for the provision of ICT in education more generally.

These were:

- Technical and services architectures to ensure reliable, fast, ubiquitous access
- Professional learning opportunities for in-service teachers and ICT training for teacher educators and pre-service teachers
- Strong inter-jurisdictional interaction and cooperation to ensure the maximum benefit from investments in ICT

The first two of these are included in this report in brief and will be addressed in detail in the Software Infrastructure Report and the Workforce Capability Report to be published through the Strategic ICT Advisory Service in 2009.

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Recommendations

1. Provide access to post-secondary education options for remote and regional users leveraging the investments being made through the schools-focused DER and existing broadband initiatives
2. Extend the digital education revolution concept to the VET and University sectors
3. Task a national body to work through national partnerships to reduce fragmentation of effort, and making best use of the investments made in ICT in education at a broad level, and collaborative learning in particular
4. Embed new media literacy skills into Australia’s national curriculum in a consistent way independent of specific technologies.

2.1 Discussion

Recommendation 1: Provide access to post-secondary education options for remote and regional users leveraging the investments being made through the schools-focused DER and existing broadband initiatives

While two separate broadband initiatives are underway, one through DEEWR’s DER and the other through the DBCDE, this investigation has identified that delivery of education to remote and regional areas is a major equity issue. That is, the level of their educational attainment is directly related to a person’s degree of remoteness from major population centres.

- Education.au recommends a specifically targeted ICT in Education Delivery to Remote Areas program to immediately address the disparity of access to post-secondary education. Work with industry and business to identify skills and courses most relevant to employment opportunities in the targeted remote and regional areas.
o Work with the school education sector to utilise infrastructure provided through DER and broadband initiatives for the delivery of post-secondary education opportunities.

o Work with the VET and university sectors to develop and/or provide a suite of post-secondary education options relevant to remote and regional Australians.

o Develop an inter-jurisdictional approach to the provision of the program.

o Fund the provision of online teacher facilitators and fly-in/fly-out teaching staff to support student engagement, retention and completion.

o Provide collaborative learning opportunities for remote and regional students and provide training and support to develop new media literacy skills both in the students and the teachers in the program.

o Specifically develop post-secondary education options in a way relevant to indigenous students in remote and regional areas.

**Recommendation 2: Extend the digital education revolution concept to the VET and University sectors**

While the DER will have an impact on the school education sector, it must be expanded to include vocational education and training (VET) and the university sector to ensure students have a seamless experience of ICT in education as they move from one sector to another.

This will ensure that all Australians in formal education have access to 21st century skills, tools and technologies to support their learning.

VET has the Framework which could be extended to deliver a VET-focused DER initiative. What a VET-focused DER might look like would be developed collaboratively in consultation with the sector and industry ensuring that the focus is on providing projects, initiatives and services that provide students with pathways to work, and employers with employees with appropriate skills and knowledge. It may involve a transformation of the VET teacher workforce with greater emphasis of workplace-based collaborative learning provided online, and ICT-supported skills development and reinforcement.

While a conceptual infrastructure for ICT in education exists in VET through the Framework, the university sector has no sector-wide commitment to the provision of world class ICT and collaborative learning opportunities. While there are many exciting initiatives and investments being made, a coordinated sector-wide approach would provide students with consistency of service provision and quality across and between universities. It would also ensure that when students transition from school into the university sector their ICT and collaborative learning skills are enhanced, extended and leveraged to achieve better learning outcomes, higher completion rates and a higher level of student satisfaction with their university experience.

It would also provide an incentive for university teachers to upgrade their skills and ensure that they too develop and enhance their new media literacy skills.

This could be achieved through rewards, awards and grants that focus on the innovative use of ICT for teaching and learning. This is currently one component of the university-focused ALTC grants program which would benefit from a higher profile and an agreed focus on priority areas of ICT innovation that should be targeted for funding.

Professional learning for teacher educators in ICT for collaborative learning - those that are educating our pre-service teachers in universities – must be supported, and benchmarking and/or accreditation of skills and knowledge must be implemented across the university sector.
Teaching and learning centres must be tasked with providing professional learning for university teachers specifically around collaborative learning and ICT and this learning must be provided in a way that is proven to be effective in embedding ICT skills into pedagogical practice.

The focus on collaborative learning and ICT in the VET and university sectors through the extension of the concept of a digital education revolution would ensure that students will have 21st century technology for learning embedded throughout their learning journey modelled by teachers with high level ICT skills in institutions that value and support ICT for learning.

- Extend the VET Australian Flexible Learning Framework to implement a VET-DER concept to be developed collaboratively with business, industry and the VET sector.
- Work with the university sector through AICTEC to develop a university-focused DER concept and program to be administered through the AICTEC implementation body.
- Determine priority areas for grant funding in ICT for collaborative learning projects.
- Extend the Australian Research Council’s research priorities to include ICT in education.

**Recommendation 3: Task a national body to work through national partnerships to reduce fragmentation of effort, and making best use of the investments made in ICT in education at a broad level, and collaborative learning in particular**

To eliminate the fragmentation of effort around ICT and collaborative learning, we recommend the tasking of a body to implement the strategic directions for ICT in education developed through AICTEC and the Council of Australian Governments (COAG).

It would work through developing national partnerships and collaborations with jurisdictions and sectors

This body should establish an initial 5-year program and target areas of greatest priority for implementation in the first two years, commencing mid-2009.

From this investigation the priority areas identified are:

- the provision of professional learning opportunities related to ICT and collaborative learning skills, including in teacher education, as this will increase the efficacy of all spending on ICTs including that expended through the schools-focused DER initiative.
- the delivery of post-secondary educational opportunities via ICTs and collaborative learning approaches to remote and regional Australia to address serious issues of equity and social inclusion
- the development of processes and relationships to support the mainstreaming of proven approaches and tools to leverage investments made in ICT for education nationally and across all sectors.

This will be achieved through stakeholder engagement in formulating the processes, strategies and programs for the initiative, not just in the initial start up phase, but through the terms of the body’s lifecycle.

The focus will be on inter-jurisdictional collaborative arrangements and national partnerships with the jurisdictions and sectors.

The initiative will have both an implementation role for AICTEC and COAG strategic directions, and a coordinating role for existing initiatives, and an initiating role for new projects and programs.

It will coordinate existing activities and evaluate how these can be mainstreamed, as appropriate, for all education in Australia.
It will initiate new activities that can take education and training’s use of ICT to new levels of effectiveness for Australia’s learners including trialling, providing proof of concepts, and in providing funds to investigate the most effective use of ICT for learning.

It will apply to all sectors of education from early childhood through to adult education.

It will ensure that rural and remote communities have the opportunity to take advantage of ICT for learning.

It will provide benchmarking for technology use and effectiveness in learning to ensure real outcomes are achieved as the result of the initiative.

It will address related infrastructure issues such as standards, intellectual property, interoperability, collaboration and sharing as enablers that support effective use of ICT for learning.

For example, it could be tasked:

- to collaboratively develop a national framework for ICT in education initiatives to reduce duplication of effort and agree on priority areas
- to develop and disseminate evidence of ‘what works’ in the use of emerging technologies and ICT and their impact on learning
- support AICTEC and COAG to develop strategic directions that the jurisdictions will use to establish their ICT policy and then work with stakeholders to support implementation
- to consult with students and teachers on the challenges and possibilities of ICTs for learning
- to develop, support and disseminate models of pedagogy and assessment appropriate to ICTs and collaborative learning
- to support, facilitate and provide access for those in remote and regional areas
- to support, facilitate and implement accessibility standards for ICT
- to develop and/or compile a pool of open source products and plug-ins for use by the education sector
- to support the open agenda in relation to standards, content, and architectures
- to engage with the standards agenda nationally and internationally, particular in relation to those standards that impact on the education sector
- to work with stakeholders to identify strategies for managing intellectual property issues and costs of implementation of those strategies
- to commission and undertake research to guide decision making and develop strategic road maps for ICT in education so that pedagogy leads technology
- to develop partnerships with organisations to undertake trials and projects with the aim of mainstreaming those with positive impacts on learning
- to develop partnerships internationally to support knowledge exchange
- to engage with other groups with intersecting interests such as the arts, archiving, communications and library communities.

**Recommendation 4: embed new media literacy skills into Australia’s national curriculum in a consistent way independent of specific technologies.**

As evidenced in this report, the concept of the ‘digital native’ is not one that is supported by evidence. There is a strong need for the explicit teaching of new media literacy skills as part of the everyday school curriculum. The development of the new national curriculum by the NCB is an ideal opportunity to do this.17
This would provide a consistency of student experience across the jurisdictions and would develop a student cohort comfortable with collaborative tools and skilled in collaborative learning approaches.

Specifically the recommendations are:

- That the NCB considers an ICT Continuum framework with the following suggested structure:
  - digital literacy
  - information literacy
  - new media literacy.

- That the NCB agree the definitions of digital literacy, information literacy and new media literacy.

- That the stages of learning for the ICT Continuum be aligned with the stages of learning at the national level and build upon the work of state/territories.

- That the NCB keep a watching brief and develop partnerships with organisations that can inform its work, particularly in regards to emerging technologies and their impact in school curriculum.

- That the NCB ensure that the ICT Continuum is described in language that is contemporary, relatively technology independent, and that allows flexible choice for teachers and schools.

- That a national committee of experts experienced in curriculum design, learning technology, industry, and practitioners (principals and teachers) oversee and implement the ICT Continuum.
3 About collaboration in teaching and learning

3.1 Overview of SICTAS Collaboration in Teaching and Learning investigation

The rapid growth and uptake of information and communication technologies (ICT) has created opportunities for e-learning – that is, learning facilitated by electronic technologies.

The Collaboration in Teaching and Learning (CTL) investigation for the Strategic ICT Advisory Service (SICTAS) is a collation of cross-sectoral information from multiple sources particularly focused on the use of ICT for collaboration in teaching and learning, focused on the Australian environment and including some relevant international examples and research.

This investigation focuses on collaborative learning as it relates to information and communication technologies (ICT).

The investigation found that effective collaborative learning using ICT is dependent on services and skills that are not specific to collaborative learning, but are essential for the provision of ICT in education more generally.

These were:

- technical and services architectures to ensure reliable, fast, ubiquitous access
- professional learning opportunities for in-service teachers and ICT training for teacher educators and pre-service teachers
- strong inter-jurisdictional interaction and cooperation to ensure the maximum benefit from investments in ICT.

The first two of these are included in this report in brief and will be addressed in detail in the Software Infrastructure Report and the Workforce Capability Report to be published through the Strategic ICT Advisory Service in 2009.

The final point is addressed in this report.

Definitions

Collaborate

To collaborate: to work jointly with others or together especially in an intellectual endeavour.

Collaborative learning

“Collaborative learning” is an umbrella term for a variety of educational approaches involving joint intellectual effort by students, or students and teachers together. Usually students are working in groups of two or more, mutually searching for understanding, solutions, or meanings, or creating a product. Collaborative learning activities vary widely, but most center on students’ exploration or application of the course material, not simply the teacher’s presentation or explication of it.

Collaborative learning represents a significant shift away from the typical teacher-centered or lecture-centered milieu in college classrooms. In collaborative classrooms, the lecturing/listening/note-taking process may not disappear entirely, but it lives alongside other processes that are based in students’ discussion and active work with the course material. Teachers who use collaborative learning approaches tend to think of themselves less as expert transmitters of knowledge to students, and more as expert designers of intellectual experiences for students - as coaches or mid-wives of a more emergent learning process.”
3.2 Collaborative learning using ICT in Australian education

Collaborative learning is a broad term for educational approaches involving joint intellectual effort by students, or students and teachers together. Considerable evidence has been found for its educational benefits, and the success factors required to support it have been identified.

Many technology tools are used to support collaborative learning in all sectors of education. These include tools such as wikis, microblogs, social networking services, virtual worlds, and online games. Appendix 2 provides an overview of the technologies and tools making an impact in education, and provides some examples. Skills developed from participating in collaborative learning through formal education and informal learning have direct relevance to the 21st century workplace where collaborative tools are used for professional purposes.

Large numbers of students use collaborative learning type tools for social purposes, although the frequency of use, and their experience with particular tools and technologies varies considerably.

Students vary in their ability to assess the relevance and importance of information they access through ICT.

Access by staff and students to collaborative learning tools and the enabling infrastructures, such as broadband, varies between jurisdictions and sectors, and between learning organisations.

Professional learning opportunities, focused on collaborative learning using ICT, are limited. Teacher expertise, confidence, and take-up varies considerably.

Teacher education in universities does not consistently integrate collaborative teaching approaches, tools, technologies, pedagogies and assessment methods into the teacher education curriculum. Opportunities for pre-service teachers to develop expertise using ICT tools for collaborative learning is limited, and in many cases the ICT components of teacher education degrees are elective rather than compulsory.

Teachers argue that it takes more time and effort to use collaborative learning approaches and that use of information and communication technology (ICT) requires confidence both in the reliability and quality of the ICT, in their ability to use the ICT, and in their skills in facilitating students’ engagement. That is, effective collaborative learning takes time and effort to implement.

Significant activity is being undertaken in Australia to take advantage of the possibilities of ICT for teaching and learning. A subset of this activity is the use of ICT to support collaborative learning.

These activities include projects under the Australian Flexible Learning Framework19 (Framework), grants provided through the Australian Teaching and Learning Council (ALTC) under their Competitive Grants Program20, state education department initiatives such as Connected Classrooms21 (NSW), Next Generation (VIC)22, and Smart Classrooms23 (QLD) and projects that were funded by the Department of Education, Employment and Workplace Relations (DEEWR) through the Managed Environment for Research Repository Infrastructure MERRI24 and the Federated Repositories of Online Digital Objects FRODO25 focused on the higher education sector.

Through the Digital Education Revolution (DER) important access and infrastructure issues are being addressed. The supply of broadband to schools is being specifically targeted to those that need it most, with an aim of achieving, or being able to scale up to, 100Mps. Professional learning opportunities for school teachers, focused on ICT skills and knowledge, are being enhanced with the provision of funds through the Australian Government Quality Teaching Program.

Other Federal government departments, such as the Department of Broadband, Communication and the Digital Economy (DBCDE) through the Clever Networks initiative26, are delivering programs that will positively impact on the delivery of collaborative learning opportunities.
Initiatives from the Catholic and Independent schools sectors, and work undertaken through research groups in universities, Technical and Further Education centres (TAFEs) funded by institutional grants, are also part of a complex and fragmented landscape of collaborative learning initiatives using ICT.

Overall the Australian education sector has an exciting range of projects and initiatives, but the activity is fragmented and uncoordinated.

3.3 The Collaboration in Teaching and Learning investigation

The investigation is made up of three parts. Firstly, desk research on the topic; secondly, an open conversation using an asynchronous collaborative tool (edna groups) for contributions from, and discussion amongst, interested people and; thirdly, a synchronous ‘Tankette Talk’ using Wimba Live Classroom online conferencing software for around 10 invited participants from the education sector.

Participant information is available in Appendix 1.

3.3.1 Desk research

A review was undertaken of key content relevant to the focus of this investigation. It included:

- research papers focused on particular technologies and their use and efficacy in teaching and learning
- emerging technology reports
- blog posts and articles by educators, IT and ICT professionals, and educational technologists.

3.3.2 The CTL Tankette

An open conversation using an edna group commenced on 3 October 2008 and ran until 28 November 2008.


A subset of the CTL Tankette edna group was participants in the CTL Tankette Talk using Live Classroom.

These conversations were designed to gather views from teachers and administrators in the education sector. The views are their own and, because of the small number of participants, cannot confidently be extrapolated across the education sector without follow up validation.

A report on the CTL Tankette and summary of the discussions is at Appendix 1.

3.3.3 Scope

The investigation found that effective collaborative learning using ICT is dependent on services and skills that are not specific to collaborative learning, but are essential for the provision of ICT in education more generally.

As a result the recommendations emerging from this investigation focus on ICT in education issues, although the scope of the investigation was limited to the use of ICT in collaborative learning.

Considerable benefit would be gained in investigating issues of ICT in education more broadly.

It is out of scope to map the various projects and initiatives relevant to ICT in collaboration in teaching and learning, or ICT in education in general, but to enable benchmarking of activity and gaps,
collating ICT in education activities and initiatives underway across the sectors and jurisdictions would be a good starting point.  

There are limited opportunities and processes to support the transition of successful collaborative learning projects or research into the general educational environment and a process for this needs to be established.

Although individual jurisdictions, sectors and learning organisations may, or may not, have a vision for the use of ICT in teaching and learning, and/or for collaborative learning supported by ICT, no national vision for the use of ICT for collaborative learning was identified.

### 3.3.4 The theory underpinning collaborative learning

Within the Australian education and training sector, collaboration as a teaching process or methodology (collaborative learning) has emerged from a range of theories including:

**Social constructivist learning theory**

“Social constructivism has social interaction at its heart – that is, people learn through social interaction and peer relationships and achieve their developmental milestones as a result of that interaction, along with support or mentoring by others as needed and when needed through scaffolding.”

**Cooperative learning**

“Cooperative Learning is a relationship in a group of students that requires positive interdependence (a sense of sink or swim together), individual accountability (each of us has to contribute and learn), interpersonal skills (communication, trust, leadership, decision making, and conflict resolution), face-to-face promotive interaction, and processing (reflecting on how well the team is functioning and how to function even better)”

**Situated learning theory**

Jean Lave’s theory of situated learning argues that learning occurs in authentic contexts with social interaction and collaboration as the key components. A learner learns as part of that community of learners, develops knowledge and experience and eventually becomes an expert.

**Other theoretical models**

Elements of a number of theories are used in the construction of collaborative learning activities. These include constructivism, behaviourism, Piaget’s developmental theory, neuroscience, brain-based learning, learning styles, multiple intelligences, right brain/left brain thinking, communities of practice, control theory, observational learning, George Siemens’ concept of connectivism, and Yjor Engstrom’s theory of expansive learning.

Success in collaborative learning relies on successful and sustained interactions between the community of learners, and a teacher-role shifting from a purely instructional model towards a guiding, facilitating, collaborative model.

### 3.3.5 National projects that support ICT for collaborative learning

Government policies and initiatives have played a key role in the education and training sector embracing ICT in the delivery of curriculum.

Initiatives include the schools online curriculum content development, now known as The Le@rning Federation (TLF) and the Framework.
The Le@rning Federation

The Le@rning Federation is a collaborative initiative of all Australian and New Zealand governments and provides online teaching and learning content free to all Australian and New Zealand schools. Alongside the development of resources, TLF’s collaborative networks provide advice and feedback on curriculum, pedagogy, learning technologies, distance education, technical standards, systems, and intellectual property.

On-going evaluation of the implementation of TLF’s online curriculum content initiative is undertaken to gauge the usefulness of the learning objects in supporting teaching and learning in specific curriculum domains, and about the effect of learning objects on students’ motivation, depth of learning, acquisition of higher-order concepts, collaboration with peers, thinking about new ideas and independence in learning.

The Australian Flexible Learning Framework (the Framework)

The Framework strategy was launched in 2000, in response to ICT developments in workplaces and society. The Australian Government and all State and Territory governments agreed to work together to advance the use of e-learning in vocational education and training (VET). The Framework provides the VET sector with the essential e-learning infrastructure and expertise needed to respond to the challenges of a digital economy and the training needs of Australian businesses and workers.

Over the years the Framework has funded projects that developed the capabilities essential for employees to operate effectively in the digital age. Business activities have included professional development programs delivered through collaborative tools, development of digital resources and centralised access to those resources, engagement with standards to build and provide interoperable systems across the sector, providing opportunities for learners with disabilities, mature age workers, and disengaged youth, and improving the futures of indigenous people through e-learning.

Through the Framework programs the VET sector has embraced emerging technologies in teaching and learning and has experimented in the delivery of courses through the use of collaborative tools such as the Moodle course management system, web conferencing and virtual worlds.

3.3.6 Success factors

The benefits of web conferencing for students

As part of a 2007 Framework project, students and teachers at the Southern Queensland Institute of TAFE engaged in web conferencing as part of their studies. Key messages to come out of this research project indicate that collaboration and interactivity enabled a greater sense of connection to the learning experience for both students and teachers. The technology provided flexible options for group learning and enabled students to return to recorded sessions at a later date. The study also notes that appropriate broadband and technical equipment such as headsets are essential for successful integration of such technologies in the delivery of courses.

2003 research by Roslin Brennan found that certain preconditions needed to exist for the successful use of social software. These included:

- having an authentic need (real and not contrived)
- being relevant to the context and appropriate for the client
- being supported by an enabling organisational culture within a spirit of openness and a willingness to share and collaborate.

Brennan says that organisational and ICT support is paramount. Professional development and just-in-time training and mentoring and work-based learning are essential ingredients, and the LearnScope project is an example of the effectiveness of workplace training.
The benefits for professional development: LearnScope

For eight years LearnScope\(^{44}\) has focused on providing professional development to enhance the skills and understanding that underpin e-learning. It has provided funding for work-based professional development projects and encourages both individuals and teams to model sustainable practices in their own learning.

A LearnScope evaluation\(^{45}\) suggests that it has been successful in encouraging the uptake of e-learning to meet the needs of students as clients and for uses in professional development. The evaluation survey indicates that:

- 70% of respondents reported that LearnScope had an impact on their ability to implement e-learning choices for clients at a ‘significant’ to ‘highly significant’ level
- participants are experimenting with creating flexible options for individual learners and target groups using appropriate technologies
- LearnScope participants gained computer skills that gave them greater employability prospects.

The benefits of Web 2.0 tools

Becta reports that while young learners are prolific users of Web 2.0 technologies in their leisure time the use of Web 2.0 in the classroom was limited. However, schools and teachers who are innovating in this area have found benefits, such as:

- Web 2.0 helps to encourage student engagement and increase participation – particularly among quieter pupils, who can use it to work collaboratively online, without the anxiety of having to raise questions in front of peers in class – or by enabling expression through less traditional media such as video.
- Teachers have reported that the use of social networking technology can encourage online discussion amongst students outside school.
- Web 2.0 can be available anytime, anywhere, which encourages some individuals to extend their learning through further investigation into topics that interest them.
- Pupils feel a sense of ownership and engagement when they publish their work online and this can encourage attention to detail and an overall improved quality of work. Some teachers reported using publication of work to encourage peer assessment.\(^{46}\)

There are many success stories in the use of collaborative learning, but it is clear from the research that certain conditions need to prevail for it to thrive. Many elements need to be in place, such as access to quality and appropriate content, ability of teachers to integrate it into teaching and learning practices, access and bandwidth, and the presence of an overall strategy by the institution to embrace collaboration as its preferred methodology for teaching and learning.

3.3.7 Skills: the benefits of moderation and facilitation skills

Online facilitation is the term used to describe the management of learning through the use of information and communication technologies.

Literature equates the role of the online facilitator to that of an online teacher or trainer and also called e-moderator. Their role is to help the learner through their learning experience.

Gilly Salmon\(^{47}\), in her model of teaching and learning online outlines five steps that learners need to progress through with the help of the e-moderator. The five steps include access and motivation, online socialisation, information exchange, knowledge construction and development - with each stage requiring the mastering of certain skills and correspondingly needing different facilitation skills.
Salmon suggests that online facilitating may hold the key to teaching and learning online. As indicated in her five step model, the focus is no longer on content but on process and that shift of focus implies that online teachers will need to develop moderation skills. Although one may consider them new skills they are not very different from the skills required of a skilled teacher managing face-to-face discussion. In general they need pedagogical, social, managerial and technical skills.

**Facilitator skills**

- able to use a range of tools (email, forums, chat, website building tools, video and audio conferencing tools)
- able to engage the learner – ensure all participate
- able to provide direction and support
- ask appropriate questions and have good listening and feedback skills
- able to build online teams
- able to manage online discussions – guard against dominators and encourage non-participants
- able to build relationships
- able to motivate the learner
- time management skills
- able to establish and maintain guidelines
- planning skills.

**Challenges**

- encouraging ownership of learning
- online learning is collaborative and the role of the facilitator is that of enabling purposeful collaboration
- construct the conditions of the learner’s interaction so that the experience enables them to learn
- maintaining regular contact with learners
- able to motivate group learning
- ensure there is mutual respect
- for effective learning to take place one needs to recognise the appropriate method(s) that work for particular learners.

Research indicates that while some of the skills required for effective online facilitation are similar to those of teachers skilled in face-to-face discussion, further training is required to operate effectively online. Professional development activities need to include elements that support social and collaborative learning and highlight the changing role of the teacher.

### 3.4 Shift in philosophical, theoretical and professional dimensions of learning

Jan Herrington and Anthony Herrington from the University of Wollongong (see Table 1) have described the shifts occurring in the dimensions of learning as we move towards collaborative learning.
### Table 1: Shifts in dimensions of learning

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Moving from</th>
<th>Moving to</th>
</tr>
</thead>
<tbody>
<tr>
<td>Philosophy</td>
<td>Instructivist</td>
<td>Constructivist</td>
</tr>
<tr>
<td>Theory</td>
<td>Behaviourist, cognitivist</td>
<td>Situated, socio-constructivist, andragogical</td>
</tr>
<tr>
<td>Course design</td>
<td>Bounded scope and sequence</td>
<td>Open-ended learning environment, flexible content</td>
</tr>
<tr>
<td>Time and place</td>
<td>Fixed in educational institutions</td>
<td>Distributed, to suit the contexts of the learners</td>
</tr>
<tr>
<td>Knowledge base</td>
<td>‘Objective’ knowledge largely determined by experts</td>
<td>Knowledge built and shared among the community</td>
</tr>
<tr>
<td>Tasks</td>
<td>Decontextualised, concise, self contained</td>
<td>Authentic, reflective, complex and sustained</td>
</tr>
<tr>
<td>Resources</td>
<td>Fixed, chosen by teacher</td>
<td>Open, chosen by learners with access to search tools</td>
</tr>
<tr>
<td>Support</td>
<td>Teacher</td>
<td>Community of learners</td>
</tr>
<tr>
<td>Mode</td>
<td>Individual, competitive</td>
<td>Collaborative, networked</td>
</tr>
<tr>
<td>Technology tools</td>
<td>Fixed, located in learning space</td>
<td>Mobile, portable, ubiquitous, available</td>
</tr>
<tr>
<td>Knowledge outcomes</td>
<td>Facts, skills, information</td>
<td>Conceptual understanding, higher order learning</td>
</tr>
<tr>
<td>Products</td>
<td>Academic essays, exercises, or no tangible product</td>
<td>Authentic artifacts and digital products</td>
</tr>
<tr>
<td>Assessment</td>
<td>Standardised tests, examinations</td>
<td>Performance-based, integrated and authentic assessment</td>
</tr>
<tr>
<td>Transfer of knowledge</td>
<td>Stable knowledge adapted to different contexts</td>
<td>New and changing knowledge acquired when required</td>
</tr>
<tr>
<td>Professional learning</td>
<td>Courses, group events, workshops</td>
<td>Personal, just-in-time, community based</td>
</tr>
</tbody>
</table>

### Implications of the shifts for teaching and learning

Moving towards collaborative learning has implications for teaching and learning. For this the investigation below develops the Herrington and Herrington table further and identifies these implications.
<table>
<thead>
<tr>
<th>Dimension</th>
<th>Moving to</th>
<th>Implications for collaboration in teaching and learning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Philosophy</td>
<td>Constructivist</td>
<td>Collaborative learning within and between learning organisations, teachers as guides and facilitators, changes in role of teachers, changes in skills mix needed for teachers</td>
</tr>
<tr>
<td>Theory</td>
<td>Situated, socio-constructivist, andragogical</td>
<td>Real life examples, simulations, role plays, real contexts, immersive learning, games, virtual worlds needed to provide relevant and authentic learning experiences</td>
</tr>
<tr>
<td>Course design</td>
<td>Open-ended learning environment, flexible content</td>
<td>Re-usable and shareable content, learning environment not necessarily bound by the learning organisation, sector or jurisdiction, lifelong learning, open courseware, shared courseware</td>
</tr>
<tr>
<td>Time and place</td>
<td>Distributed, to suit the contexts of the learners</td>
<td>Greater use of online, blended, distance, just-in-time and flexible learning opportunities</td>
</tr>
<tr>
<td>Knowledge base</td>
<td>Knowledge built and shared among the community</td>
<td>Skills in community building and maintenance, e-moderation and facilitation required for teachers and leaders. Trust, identity, privacy, knowledge management, are challenges.</td>
</tr>
<tr>
<td>Tasks</td>
<td>Authentic, reflective, complex and sustained</td>
<td>Tension between standardised curricula, testing, benchmarking and grading, and a co-developed, flexible curricula and set of tasks and experiences that respond to learner needs and interests.</td>
</tr>
<tr>
<td>Resources</td>
<td>Open, chosen by learners with access to search tools</td>
<td>Tension between provision of the ‘right’ resources that are pre-selected by the teacher or learning organisation, and resources from a variety of sources possibly restricted by filtering and blacklists. Requires the development of information literacy, critical thinking, and good judgement by students to assess the appropriateness of the resources.</td>
</tr>
<tr>
<td>Support</td>
<td>Community of learners</td>
<td>Requires a reworking of the role of ‘teacher’ and the development of responsibility for learning in students. Requires a shift from transmission model to a collaborative learning model.</td>
</tr>
<tr>
<td><strong>Mode</strong></td>
<td>Collaborative, networked</td>
<td>Requires a shift in thinking about grades and results and a shift in focus from performance to process. That is, students need to show that they know how to learn and apply that learning and to negotiate within their communities of learners.</td>
</tr>
<tr>
<td>---</td>
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</tr>
<tr>
<td><strong>Technology tools</strong></td>
<td>Mobile, portable, ubiquitous, available</td>
<td>Requires change from the computer room model to a model where connected devices are part of the normal teaching and learning environment: used or not used as appropriate to the learning experience.</td>
</tr>
<tr>
<td><strong>Knowledge outcomes</strong></td>
<td>Conceptual understanding, higher order learning</td>
<td>Requires a shift away from product to learning process and development of new ways of assessing, not just an ability to retain facts.</td>
</tr>
<tr>
<td><strong>Products</strong></td>
<td>Authentic artefacts and digital products</td>
<td>Requires new ways of thinking about assessment tasks that are relevant to what it is that students need to learn, know and understand – could include immersive environments, role plays and simulations. May need the development of shareable resources, methods of sharing and reusing, tagging (metadata) of resources, trust federations for sharing.</td>
</tr>
<tr>
<td><strong>Assessment</strong></td>
<td>Performance-based, integrated and authentic assessment</td>
<td>May be tensions between standardised testing and benchmarking, and assessing collaborative learning achievements by diverse cohorts of students.</td>
</tr>
<tr>
<td><strong>Transfer of knowledge</strong></td>
<td>New and changing knowledge acquired when required</td>
<td>Requires a shift in the understanding of learning and the purpose of education. That is, part of the process of understanding learning will need to be the understanding that learning is lifelong and skills and knowledge will need to be updated and refreshed in response to a relentlessly changing environment.</td>
</tr>
<tr>
<td><strong>Professional learning</strong></td>
<td>Personal, just-in-time, community based</td>
<td>Shift from formal ‘time away’ learning to in-house, just-in-time learning for professional learning. This will require different models and modes of professional development, tailored to individual needs, as well as both formal and informal support for communities of practice both f2f and online.</td>
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3.5 Technologies supporting Collaboration in Teaching and Learning

A range of ICT are used to support collaborative learning. They include individual tools and software applications that incorporate collections of individual tools.

What is a collaborative tool?
The International Organisation for Standardisation / International Electrotechnical Commission (ISO/IEC) defines a collaborative tool as:

> “a ‘computer-based system that supports groups of people engaged in a common task (or goal) and that provides an interface to a shared environment’. It is the basis for computer supported cooperative work. Many elements are important in selecting a collaborative tool.

They can be categorized into the following key elements:

Ease of Use
A collaborative tool enhances productivity by being extremely user-friendly in providing the collaboration. It enables, through open communication among the participants, to assist in achieving a shared purpose.

Collaborative
The tool facilitates an exchange of information, consensus-building and resolving differences.

Temporal
The tool will, without regard for time, space, and/or location ensure that participants can work collaboratively in their own time and space. However, the tool should respect the time requirement for the completion of the task it supports.”

Like all industries, the education sector is grappling with identifying which ICT will have the most impact.

Two groups produce reports identifying technologies to watch. The most relevant to the education sector is the Horizon Project - a joint venture between the New Media Consortium (NMC) and Educause. The Horizon Project publishes an annual Horizon Report on emerging technologies, specifically those relevant to education. In 2008 the first Australian-New Zealand Horizon Report was published.

Gartner is an international consulting company and it publishes an annual report on emerging technologies.

Information about the emerging technologies identified by these reports is in Appendix 2.

In the course of the Collaboration in Teaching and Learning (CTL) Tankette, which included an online discussion forum and a Live Classroom event with 10 invited participants, the participants identified the technologies that they believed would have the most impact on collaboration in teaching and learning over the next few years: these were broadband, mobile technologies, and wikis and blogs.

A range of technologies is already being used to support collaboration in teaching and learning to greater or lesser extents. These are discussed in Appendix 2 and include:

- Web 2.0 tools
- text-based communication tools
- email
- blogs
- wikis
- instant messaging/chat
- microblogging
- immersive learning environments
- electronic games
- 3D virtual worlds
- people networks
- discussion forums – web (+email)
- groups and communities services
- social software
- online conferencing
- interactive whiteboards
- voice over IP (VoIP).

It’s self evident, but worth stating here, that the technologies, on their own, do not make collaboration or learning happen. The technologies need to be used in ways appropriate for the learning exercise, the subject matter, the student cohort, the students’ skill set and the technology infrastructure.

The use of ICT to support collaborative learning activities is a decision based on a mutually dependent combination of:

- ICT tools: the availability of appropriate ICT tool(s) for the task(s)
- subject matter: the appropriateness of the subject matter for tasks constructed around collaborative learning activities
- pedagogy: a pedagogical framework appropriate for the ICT tools and subject matter
- people: staff comfortable with technology use for collaboration and the appropriate collaboration skills and the capacity to model them with and for students.

A discussion of technologies being used for collaborative learning is in Appendix 2.
4 Enabling collaborative learning

4.1 Key points

The Collaboration in Teaching and Learning investigation identified the following key points:

- Priority needs to be given to providing ICT that will bridge the education divide between metropolitan and remote and rural communities.
- Using ICT for collaboration in teaching and learning needs to cater to diverse student capability, accessibility, and access.
- Fluency in new media literacy is not automatic, it requires explicit teaching and development.
- ICT policies for collaboration in teaching and learning are needed to support innovation.
- Learning and pedagogy must drive technology use.
- New skills and knowledge is needed by teachers.
- ICT tools for teaching and learning need to be decoupled from the provision of education administration systems.
- Open Educational Resources (OER): creativity and innovation thrive through collaboration.
- Knowledge management for the content created in, and by use of, collaborative tools needs to be addressed.
- Approaches are needed to manage identity and authentication.
- Cyber bullying must be discouraged and managed.
- Human beings are changing because of their use of ICT.

4.2 Priority needs to be given to providing post-compulsory schooling opportunities to remote and regional areas

This investigation has identified that the lack of post-secondary educational opportunities in remote and regional areas is a major equity issue.

Statistics gathered by the Australian Bureau of Statistics (ABS) in ‘Australian Social Trends 2008’ tell us that those who live in remote and regional areas are less likely to have any education beyond compulsory schooling. This is particularly significant for Aboriginal and Torres Strait Islanders who are more likely to live in a remote or regional area.

The number and type of educational institutions, subjects available and levels of study are limited, and qualifications may seem less relevant to work prospects in remote and regional communities. The proportion of people with a non-school qualification declines with increasing levels of remoteness\(^5^5\).

Ensuring that Australians in remote and regional areas have access to, and participate in, a wide range of educational opportunities is key to providing them with possibilities for growth, improved employment opportunities, better wages and a future.

Non academic factors also have considerable influence on student retention and completion\(^5^6\), including academic, social and financial support\(^5^7\).

While two broadband initiatives are underway to support the delivery of ICT in education, one through DEEWR’s DER Fibre Connections to Schools project, and the other through the DBCDE’s Clever
Networks project, both of these are focused on enhancing the provision of school education, and in the case of Clever Networks broader service provision in areas such as health and government services.

However, these services combined with the infrastructure being put in place through the schools-focused DER provide the cross-sectoral Australian ICT in Education Committee with an opportunity to work with jurisdictions and sectors to develop a method and system to provide VET and university courses online to remote and regional students.\(^{58}\)

The provision of these opportunities to remote and regional Australians was also identified as an issue that requires action in the 2008 Bradley Review of Higher Education.

Course provision should be initially targeted towards skills and courses needed by industry and business in remote and regional areas.

The use of ICT and collaborative learning approaches should also be implemented to support student retention, course completion and student engagement and satisfaction with their experience of further education.

As many indigenous people live in remote and regional areas this kind of program could have a significant impact on their levels of educational attainment over time, especially if parts of the program were designed to meet their specific educational and ICT needs. If the types of courses made available fed directly into the employment needs of the remote or regional area, then this type of program may assist in achieving the broader Australian Government policy of closing the gap between indigenous and non-indigenous Australians, particularly:

- to halve the gap in employment outcomes for Aboriginal and Torres Strait Islander people within a decade.\(^{59}\)

Alternatively, it would provide remote and regional Australians with qualifications which enable them to move to areas of high demand for their skills, and generally make them desirable employees in a society where it is expected that from 2010 the supply of people with undergraduate qualifications will not keep up with demand.\(^{60}\)

Collaborative learning – that is, not just self-paced online learning but learning collaboratively with a cohort facilitated by a teacher – assists in keeping students engaged in the learning process.\(^{61}\)

Collaborative learning using ICT provides an opportunity to bridge the geographic and social gap, bring learning opportunities to remote and regional communities, and support students in completing their studies. These opportunities cover all sectors of education.

ICT that support collaboration would also provide opportunities for professional learning and networking for teachers in remote and regional communities.

### 4.3 Using ICT for collaboration in teaching and learning needs to cater to diverse student capability and access

Whether it’s a mobile phone or Facebook, there is no doubt that Australian’s are big users of ICT.\(^{62}\)

Young Australians (those aged between 8 and 17 years) are high users of electronic media and communications. Young people spend an average of one hour and 17 minutes per day using the internet, with the amount of use increasing with age. Boys spend significantly more time than girls playing games against other players online, while girls spend more time engaged in online communications activities such as messaging, chatting, using social websites and emailing. Families with children in this age range have higher rates of internet and broadband penetration than those across all Australian households, with 91 per cent having internet and 76 per cent broadband internet connections.\(^{63}\)
There is considerable debate about whether there is a distinction to be made between a ‘digital native’ and a ‘digital immigrant’ as coined by Marc Prensky. To take the view that all young people are or will be digital natives because they are growing up surrounded by ICT, or are able to use it effectively, is an assumption that cannot currently be supported by evidence.

Further, collaborative learning is still a challenge for students who frequently just want to know what the right answer is, rather than explore the question.

Research undertaken amongst university students in Australia through an ALTC grant suggests the uptake of various applications and devices varies from person to person – that is, there is not a set of collaboration tools that educators can assume that everyone is confident or a ‘digital native’ in using.

“For example more than 80% of students surveyed had never produced a Podcast and had never contributed to a Wiki. More than 70% had never kept their own Blog. More than 50% had never used a social networking site, read someone else’s Blog or downloaded a Podcast. Nevertheless there is a sizable minority of students who are very frequent users of Web 2.0 technologies. For example, 16% of students indicated that they use social networking software once per day or several times per day, and nearly 18% of students comment on blogs at least once per week. Similarly, 15% of students produce and contribute to their own blog on a daily or weekly basis. There is a significant subset of students who are downloading and/or sharing MP3 files on a daily or weekly basis (43.2%) and sharing photographs or other digital files (24.3%).”

Obviously this research applies to a current university cohort and the findings may change as students in primary schools now move through to VET and higher education, particularly if the DER is successful in embedding ICT into pedagogy and day-to-day learning activities in later secondary classes, and implementation initiatives in states, territories and the Catholic and Independent schools sectors are effective.

Having said that, technology skills still need to be taught and are being taught in primary schools where ICT are part of the curriculum: keyboarding, interactive whiteboard functions, how a computer works, are explicitly taught to students by teachers as the basic skill set needed to effectively use technology and to effectively participate.

There are other exceptions to assumptions that all students will be digital natives: for example, Steiner Schools, based on the work and philosophy of Rudolph Steiner do not support the use of any ICT before year 9.

At the end of Class 8, the student is considered as sufficiently grounded and well prepared to fully meet the challenges of the modern world with all its technical possibilities. It is at this stage, that I.T. is taught to the students as a useful tool for their education and career choices; I.T. becomes an integrated part of the high school curriculum.

In Victoria, a Steiner stream is optional in some government schools.

In a speech to the Australian Parliament, Maxine McKew, Parliamentary Secretary for Early Childhood Education and Childcare, draws attention to ABS data which recognises that 20,000 Australian children are completely outside the education system.

ABS data suggests that the total number of children of compulsory school age who are not enrolled is around 20,000. The data further suggests that school attendance rates across states and territories are between 91 per cent and 93 per cent, with the rate for Indigenous children around 10 per cent less. That is 20,000 children not in the system. So what are the consequences — the consequences that the member for Warringah did not even attempt to address? These 20,000 children will never make it to a high-school graduation, will be unlikely to ever get a foothold in the job market and, more than likely, will be disengaged citizens for their entire lives. Without even the most basic tools by which they can navigate a complex world, those without adequate schooling are likely to be lost, unhappy and,
think it is fair to say, resentful souls. If they themselves parent, those same attitudes will be passed on to their children—lack of engagement and distrust of the value of learning”.

This diversity in the learner cohort’s experience in the use of ICT, and diversity in their experience of collaborative approaches to learning, must underpin our provision of and support of ICT for teaching and learning. That is, we need to acknowledge that:

- Learners and teachers are and always will be diverse, (age, gender, previous experience and access, disability, culturally, and linguistically diverse, etc) and will have different needs and requirements.
- New technologies (software, hardware, gadgets) will continue to emerge - and while a learner may be familiar with one set of tools, that does not mean they will confident in using unfamiliar tools and applications, or will want to.
- Students’ prior knowledge needs to be assessed before competency is assumed, particularly in relation to applying prior knowledge to a learning, rather than social, context.
- Support and mentoring in the effective use of collaborative tools and collaborative ways of learning for both students and teachers will require an ongoing commitment of resources.

4.4 Fluency in new literacies is not automatic, it requires explicit teaching and development

The ubiquity of ICT in everyday life and the use of ICT for teaching and learning require both students and teachers to rethink what ‘literacy’ means. Although students and teachers may be able to use technology – that is, press the right buttons to make things happen – there is a range of skills required for sense making when using technology. These sense making skills are necessary in the general community to be an effective digital citizen (pay bills, do banking, find a job online), as well as in teaching and learning. Collaborative learning requires a student to have proficiency in ways of interacting with others both online and in face to face classes.

What are these sense making skills? A number of terms are being used to describe these: digital literacy, information literacy, new media literacy.

From the definitions that abound, new media literacy is the most comprehensive, though the term will date as this ‘new’ media literacy will not be ‘new’ for long.

Coined by the NMC new media literacy skills embrace digital and information literacies. They are defined as:

the set of abilities and skills required for proficiency where the aural, visual, and digital realms overlap. These include the ability to understand the power of images and sounds, to recognize and use that power, to manipulate, transform, and pervasively distribute digital media, and to easily adapt digital media to new forms.

Within that, the NMC report says 21st century literacy is:

- multimodal
- includes creative fluency as well as interpretative facility
- means learning a new grammar with its own rules of construction
- lends itself to interactive communication
- implies an ability to use media to evoke emotional responses
- has the potential to transform the way we learn.
It includes the ability to make judgements, negotiate entry and participation into new communities and collaborations, to understand appropriation and how to make meaning from reuse and repurposing, and to use play as a method of experimentation and problem solving, amongst others.\textsuperscript{75}

A 2008 Joint Information Systems Committee (JISC) report\textsuperscript{76} found that information literacy skills – a subset of new media literacy skills - amongst young people in the UK needed attention. The report found that:

- The information literacy of young people, has not improved with the widening access to technology: in fact, their apparent facility with computers disguises some worrying problems.
- Internet research shows that the speed of young people’s web searching means that little time is spent in evaluating information, either for relevance, accuracy or authority.
- Young people have a poor understanding of their information needs and thus find it difficult to develop effective search strategies.
- As a result, they exhibit a strong preference for expressing themselves in natural language rather than analysing which key words might be more effective.
- Faced with a long list of search hits, young people find it difficult to assess the relevance of the materials presented and often print off pages with no more than a perfunctory glance at them.

The challenge in teaching and learning is to ensure that students have the information literacy skills – search, find, evaluate – as well as those that enable them to both ‘read’ and critique the content and media and construct it. That is, these skills are not discrete entities but pivotal for sense making in a modern technology-based world.

These skills need to be explicitly identified, described and taught to students to ensure they are able to fully participate in collaborative learning opportunities.

The development of a national curriculum by the NCB for the school education sector provides an opportunity to embed new media literacy skills. This would provide a consistency of student experience across the jurisdictions and would develop a student cohort comfortable with collaborative tools and skilled in collaborative learning approaches.

Given the various names of these ‘skills’ an important starting point would be to agree the definitions of digital literacy, information literacy and new media literacy and establish a ICT skills continuum that would be aligned with the stages of learning at a national level and build upon the existing work of the states/territories.

These skills would also need to be embedded into VET and university sectors as competencies and graduate attributes respectively.

### 4.5 ICT policies for collaboration in teaching and learning to support innovation

Innovation ‘pre-eminently determines our prosperity’ argues the report from the Review of the National Innovation System\textsuperscript{77}. It also argues that:

> Innovation is about far more than the funding of research and science, or even of that and commercialisation. Australia thrives only if a critical mass of business enterprises and workplaces are consistently innovating – not just with next generation products, inventions and technologies, but in their operations, organisation, relationships and business models.

In its submission\textsuperscript{78} to this Review\textsuperscript{79}, Education.au argued that:

> Australia, as a society, needs to accept and embrace both the risks and benefits of being an innovative nation. The culture of innovation needs to be embedded within the education and training sector as part of our lifelong learning culture. Methods and processes for harvesting
innovative ideas, exploring and exploiting them, need to be embedded within organisations. Creating a culture of innovation requires open and collaborative management styles and recognition and reward for those who provide ideas.

Many areas of innovation in teaching and learning are in the area of collaborative learning and the ICT tools that support it, but many organisational ICT policies and practices are focused on appropriate use and governance rather than on supporting innovation. They are frequently focused on preventing and limiting access to the tools and services teachers wish to use to engage their students and to support their own professional networking.

Innovation in teaching and learning needs to be explicitly supported and modelled by leaders and provision is made to make technology available to enable that innovation.

Mainstreaming of innovations in teaching and learning practice enabled by technology needs to be formalised in organisational ICT plans and/or teaching and learning plans. This could be facilitated by the tasking of a national body to implement the strategic directions established by AICTEC and COAG.

4.6 Learning and pedagogy must drive technology use

Technology is changing quickly and new tools, applications and gadgets emerge frequently. In the education sector, teachers are often looking for uses for the tools for teaching and learning because the tools have already engaged their students. From that point of view, the technology can be perceived as driving the learning.

The Education.au and edna consultations found that stakeholders believe that:

- Learning needs and appropriate pedagogies must be the driver of change rather than tools and technologies in themselves

It may seem self evident, but it is still worth explicitly stating that the key issue is whether a particular ICT is an effective tool for teaching and learning, not whether it is new or an emerging technology and everyone’s talking about it.

This view was also expressed during the CTL Tankette open conversation.

Tensions can arise where teachers believe new tools are effective or necessary for learning and are unable to use them because they cannot get them implemented within their organisation or system, or there is a long lag time between the desire to use a tool and its implementation.

From example, many Web 2.0 technologies or services are not supported in many school sector and some TAFE environments. However many teachers believe, and recent research from Becta in the UK suggests, that Web 2.0 tools impact on students’ learning experiences in a positive way.

This suggests that through AICTEC, the education sector could benefit by building a vision for the future of ICT in supporting both collaboration in teaching and learning and professional learning for teachers.

A shared understanding and explicit support for ICT for collaborative learning would support the implementation of projects and policies that support good pedagogical practice while encouraging the use of ICT to support teaching and learning.
Some organisations have developed a vision for the use of ICT for teaching and learning. For example, Macquarie University has a Technologies in Teaching and Learning Plan which has guiding principles and priorities:

The principles that guided the development of the Plan were:

- Agility and flexibility – to enable Macquarie to stay abreast of change
- Enablement – to support innovation in learning and teaching
- Enhancement of the student learning experience
- Sustainability of infrastructure and academic programs
- Quality of teaching and learning – supporting staff in their work and enhancing the learning experience for students
- Alignment with Macquarie’s strategic directions and priorities
- Consolidation – building on existing expertise and successful practice.

The priorities for this plan are to:

- Enhance student engagement and learning
- Encourage and recognise students’ contributions to innovative practice
- Consolidate the integration of technologies for learning and teaching into mainstream policy, planning and practice
- Develop quality assurance and enhancement of systems and academic programs
- Support innovation in the use of technologies for learning and teaching.

4.7 New skills and knowledge needed by teachers

In March 2008, Education Network Australia (edna) commissioned an online survey into ICT use by Australian educators. It is important to note that it was an online survey and participants were self-selecting.

Findings of this survey include:

- Overall ICT proficiency levels are similar for educators of all experience levels after two years practice
- A greater proportion of teachers who are further into their career (10-20 years plus) rated their proficiency as transforming practice.
- Late career teachers also use the Internet more frequently.

This research appears to dispel conventional wisdom that new teachers are more ICT-savvy than their more experienced counterparts.

The Education.au and edna consultations with stakeholders in 2008 found that:

- Strategies to bridge the gap between early adopters of digital pedagogies, services and content and traditional pedagogies, services and content for educators – more effective professional learning is crucial.

The need for additional professional learning and support for teachers was a strongly expressed theme in the CTL Tankette open conversation. This issue and possible models for effective professional learning will be covered in detail in a subsequent SICTAS report, the Workplace Capability Report to be published in 2009.
4.8 ICT tools for teaching and learning need to be decoupled from the provision of education administration systems

Most systems and organisations are providing a one-size-fits all ICT solution to support teaching and learning, usually through a Learning Management System (LMS).

Some state/territory education departments provide system-wide ‘solutions’ to ICT and these tend to be based on a closed system model. That is, the provision of a one-size-fits all product that is limited in its ability to take advantage of new and emerging technologies in a timely way. This is not a criticism, but an acknowledgement that education systems and learning organisations are tasked with providing a consistent ICT experience to their students and teachers. Policy, ICT frameworks and the tools are provided centrally. In parallel, trialling of new technologies supporting collaboration in teaching and learning occurs through projects, frequently funded centrally through grants.

While jurisdictions and learning organisations grapple with implementing a consistent set of tools and services at a system level, the suite of available applications, tools, gadgets and infrastructure tools is changing, and will continue to change.

Models that enable organisations to continuously incorporate new tools, services and pedagogies need to be developed to ensure that new practices can benefit students as they become available.

In essence, ICT tools for teaching and learning need to be decoupled from the provision of education administration systems.

4.9 Open educational resources (OER): creativity and innovation thrive through collaboration and open access

Open Education Resources (OER) are teaching and learning materials that are freely available online for everyone to use, whether you are an instructor, student, or self-learner.

Re-use and adaptation of OER by educators brings new potential to support individualised teaching and learning, personalised networked services, and collaborative innovation across institutions and academic disciplines. The trend towards the use of open educational resources is likely to have an impact on the way education is delivered globally and how certification by educational organisations is managed and regarded by others.

Most systems and organisations keep their teaching and learning resources locked into repositories and learning management systems and they are only available to students enrolled in that subject and to the teachers teaching in that area.

Intellectual property rights in those teaching and learning resources frequently reside in the organisation, system or Commonwealth, or in the individual, and may include embedded third party resources which are owned by other parties.

This level of complexity militates against the sharing and repurposing of existing resources because organisations are concerned about violating copyright.

Use of Creative Commons licensing, which is also internationally recognised, and changes the way we think about intellectual property is necessary if we want to take advantage of the possibilities of OER.

In 2006 Education.au undertook a consultation with the higher education sector about copyright issues specifically as they related to teaching resources. This consultation was related to the ALTC
Exchange project for the Australian Learning and Teaching Council. A range of challenges were identified:

- sector-wide agreement for sharing will be difficult to attain
- need for educational outreach about copyright
- synergies and differences between e-research and e-learning to be noted
- support for a Creative Commons licensing approach, but this is not a total solution
- need for institutional signoff
- sector-wide projects need to be monitored for implications
- copyright and social networking contributions need to be managed by Terms and Conditions statements.

Supporting an open access regime for teaching and learning resources and developing a mechanism for sharing and exchanging those resources could have considerable benefits: the possibilities of reuse, the reduction in duplication of effort, the ability to leverage innovative resources widely, broader and cross-sectoral knowledge sharing, and increased equity of access to resources regardless of location, sector or organisation for the benefit of all students.

An OER approach would be a useful one for the delivery of post-secondary educational opportunities for remote and regional Australians. The content could be developed or sourced once to meet local requirements, but provided nationally to students, and reused and repurposed as necessary.

4.10 Knowledge management for the content created in, and by use of, collaborative tools, needs to be addressed

Knowledge management is essentially a range of practices that enable knowledge to be managed within an organisation. Many new and emerging technologies, and how they are being used by teachers and students, create knowledge management challenges for organisations.

As mentioned above, most organisations have closed learning management systems where teaching and learning information, content and tools are located. But emerging technologies, particularly collaborative tools and applications, are frequently not found within those systems so teachers and students use free, public tools. They may use them in the ‘cloud’ – services like delicious, YouTube, edublogs, edna groups, Second life – or they may set up and host their own service, website or system outside the organisational learning management system or outside their institution.

The outcome is that organisationally generated knowledge, student work, and teaching and learning resources that are owned by organisations, reside on systems over which the organisation has little or no control, and with which they have no formal arrangements for service levels, standards, or continuity.

Thus, ways of managing organisational (sectoral, national) knowledge about teaching, learning, collaboration, teaching practice, pedagogy, collaborative tools and software has to be managed in an environment that is distributed, fragmented and a mix of the personal and professional, and includes a range of different kinds of software applications and tools that are constantly changing. Alternatively no use of collaborative tools outside the organisation is allowed, or only a certain number of mandated tools are allowed. Neither of these options is likely to be sustainable, nor would either approach support innovation in collaborative learning.

But the dispersal of this knowledge across multiple environments means that it is useful only to the individual who knows where it is, or the group who has collaboratively developed the content – thus the benefits of knowledge sharing are largely lost to the organisation and to the nation more generally.
The content is not captured and organised in a standards compliant way and therefore is not available to be shared with other systems or other individuals. Duplication of some resources, inconsistencies in the way resources are organised and made available, and lack of access to resources because needing membership of a system are just a few of the challenges.

The university representative body, the Australasian Council for Online, Distance and E-learning (ACODE) recognises these challenges and is identifying the issues in using external services and writing guidelines, for their use.

**ACODE issues and principles for using Web 2.0 hosted externally**

The document identifies four main areas of policy challenge:

- legal/organisational
- learning and Teaching
- technical
- implementation.

The legal/organisational issues relate to knowledge management issues arising from the use of Web 2.0 services hosted externally.

**Legal and organisational**

Issues

- Different legal jurisdictions create uncertain and complex legal environments for universities to operate in (e.g. the Patriot Act in the USA conflicts with rights to privacy in local jurisdiction).
- Universities have a duty of care to staff and students that is not shared by a third party service.
- Are the terms of use of an external service consistent with existing university policies and operational guidelines?
- Records management of course material and assessment outputs. If it is a requirement that course materials and assessment outputs are maintained for a period of time how will this be achieved in a dynamic environment like a blog or wiki?
- Continuity and reliability of services. Exposure to legal liability if an institution recommends use of an external service that ceases operation and renders staff/students' work inaccessible.
- Accessibility - do the third party services meet the accessibility standards required of the university?
- Copyright/intellectual property - do the third party services meet the copyright standards required of the university?
- Confidentiality/privacy - open versus password protected access to course materials plus teaching and learning processes. If sensitive topics are being presented or discussed (e.g. matters deemed relevant to national security, critiques of people or institutions) is the university at risk? Should there be conditions around what content and interactions are made public?
- Back-up /security - this could be a problem if teaching or assessment content suddenly disappears during the semester. How can this be managed if staff has the freedom to use third party services?
- Risk management - registering use, managing risks and associated processes, contracts and licences (if relevant) need to be clearly defined and responsibility for these allocated.
Ownership, purpose and use of log data generated through normal use of the service.

There may be a perception of implied endorsement of commercial services or products advertised by the third party services.

Have an exit strategy.

Effective knowledge management is dependent on good document and resource management practices. Strategies such as the use of metadata and standardising folksonomies for resource description are ways of supporting resource discovery.

**Metadata**

The use of metadata standards to describe content enables it to be shared, discovered, and manipulated. International standards such as Dublin Core (DC) and Learning Objects Metadata (LOM) have been collaboratively developed by communities of practice and are used to describe learning resources. The Dublin Core Metadata Element Set is a vocabulary of fifteen properties for use in resource description. The IEEE LOM standard specifies the syntax and semantics of metadata for the description of learning resources. Metadata provides a means for describing resources and their attributes both precisely and in a standard way. Metadata application profiles, based on established standards, have been created to accommodate local and project needs. Well established profiles exist, and a selection specifically relevant to teaching and learning are listed in Appendix 3.

**Social tagging and folksonomies**

‘Social tagging’ is considered a Web 2.0 technology in that the tags (keyword descriptions of a resource) are user generated, rather than terms provided from a thesaurus or taxonomy. User generated tagging is also called ‘social tagging’ and collections of tags created by a group of individuals in a community or social network is called a ‘folksonomy’.

Social tagging means that terms meaningful to a particular user community can be used and thus enhance resource discovery and information sharing. They can reflect current local usage, can create clusters of meaningfully related content through aggregation, are easy to apply, and can be displayed as hyperlinks.

However, the disadvantage is the lack of consistency that occurs when every individual user tags a resource with their own idiosyncratic terms. Services like the social bookmarking service, Delicious, recommend tags for resources that the user is saving that have already been tagged. Some online communities develop a set of shared tags to be used when describing or categorising content to enable that content to be discovered easily within that group. Other suggestions are a ‘taxonomy-directed folksonomy’ approached used in an edna proof of concept where:

An established taxonomy from the Australian education sector suggests terms for tagging and users can suggest terms. Importantly, the folksonomy will feed back into the taxonomy showing gaps in coverage and helping us to monitor new terms and usage to improve and develop our formal taxonomies.

Where various collaborative tools are used to create and distribute resources to a group or network, organisations/institutions need to look at policies that support the following:

- adopting a holistic approach to the description and management of resources including content created through the use of Web 2.0 tools
- managing how and where staff and/or students can use tools outside the organisation’s IT environment (eg Facebook, Delicious etc) and that information can be leveraged by the organisation through shared tags and aggregation
• support implementations that encourage the description of resources and automatically capture information about resources
• software developments and implementations that support interoperability and international standards and import and export to and from other systems, and being able to move content into and out of a Content Management System (CMS) and LMS
• support the use of annotations such as comments and ratings to accompany resources to provide context and add value to the resource.

The establishment of a national body to implement AICTEC and COAG strategic directions would be in a position to work with stakeholders in working through these issues and developing a national, cross-sectoral approach to them. This would have significant benefits in reducing and managing risk for students, teachers and sectors in using these tools, address copyright and intellectual property issues in a consistent way with the goal of increasing compliance and reducing complexity.

A shared approach to educational content description to enable resource discovery and position the education sector to exploit the possibilities of the semantic web.

A consistent approach to many of these issues, and sharing of resources, infrastructure, and knowledge across sectors and organisations would also reduce compliance and implementation costs.

4.11 Trust federation and user-centric approaches needed for identity management and authentication

Two kinds of identity management are briefly considered here: institutional identity and personal identity.

Institutional identity is the identity provided when a user is registered as a member of an organisation – for example they are registered as a student or teacher in a learning organisation.

A personal identity is what we create when we register with a public online service such as Facebook.

To use most online collaborative tools, users have to identify themselves to that tool through a registration process so they can contribute and participate. This identification then enables the system to determine the level of access the user has to it. This means that individuals are likely to have multiple online identities.

Any number and type of attributes can be required to resolve identity – from the complex to the simple. The authentication of identity by the system then allows the user to access the aspects of the online system they are allowed to.

Authentication can be managed in different ways: three discussed below are trust federations, passwords and OpenID.

What a user is able to access is dependent on their status in the online system - as a guest, member of a group/class, friend, friend of friend, administrator etc.

What kinds of rights a user has will depend on the system they are using, and its purpose – that is, the ability to change, update, add and modify content, comment on it, rate it, describe it, bookmark it and share the collections of bookmarks with others, add friends, create new networks and so on.

For example, in an LMS students can see the online aspect of the courses they are enrolled in, and certain information about the fellow students in their classes – such as their posts to a discussion board. The teacher will see information about the classes, the class information, their students and their student marks as well as the student generated content. In these systems what a user can see is
tied to their role and is tightly restricted by authentication of their identity to protect people’s privacy and safety.

On public collaborative services like the social networking site, Facebook, once registered a user can decide who can see what elements of the personal information they add to Facebook – only friends, friends of friends, or everyone. The exposure of their Facebook content is determined by user control, not by an administrator or owner. This raises other issues in relation to privacy and new media literacy which are discussed elsewhere.

Identity management approaches

With the maturity of the internet and, in particular, its use in education, standards have emerged for identity management and access control. Options particularly relevant to the education sector are:

- trust networks
- password
- OpenID.

Trust networks: Australian Access Federation

Trust networks, also known as trust federations, remove user identification and authentication from the service provider to an identity provider - which is generally an institution which has applied to be a member of the trust federation. That is, trust federations provide individuals with an institutionally authenticated identity.

In 2005 the Australian Government's Department of Innovation, Industry, Science and Research (DIISR) commissioned the development of the Australian Access Federation (AAF) - a trust federation for the higher education and research community modelled on similar international academic networks. The idea underpinning the AAF is that will provide users with a single sign-on access to a wide range of services made available through the trust federation members. It supports both anonymous authenticated access and identified access.

Password

The most common use of access to controlled services is through the use of passwords. The use of passwords is dependent on the user remembering the various combinations of user identifier (name) and password being used a service. Given that most people are registered with many services, the password system has limitations in terms of usefulness.

User-centric identity (eg OpenID)

An emerging user-centric solution, which addresses the shortcomings of the password systems, is the OpenID. Like a trust federation OpenID offers single-sign-on functionality for the user. OpenID identities can be created and stored on an OpenID identity service. It is a personal identity that can be used for any services that support the OpenID system.

Large industry players such as Microsoft are proposing Information Card frameworks as a next generation approach to user-centric identity. This ‘meta-identity’ concept is still emerging but is likely to gain momentum over the next few years.

The challenge for the education and training sectors is to establish interoperable identity management and authentication systems which meet the needs of their learners, teachers and administrators. Personal information, stored by institutions, needs to be managed so that the information does not need to be duplicated. Learner and administrative systems need to be interoperable and have access to shared sets of personal data that is created and updated once but made available to all systems.
that are allowed to access to it. Ideally users should be able to move between institutional-based services and OpenID services they use outside their institution.

A first stage would be to expand the AAF into a national trust federation for all sectors of education. This could support sharing of resources between sectors, between institutions, and between jurisdictions.

Development of an OpenID and/or Information Card solution to accommodate students and teachers using collaborative tools outside an organisation may also have some benefits in terms of overall identity management.

This will be further considered in the SICTAS Software Infrastructure report to be published in 2009.

4.12 Students need to learn how to manage their personal information

In the digital economy individuals leave their electronic footprint identifying where they have been, what they have looked at and what messages they have sent. This computer-processable personal information can be collected, stored, individualised and put to a variety of uses around the world – possibly without the users’ knowledge.

The legal landscape around the management of personal information is complex as it consists of obligations with multiple exceptions. There are national and state acts that apply, as well as different Acts that apply to public and private sectors and also to private sector organisations with an annual turnover of more than $3 million.

In the case of the Australian Act, the Information Privacy Principles apply to the public sector and the National Privacy Principles to the private sector. The Principles aim to protect personal information and provide guidelines to data collectors/managers about their responsibility in the collection, storage, security and use of personal information.

The ease with which personal information can be copied, pasted, and sent around via the internet to many hundreds or thousands of people in a second or two can have implications for users of collaborative tools and for the efficacy of collaborative learning.

Legal measures are in place to safeguard personal information provided to online services, but incidents of misuse, non-compliance, and loss of personal information are a regular occurrence.

A recent survey by the computer security company, Symantec, found that 79 per cent of Australian businesses know they have lost sensitive information about themselves or their customers. Forty per cent of companies that lost information acknowledged six to 20 losses in the previous year.

Australia does not require companies or government departments to reveal breaches to the integrity of personal information to the people affected, so it is not possible to know precisely how many have occurred. In America, 44 states have laws requiring businesses to inform affected consumers when breaches occur and the Privacy Rights Clearinghouse (www.privacyrights.org) monitors them.

Personal information can be compromised by cookies, web bugs, and scripts. These are briefly explained in Appendix 4.

Protection

The greater use of Web 2.0 to support collaboration in teaching and learning means that the protection of personal information becomes more significant – particularly when those collaboration tools are public tools rather than ones provided by the educational institution.

Personal information for registration purposes is provided to various services along with personal documents and resources that are stored on their servers.
Organisations need to have clear policies on how personal information is to be stored and managed and who is able to access it. Where organisations are using cloud computing services, for example, it may be difficult to apply those same privacy standards, and where jurisdiction is not in Australia (for example, Google is providing Macquarie University and NSW DET with email services hosted in the USA) then different privacy standards will apply.

Where students and teachers are using external services such as Facebook, Second Life or Delicious, then the policies of those organisations apply. These policies may be in conflict with organisational policies.

Educational organisations need to ensure that their students and teachers know how to protect their privacy and personal information – both in a general sense and in any specific collaborative tools that are being used – and ensure that the privacy policies of external tools are not in conflict with organisational policies.

Research tells us that there is significant variation in competency and usage of ICT amongst young people, and that their information literacy skills are wanting. Further, some young people are entirely outside the education system and will not have access to any ICT or to collaborative learning opportunities. Others attend schools that have philosophies that discourage access to ICT and other electronic media until year 9.

Therefore, assumptions cannot be made about students’ competencies with ICT in general, or with particular tools. Information literacy skills, digital literacy skills, visual literacy skills, and collaborative learning skills are skills that are needed to enable people to effectively contribute to and participate in the digital economy. Evidence suggests that these need to be explicitly taught and modelled and cannot be assumed to exist in students.

The development of the national curriculum by the NCB provides an ideal opportunity to explicitly include and embed these new media literacy skills in the school education sector.

This would provide a consistency of student experience across the jurisdictions and provide them with the knowledge and information that they need to properly manage their online identity and personal information.

The inclusion of new media skills as competencies within VET and as graduate attributes in higher education would ensure a whole of education approach to ensuring students have the skills to manage their online digital footprint appropriately.

4.13 Cyber bullying must be discouraged and managed

Cyber bullying is bullying behaviour which is carried out by using ICT - using email, chat rooms, discussion groups, instant messages, social networking services, and SMS (short message service) by mobile phone. It involves communication by the bully or bullies to or about the victim that is abusive, defamatory, threatening, offensive or derogatory.

It is included in this investigation on ICT in collaboration for teaching and learning because ICT enables cyber bullying, and because collaborative learning needs good relationships between students online, as well as understanding about appropriate behaviour when using ICT.

The discouragement of cyberbullying behaviours is also part of the skill set required by the 21st century teacher and needs to be included as part of teachers’ online professional learning.

Current research indicates that cyber bullying is common. An Anti-Bullying Alliance study found that 22% of young people reported that they had been a victim. Between 2000 and 2006, studies in Australia, Canada and America have documented a significant increase in occurrences which likely
reflects the increased use of ICT. A 2005 study\textsuperscript{110} conducted by QUT academic Dr Marilyn Campbell found that a quarter of surveyed students in year 8 had been bullied using technology.

While much of the cyber bullying may occur outside of teaching hours it spills over into class interactions, and can have a negative impact on the potential of collaborative learning which relies on trust relationships, team work, and good communication.

Some believe that collaborative learning – that is, building relationships between students – can also be used as a strategy to reduce bullying.

Methods such as collaborative learning, and friendship circles, as well as helping bystander children discourage bullying through non-participation (e.g., as an ‘audience’ for bullying incidents), telling trusted adults, or actively supporting bullied children (through inclusion in their activities) all work well.\textsuperscript{111}

Recent research\textsuperscript{112} suggests that ‘bystander behaviour’ may have an impact in reducing bullying. Although the research applies to school ground bullying it is likely that similar approaches will be effective for cyber bullying.

The UK’s Department for Children, Schools and Families and its ICT agency, Becta\textsuperscript{113}, have undertaken research and produced kits to tackle the problem through a combination of education, technical controls and community awareness.

Australia’s state education departments have also developed user-appropriate content, guidelines and templates that schools can use or incorporate into their strategies.

For example, in 2006 the Victorian Department of Education and Early Childhood Development, under the ‘Safe Schools are effective schools’ strategy\textsuperscript{114}, introduced new anti-bullying guidelines and policies\textsuperscript{115} for all Victorian government schools. In line with the new policies and guidelines schools were required to review their Student Code of Conduct. The guidelines include strategies and approaches to be used by parents, teachers and students.

As part of developing their new media literacy, students need to become responsible global citizens and better decision makers online\textsuperscript{116}. This empowerment approach to managing cyber bullying focuses on developing a moral and responsible citizen equipped with the decision making processes to behave appropriately. That is, the emphasis is on developing core character values of caring, honesty, fairness, responsibility, and respect for self and others as the underlying message of cyber bullying education.

The incidence of cyber bullying in schools, TAFEs and into university is likely to continue to rise. A range of actions need to be considered to deal with these issues.

- Better training for pre-service teachers and professional development of in-service teachers is needed to prepare them to recognise and handle cyber bullying.
- Research is needed to investigate the complexities of cyber bullying – educational programs and technical interventions have not been very successful as statistics indicate that cyber bullying is on the increase\textsuperscript{117}.
- Cyber bullying is not bound by national borders – strategies need to be implemented that tackle it globally. Options could include the setting up of a global working group that recommends strategies.
- Shift the focus on developing critical thinking and decision-making skills rather than teaching about technologies that change rapidly.
- Work on ‘bystander’ behavior in the technology environment as a way of discouraging continuation of harassment and preventing future bullying.
Research reveals most youths do not disclose cyber bullying to adults for fear of adults overreacting and cutting off online access. Students need to have a student-initiated mechanism for confidential reporting to adults.\textsuperscript{118}

4.14 Human beings are changing because of their use of ICT

The extensive use of ICT has raised questions about whether these uses have an impact on how the human brain develops and is 'wired', and if so, what those changes may mean for teaching and learning.

N-Gen students are literally wired differently from previous generations, their brains shaped by a lifelong immersion in virtual spaces. Repeated and prolonged exposure to the digital world may mean that N-Gen students process and interact with information in a fundamentally different way from those who did not grow up in this environment.\textsuperscript{119}

It is an area that may require some expert exploration and research to assess the impacts on teaching and learning. Topics could include:

- neuroscience
- brain plasticity\textsuperscript{120}
- executive function\textsuperscript{121} and how this may be impacted upon by ICT
- continuous partial attention\textsuperscript{122}.
5 Decision making

5.1 Overview

The speed of technological change makes decision-making about tool selection challenging. Should we implement blogs, a social networking service, change our LMS, introduce an immersive learning environment, and provide games authoring tools? Should we build in-house, buy proprietary products, buy open source? How do we develop and maintain an environment supporting innovation in teaching and learning, deliver professional development, identify a return on investment, measure improvements in learning outcomes?

There are no easy answers to the question of what technology to implement, when and how. New technology tools and applications will continue to be developed and students will expect them to be part of their learning experience, and it will be necessary to embrace them to ensure that students are properly prepared with 21st century skills and thus able to take their places in the workforce.

This means that the education sector must be prepared to embrace innovation and establish processes and procedures at all levels that support and integrate innovation.123

If we are to take advantage of technology for teaching and learning our decision-making must be evidence-informed.

At the same time decision-makers must acknowledge that some tools will be so new that there will not be an evidence base. A process of trialling and experimenting should be explicitly integrated into ICT policy, and innovation and risk taking rewarded.

Further, the education sector needs to think beyond currently emerging and maturing technologies – Web 2.0, cloud computing, mobile phones. No matter what decisions are taken today, in a few months or a year another set of decisions will need to be taken because new technology innovations will be emerging.

What is required is broader thinking about ICT and the education sector. The question that needs to be answered is: what do we want ICT to do for collaboration in teaching and learning?

Guiding principles for the use of ICT in teaching and learning should be developed by and agreed to by all jurisdictions and all sectors through AICTEC to provide a consistent framework for innovation for ICT in teaching and learning.

At the pointy end of decision-making about individual tools, people will make decisions based on some kind of process: requirements gathering, feature lists, product identification, product evaluation and comparison, tender development, provider selection, implementation.

These decisions need to be made in a clearly defined framework for ICT and collaboration for teaching and learning.

The tasking of a national body to implement AICTEC and COAG’s strategic directions for ICT in education could, as part of its role, provide a range of services that support evidence-informed decision making, the development of proofs of concept, requirements gathering, national ICT services, and a knowledge bank for sharing information gathered about technologies in use.
5.2 Decision making supports

Different groups and organisations have developed ways of decision making when it comes to ICT in education. Some of these are high level decision making matrixes (Education.au), some enable benchmarking of an organisational position (ACODE), some are specific to a student cohort (IMS) and others to educators (NETS). The range of benchmarks, guides for addressing the issues arising from the selection and use of ICT for teaching and learning suggests that the development of some standards for the Australian education sector could be a benefit and this could be a useful role for a national body tasked with implementing AICTEC strategic directions to take on.

These benchmarks would be developed collaboratively through AICTEC to create a supporting network of documentation to support all decision makers make knowledge-based decisions.

5.2.1 Education.au’s decision-making matrix

In 2005 Education.au wrote a report for Australian Capital Territory (ACT) DET. In the report Education.au developed a high level decision-making matrix for issues that needed to be taken into account when considering the implementation of new technologies. Although focused on the needs of the school education sector the questions, with some modification, are relevant to VET and higher education sectors as the focus is on the outcomes, implementation, and the people issues, than on the technologies. That is, technologies will continue to emerge: addressing the outcomes, people issues and the implications can help assure that the investment in ICT is realised in better learning outcomes, retention and completion rates, social inclusion, innovative practice and enhanced productivity.

Teaching and Learning outcomes

- Is the technology likely to support and improve teaching and learning outcomes?
- Does it provide students with the digital literacies required to live and work in contemporary society?
- Does the technology enable existing pedagogical models to be utilised?
- Does it require new thinking about teaching and learning in order to fully utilise its potential?

Teacher Acceptance

- Will teachers accept and use this technology?
- What will be the requirements for, and impact on, teacher training and professional development?
- How will teachers be introduced to and given on-going professional development so as to maximize the effectiveness of this technology in the curriculum?
- What kind and levels of technical support will be provided for this technology?
- Will teachers be required to have their own device associated with this technology? If so, what part of the cost will they need to bear?

Student Acceptance and Parental Support

- Will students find this technology relevant to their lives and their learning?
- Does the use of this technology utilise existing skills, support skill development, and enhance skills?
- Is using this technology part of their required digital literacy in a knowledge economy?
- Are parents willing and able to support the use of this technology – both financially, if necessary, but also by providing encouragement and support to their children?
Leadership in use and take-up
- Will this technology be supported by principals and other educational leaders?
- Will principals and others lead by example, utilising this technology in their daily practice?
- Will staff champions of this technology be recognised and supported, and provided with the opportunity to demonstrate its best practice use to colleagues?

Relevant, Available and Cost effective Content
- Is there content already available that can be used with this technology?
- If not, can the technology be effectively implemented for teaching and learning purposes?
- Will content have to be specifically created?

Sustainability, Resourcing, Risk, Extensibility
- If we invest in this technology, is the financial investment sustainable in the long term?
- What are the resource implications for infrastructure, training, maintenance and enhancement?
- As the sector grows, can the technology grow and extend to meet new requirements?

Interoperability and Integration
- Is this technology interoperable with current technology in place – that is, is it backwards compatible?
- Can it be integrated with existing systems?
- Will it interoperate with other systems?
- Is it standards compliant to enable content and data sharing?
- Is there a need for a middleware layer between it and other applications, platforms or systems?

Applicability
- Does this technology apply right across the school and college, or is it more relevant to some sectors than others?

There is clearly a need for organisations to be able to access guides, checklists, methodologies, case studies and exemplars to inform decision-making, support good practice, and enable benchmarking and reduce duplication of activity: that is, a network sharing professional knowledge.

5.2.2 ACODE e-learning benchmarks

The Australasian Council of Online, Distance and E-learning (ACODE) has developed e-learning benchmarks with good practice statements and performance indicators to enable organisations to benchmark their current e-learning readiness and supporting continuous quality improvement. These benchmarks could also be used to support decision-making.

The benchmarking areas are:
- Benchmark 1: Institution policy and governance for technology supported learning and teaching
- Benchmark 2: Planning for, and quality improvement of, the integration of technologies for learning and teaching
- Benchmark 3: Information technology infrastructure to support learning and teaching
- Benchmark 4: Pedagogical application of information and communication technology
• Benchmark 5: Professional/staff development for the effective use of technologies for learning and teaching
• Benchmark 6: Staff support for the use of technologies for learning and teaching
• Benchmark 7: Student training for the effective use of technologies for learning
• Benchmark 8: Student support for the use of technologies for learning

5.2.3 IMS Global Project Group
Under the auspices of IMS, Griffith University, along with institutions in the USA, UK and NZ are developing a framework for how to introduce higher education students’ to e-learning addressing issues of completion, retention and persistence in online learning.

The draft Best Practice Areas (BPAs) are:
• assessment and communication of expectations
• recruitment and advisement
• learning design and organisation
• functional technology
• student technology literacy
• learning community
• faculty development and support
• student support services.

5.3 International Society for Technology (ISTE) in Education’s National Education Technology Standards for Teachers

ISTE standards for students, teachers, and administrators help to measure proficiency and set aspirational goals for the knowledge, skills, and attitudes needed to succeed in today’s Digital Age.

The National Education Technology Standards for Teachers 2008 are:
• facilitate and inspire student learning and creativity
• design and develop digital-age learning experiences and assessment
• model digital-age work and learning
• promote and model digital citizenship and responsibility
• engage in professional growth and leadership.
6 Appendices

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Appendix 1: The CTL Tankette

6.1 Key points

Predicted big impact technologies

- ubiquitous high speed broadband
- mobile
- wikis and blogs.

Issues

- professional development
- technology infrastructure
- site blocking.

6.2 Methodology

6.2.1 Process

The Collaboration in Teaching and Learning project for the Strategic ICT Advisory Service had three parts. Firstly, desk research on the topic; secondly an open conversation using an asynchronous tool (edna groups) for contributions from, and discussion amongst, any interested people and thirdly; a synchronous ‘Tankette Talk’ using Wimba Live Classroom through the edna group for around 10 invited participants from the education sector.

Desk research

A review was undertaken of current content relevant to the focus of this investigation. It included:

- research papers focused on particular technologies and their use and efficacy in teaching and learning
- emerging technology reports
- blog posts and articles by educators and educational technologists.

The CTL Tankette

An open conversation using an edna group commenced on 3 October 2008 and ran until 28 November 2008.


A subset of the CTL Tankette edna group was participants in the CTL Tankette Talk using Wimba Live Classroom. A recording of the Tankette Talk is available from the CTL Tankette edna group.

These conversations were designed to gather views from teachers and administrators in the education sector. The views are their own and, because of the small number of participants, cannot confidently be extrapolated across the education sector without follow up validation. Participants in the open conversation were self selecting, and it can be assumed that they have an active interest in
ICT for collaborative learning. The participants into the Wimba Live Classroom were invited by Education.au to participate. Their level of knowledge about ICT and collaborative learning ranged from interested beginner through to expert, and a number were passionate advocates of the benefits of ICT and collaborative learning.

A large amount of content was generated through the discussions with more than 100 posts contributed. Around 50 people were registered with the edna group, with around a dozen active contributors.

A number of different topics were canvassed including:

- digital collaboration tools
- what are the factors that make collaboration work in education and training?
- e-moderation: necessary skill for success
- digital natives or not
- the top 10 or 11 things.

A range of views and ideas were put and each discussion is summarised in the final post of each thread by the CTL Tankette facilitator, Frankie Forsyth. The summaries are included below.

Invitations to participate in the CTL Tankette open conversation were electronically distributed broadly through the education and training sector including the following:

- Australasian Council for Online and Distance Education (ACODE)
- ascilite
- The Gaggle (ACT community of educational designers)
- Flex e-News
- The Loop
- edna newsletters and headlines
- SICTAS blog
- Computers in Education Group of South Australia (cegsa-members)
- South Australian Teachers Email List (satel)
- oz-teachers
- oztlnet
- Individual invitations to educators.

**Tankette Talk**

The Tankette Talk was held on 31 October 2008 using Live Classroom as the collaborative tool. Live Classroom enables voice chat, instant messaging, document sharing and has a whiteboard. The session was recorded and provided as stimulus material for the last two weeks of the open conversation.

**The Talk**

Prior to the Tankette Talk, the participants were asked to respond to three questions using an online questionnaire in Zoomerang. These responses were the basis for the discussion in the Talk.

The questions were:

- What are the technologies that you believe will be the top three innovations supporting collaboration in teaching and learning in the next three years?
• What are the three major obstacles in your sector or organisation that prevent you or your colleagues from using or exploring ICT effectively for teaching and learning?

• What are the three things you believe government(s), and/or your organisation could do to overcome the obstacles?

The questions are available from http://www.zoomerang.com/Survey/?p=WEB228DKARZMLM

A summary of the Wimba Live Classroom can be found in the edna group and below.

The recording of the Wimba Live Classroom session can be found in the edna group.

Tankette Talk participants were invited to participate because of their role within their organisation, and/or their knowledge of ICT in education.

They were invited to participate as individuals, not as representatives of their organisations, so the views they expressed are their own.

The Tankette Talk participant group included teachers from most sectors of education (higher education, school education – both primary and secondary, vocational education and training (VET), and adult and community education (ACE)).

Prior to the tankette talk the facilitator contacted each participant to ensure that they would be able to access Live Classroom from their desktop and to ensure that they were familiar with the software. Two supported online sessions were held to provide training for participants as needed.

To support the event, Education.au supplied a trained facilitator who worked with participants prior to the event, a technical support person to manage technical issues as they arose on the day, and the SICTAS convenor.

On the day of the event some participants experienced difficulties in participating due to problems with bandwidth and firewalls.

The amount of effort and time required to set up this event indicates the level of commitment and training required by teachers to effectively use collaborative technologies, and that even with that commitment and training, reliability of the internet and internal networks and firewalls can still cause participation issues.

6.3 Summaries of discussion threads

6.3.1 1 or 11 things: what’s needed to make collaboration effective in teaching and learning?

The Education.au convenor developed a short video summary about online collaboration: the first section covered tools for collaboration, the second issues, and the last outlined the 10 things (plus time) that make a difference in ICT for teaching and learning.

The article about the ‘10 things that make a difference’ was written by teacher, Chris Betcher, after a conversation with a fellow teacher, in 2000. In 2008 the same ten things (plus time) were still perceived by the participants as being as relevant now as then.

They include:

1. emotional support
2. a shared pedagogical understanding
3. a constructivist philosophy
4. at least four computers per classroom
5. help to access appropriate material
6. just-in-time technical and skills support  
7. reliable infrastructure  
8. access to professional development  
9. links to school from home  
10. leadership  
11. flexible learning spaces (added by Bryn Jones in 2008)  

Additional issues raised by the CTL Tankette discussion include:  
12. time  
13. perspective  
14. planned and supported implementation  

Key points made in the discussion were:  

- The education sector is still preparing students for industrial jobs which are disappearing. At the same time, many doing innovative work with ICT in education are doing it out of hours, in their own time, on a shoestring, because of passion and interest. This can’t be sustained.  
- If ICT is to be mainstreamed, it should be backed up with systemically planned and supported implementation. Projects or funding would need to be over a minimum of two years preferably up to four years. They would be well resourced: professional development, support staff, in-school leaders, for example, ‘Heads of Learning Technologies’. ICT has to be part of educators’ day-to-day activities. Teachers would prefer to have less reporting and more time to facilitate learning. For ICT to occur, something else has to give and/or go. The suggestion was made that solutions to ICT implementation may require policies that embrace scoping alternatives rather than one solution for all.  
- Buying the equipment first and expecting mainstream use to follow doesn’t make sense. There is the need for learning organisations to re-think the purpose and intent behind ICT use. There are ever-increasing ways to access, share, and respond to information. Phones, iPod Touch, other similar devices can provide cost effective connectivity, leaving more traditional ICT hardware available for use for other purposes.  
- Minimum number of computers required depends on class size - 7 maybe for 30 students, depending on the kind of learning. Tools need to be given to the teachers also - to learn to use, to experiment with, and to become more than comfortable with. Teachers need to be encouraged to be willing to learn together with (and from) their students. The key idea is that the ICT equipment is available in a seamless way, as and when the need arises, as close as possible to where the learning is taking place.  
- The shift in pedagogy is key to the achievement of transformational learning ... and the key to the shift lies with those who work with students and those who work with staff. Teachers need to know about what is possible. As the saying goes, ‘you can’t know what you don’t know’.  
- A national research and education network would assist in breaking down silos and reduce duplication of effort.  
- For all this to work reliable infrastructure is vital (including very high speed broadband/wireless access - at no cost) yet needs to be provided without firewalls which prevent access to key resources.  
- It’s all about attitude. A change in perception. A changed awareness. Any new policies must create systems which value and reward the new ways of learning (collaboration, networking, student generated content) and for this we need systems that measure (ie value) process as much as output.
6.3.2 Collaborative tools

- Collaboration topics may become more standardised through the introduction of the national curriculum which is being introduced to Australian schools.

- Collaboration tools however, are often fragmented, unsuitable for the classroom and users are unaware of their full potential. A national, seamless approach in which departments, schools and teachers collaborate digitally to achieve higher education aims would make them easier to access and easier for teachers to model their use.

- Examples of collaboration tools include, list servs, blogs, Virtual Classrooms, and discussion forums such as this one and the new Australian Youth Forum http://www.youth.gov.au/ayf.

- Some prefer tools which are part of their organisational suite rather than openly available tools used by learners in a more social way.

We had a choice of a tool called BlogWow available on our Sakai platform, mainstream tools like Blogger or WordPress, or finally a tool like EduBlogs which has many of the elements of the mainstream tools while being sensitive to the specific needs of educators.

BlogWow was chosen for the following reasons:

- We needed to restrict access to the blogs to the subject community because of the potential for students to reveal confidential details about children in their classes.
- We didn't need the full range of capabilities provided by the more advanced or mainstream tools and BlogWow had the key features we needed.
- By using a tool that was part of our LMS environment it meant we didn't need to register each student as we would have if we used a tool like Edu.Blogs.
- Feedback from students was that it was difficult to navigate/find interesting new postings relevant to their own interests.

This example highlights the need for government resources to be devoted to the development of new collaborative tools suitable for use in the classroom. On the other hand being adaptable/flexible in using tools the easier it becomes to move from tool to tool.

- Re the convergence of asynchronous and synchronous tools; generally communities have gathered around a 'favourite tool' and added to it, e.g. The UK's Openlearn based around Moodle (also edna groups and Live Classroom).

- Another difficulty is establishing what is being discussed and where to avoid repetition of effort. There's a need to classify (National) social communities, outside existing institutions, so they might know when an issue is being inquired into and so contribute their ideas AT THE SAME TIME. The question was asked. Are we choosing tools to satisfy our old institutions, or are they for the common communities which stand between them?

- Part of the money spent on TLF learning objects could have paid for staffing of a Web 2.0 interactive site to offer a live Q&A (ask-the-expert, perhaps also with special guests) forum for kids and classes to investigate, for eg, Aussie green issues, bullying etc.
• The impact of LMS in the University sector is far greater than a comparative amount spent on multimedia development. However the impact of TLFs may be greater in the school sector where there is more scope for reuse, once there is greater access to interactive whiteboards and laptops.

• Communication – particularly feedback is critical in learning so refining our communicative tools, and providing the structures for humans to contact and interact with other humans is the best way to spread learning. Feedback can be done by self-reflection or with others. Lecturers comment on how much they learn from reading their students papers, yet often the students miss this opportunity to read each others’ marked work.

• One person suggested we should rename the ICT acronym to: Information-Communication-Time.

• Ultimately, technology should serve the main game of our field - students intrinsically valuing learning and making informed, ethical choices about themselves and others locally and globally. This takes time to stop and process things and turn it into knowledge, even wisdom and communicate it.

• Some of the blockers or things that inhibit the use of ICT eg interactive whiteboards in the classroom are non-IT related, for example, being placed in appropriate positions (too hot/too open). See http://www.thelearningfederation.edu.au/verve/_resources/towards_a_disruptive_pedagogy.pdf

• It was noted that other .gov.au silos have already received some suggestions (although they have yet to be implemented).

• Finally, an article Gen Y Tech Tools May Not Translate to the Real World suggests there may be conflict as the Gen Y’ers join the workforce and find that many of the tools they view as essential aren’t allowed or banned altogether.

6.3.3 Is it the technology that makes collaboration work? Is it the right mix of people? Is it the facilitator/teacher? Is it the preparation before the class?

Participants suggested that a range of things helped make collaborative learning work:

• the coming together of factors
• seamless technology - so students aren't focusing on the technology rather than the event at hand preparation and planning
• having a 'vision' for the future direction of the subject
• move from the known to the unknown
• start small and grow as confidence increases
• use tasks that are authentic to what the students will be doing in real life
• be explicit about how it benefits learners
• share your enthusiasm for the subject and use the technology as scaffolding – show why it works well
• accommodate local requirements, such as legislation, or standards which are different in various countries
• provide extrinsic motivation to collaborate - Chris provided the example of a peer assessed activity which includes students marking on participation (amongst other activities)
• provide support for the teacher or academic as they try new approaches to teaching and learning
• Encourage the learners to be ‘teachers’ and partners in the learning
• provide pd opportunities for teachers to work collaboratively online before teaching this way
• acknowledge that collaboration takes time – to get to know each other and to know where each is ‘coming from’
• take the time to consider if something else has to ‘give or go’ to enable collaborative working
• if the opportunity cost is right and benefits plausible, people will engage and follow.
• one participant gave an example of the need to focus on what is really important – see Jar of golf balls.

6.3.4 Does collaboration take more time, and if collaboration takes more time and effort, is the learning that is achieved by the individual student better, more effective, deeper? How can we measure this?
• There was general agreement that collaboration does take more time, can be hugely threatening and, as one strategy out of many, should only be chosen when appropriate, ie as a means to an end rather than an end itself. The suggestion was made that learners themselves can self-evaluate and then choose their own learning pathways according to their particular needs. If I have ‘time’ to engage collaboratively, then I might do so; if I have a just-in-time needs (which I always do when I am using software), then it is much more appropriately met by accessing the online help of the application, than trying to ‘collaborate’.
• This led to a discussion about what is being taught/learnt and why - Are you here to (help students) pass, (help them) learn to pass or (help them) simply learn? You can’t make them learn, can’t motivate them ... (Zulu) just make them love and value learning. But, the influence of ‘exams’ is strong! Teaching collaborative working in the early years when learners can experience self-direction was seen as important and led to better results, but this requires time and money for mentoring.
• The final thread focused on what perspectives would be required to scope a collaboration that might bridge professional Silos for an Enhancing Whole of Government conference in Feb 09. The idea being to improve efficiencies gained through economies of scale and to improve service to the public. Network Managers, Moderators/Content Managers, Joint Funders across three levels of .gov.au agencies, Librarians, and, where there’s a need for assessment or a marking role – Teachers were all suggested.
• Ideas for breaking down the silos included (National) peer to peer networks, Single Sign On for National Lifelong Learners, handovers from ABC qanda to learning institution moderators/content managers, joint funding by government departments, reconfiguring networks (capturing content) around (interactive) communities of interest (hubs) instead of (broadcasting) and Nick Lothian’s ideas about taxonomies for folksomonies was also thought to need exploration.
• An example given was the NSW DET using Google as the email provider for its schools. Each email address becomes, in effect, a Single Sign On to Google tools and if a student learns by using Google they will likely stay with Google when school’s out. While Australian citizens are being included in the consultation process (beginning with Australia 2020), the problem is that all these kind of suggestions are fed into various agencies, who then duplicate effort by funding very similar expensive networks and software (web tools). Implementing recommendations effectively is the stumbling block at present.

6.3.5 e-Moderation
• There was general agreement that e-moderation and online facilitation skills were important in supporting the success of collaborative learning online. Kerry Trabinger\textsuperscript{134} provided a
A facilitator plays an important role in the success or failure of a Community of practice online (Copo). This statement is supported by Janet McMillan who argues: the facilitator is critical for success. They must have passion/time and the ability to bring people along with them. A good Copo facilitator needs to possess the skills of a teacher, chairman, host, and community organiser. The following is a list of characteristics and abilities a good online facilitator should possess. This list is a summary of findings from Frances Knowles (Knowplace Canada) and Leone Wheeler (RMIT FLL2000):

- technical skills
- communication skills
- thinks conceptually
- arranges social functions
- introduces humor, and thoughts of the day into discussions and know when to use tact and humor appropriately
- creates a light-hearted, welcome environment
- welcomes newcomers and encourage lurkers
- coaches participants on how to use technology
- demonstrates a great deal of dedication and patience
- enjoys working online and is available often
- values members
- Katrina Beard adds that an online facilitator: ‘
  - develops topics carefully
  - varies the discussion
  - synthesises and debriefs
  - stimulates, supports
  - encourages, provokes, challenges, cherishes and values members

Katrina also states that it is important to have a good facilitator particularly one with the ability to stop ‘flaming’. She also states that the facilitator must be allocated a significant amount of time particularly in the early stages. Carole McCullough adds that ‘a facilitator must ‘weed out and prune’ discussions.

6.3.6 The Tankette Talk

Collated Responses

Broadband

- The key technology that is seen to be likely to have the greatest impact is fast broadband access and associated infrastructure, provided without censorship of access (no net nannies or content keepers). All agreed that fast Broadband access was essential and that existing broadband in Australia was not sufficiently fast or widespread.
- From an access perspective one participant suggested that universal access to laptops connected via wireless networks in schools and universities would also have an impact.

Mobile Technologies

- Mobile technologies were also seen as likely to have an impact but further out in time – perhaps in the next five years. These technologies included mobile learning using portable gadgets connecting to local wi-fi and the wider internet using eg iPhone. Examples of how mobile phones are being used currently were provided.
Wikis and Blogs

- Wikis and blogs were also considered to be likely to have an impact especially with embedded audio-visual/video in wikis and for interaction by students with their peers. In relation to blogs, participants were finding that applications like Facebook, Flickr and Twitter are being used for writing by younger learners and are replacing "traditional blogs".

Other Software/Tools

Other tools included:

- virtual classrooms
- integrated LMS which provides anytime, anywhere access
- a great tool for teacher collaboration better enabling effective teaching (tool not specified)
- interactive multimedia (eg voicethread)
- social software/networking
- access to broadband Virtual worlds - including 3D chat
- interactive whiteboards in all school classrooms

Digital rights management

- One participant suggested that tracking usage and digital rights management will become more important across the sectors, especially as e-portfolio use increases. Creative Commons and copyright issues will also be an issue.

The Key Technologies identified in the original survey that didn’t make this group include:

- QR bar codes
- data mash-ups (won’t have an effect for maybe five years)
- online communities
- online discussion groups
- online communication tools
- gaming: game playing and creation of

Obstacles and actions

Participants reviewed and discussed a collated version of the responses to the second survey question.

What are the three major obstacles in your sector or organisation that prevent you or your colleagues from using or exploring ICT effectively for teaching and learning?

- The discussion covered aspects such as a lack of time, a dependency on 'the IT person', a 'Pass the test' or 'I am too busy correcting to assess’ syndrome..., 'a full curriculum and a need to regain a work/life balance. In addition participants agreed that good leadership is needed to assist teachers to prioritise and choose what is important not 'urgent'. Firewalls are also seen as an issue.'
What are the three things you believe government(s), and/or your organisation could do to overcome the obstacles?

- The discussion focused on removing boundaries at organisational, state, federal and international levels which prevent collaboration, bringing about a change in focus from a product to process in education, and providing just-in-time professional development support.
- Following the discussion, participants responded to the Final Poll Question which excluded ‘time’ and ‘broadband’ and these were taken as a ‘given’ for the purposes of the question.

If you had to choose one thing to fix, what would it be, what would be the first step and who would take it?

Excluding time and broadband, while participants responded from varying perspectives the key things they wish to see are:

- More appropriate professional development
- Improved policy decision-making, leadership and implementation of e-activities.

Ideas included:

- appointment to every learning organisation of an full-time ICT and learning mentor (an experienced teacher not a technology person) who can work closely with teachers in their classes as well as running whole of organisation PD when necessary.
- teachers being a support to one another. It has been a culture of teachers working in silos for too long. A commitment from leaders: not just rhetoric/walk the talk.
- have policy makers better informed about the impact of their decisions, with the political polls removed from the equation.
- project management of collaborative team learning/planning around program development with at least six months before implementation. A real collaborative team.
- change attitudes to get people skilled up, therefore PD workshops that are actually about how to think about and with the technology, rather than the technology itself
- get decision-makers listening to people who are at the ‘chalkface’ and are informed about the challenges and joys of ICT
- stronger incentives for new tech-savvy highly literate teaching graduates to join the ACE sector
- the e-mentor model (which is already emerging/strengthening in Victorian ACE).

The actions from the original survey that didn’t make this group include:

- more flexible, structures that can respond with the speed necessary to implement new stuff/release firewalls - a major problem in the ACT
- need easy-to-use tools which pull things together, do what we need them to do and make our work easier, not harder.
- exemplars of good practice to help convince educators of the possibilities in their own classrooms.
6.3.7 Tankette talk participant information

Table 3: Tankette talk participants: listed by sector

<table>
<thead>
<tr>
<th>Sector</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vocational education and training</td>
<td>1</td>
</tr>
<tr>
<td>School education</td>
<td>3 (1 apology)</td>
</tr>
<tr>
<td>Adult and Community education</td>
<td>1</td>
</tr>
<tr>
<td>Higher education</td>
<td>3 (one is a teacher-educator)</td>
</tr>
<tr>
<td>State Government education department</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 4: Tankette talk participants: listed by state

<table>
<thead>
<tr>
<th>State</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACT</td>
<td>3</td>
</tr>
<tr>
<td>NSW</td>
<td>2</td>
</tr>
<tr>
<td>NT</td>
<td>0</td>
</tr>
<tr>
<td>SA</td>
<td>0</td>
</tr>
<tr>
<td>QLD</td>
<td>1</td>
</tr>
<tr>
<td>Tas</td>
<td>0</td>
</tr>
<tr>
<td>Vic</td>
<td>1</td>
</tr>
<tr>
<td>WA</td>
<td>1 (apology)</td>
</tr>
</tbody>
</table>

Table 5: Tankette talk participants: listed by family name

<table>
<thead>
<tr>
<th>Mary Capanella</th>
<th>Queensland Department of Education, Training and the Arts</th>
<th>A/principal Education Officer - Middle Phase of Learning, Education Queensland</th>
</tr>
</thead>
<tbody>
<tr>
<td>Michael Chalk</td>
<td>Preston/Reservoir ACE</td>
<td>Literacy educator and flexible learning coordinator in Adult Community education</td>
</tr>
<tr>
<td>Don Collins</td>
<td>Coburg Senior High School</td>
<td>Principal</td>
</tr>
<tr>
<td>Barney Delgarno</td>
<td>Charles Sturt University</td>
<td>Lecturer in Teacher Education</td>
</tr>
<tr>
<td>Megan Poore</td>
<td>ANU</td>
<td>Winner of 2008 teaching awards from the Australian Learning and Teaching Council and ANU</td>
</tr>
<tr>
<td>Vivien Smith</td>
<td>Hawker Primary School</td>
<td>Principal</td>
</tr>
<tr>
<td>Cherry Stewart</td>
<td>University of New England</td>
<td>Academic Development and Learning Design</td>
</tr>
<tr>
<td>Kerry Trabinger</td>
<td>Canberra Institute of Technology</td>
<td>Flexible and E-Learning Training Manager</td>
</tr>
</tbody>
</table>
Apologies

Victoria Carrington, University of South Australia

John Hedberg, Macquarie University

Tomaz Lasic, Belmont City College
Appendix 2: Technologies to support collaborative learning

There is only One machine
The web is its OS
All screens look into the One
No bits will live outside the web
To share is to gain
Let the One read it
The One is us
Kevin Kelly: Predicting the next 5000 days of the web
Reference:
http://www.youtube.com/watch?v=yDYCf4ONh5M

A range of information and communication technologies (ICT) are used to support collaborative learning. This includes individual tools and software applications that incorporate collections of individual tools.

It's self evident, but worth stating here, that the tools themselves do not make collaboration happen, or learning. They provide an infrastructure which can then be used by teachers to support collaborative learning.

The tools need to be used in ways appropriate for the learning exercise, the subject matter, the student cohort, the students’ skill set and the technology infrastructure, not just for the sake of using the technology.

That is, collaboration in teaching and learning is not appropriate for all teaching situations.

The use of ICT tools is not appropriate for all teaching situations.

The use of ICT to support collaborative learning activities is a decision based on a mutually dependent combination of:

- tools: the availability of appropriate ICT tool(s) for the task(s)
- subject matter: the appropriateness of the subject matter for tasks constructed around collaborative learning activities
- pedagogy: A pedagogical framework appropriate for the ICT tools and subject matter
- people: staff comfortable with technology use for collaboration and the appropriate collaboration skills and the capacity to model them with and for students

**ICT supporting and enabling collaboration**

- Web 2.0
- text-based communication tools
- email
- blogs
- wikis
- instant messaging/chat
- microblogging
• immersive learning environments
• electronic games
• 3D virtual worlds
• people networks
• discussion forums – web (+email)
• groups and communities services
• social software
• online conferencing
• interactive whiteboards
• voice over IP

In 2008 the Australian Flexible Learning Framework developed a Teacher/Trainer e-learning Toolkit which lists, under a variety of headings, the ICT tools teachers need to access to support learning.

These included web applications for video sharing, blogging, social bookmarking, wikis, recording and editing audio, RSS feeds, creating web demonstrations, and web conferencing.

6.4 Web 2.0

Little agreement has been reached about a formal definition of what Web2.0 is’, but it is a term widely used to differentiate certain kinds of internet interactions from internet interactions that have occurred in the past – in the so-called ‘Web 1.0’ environment.

The distinction between Web 1.0 and Web 2.0 is, if you like, an ‘ease of use’ shorthand to talk about the current internet environment, but many of the online activities now defined as ‘Web 2.0’ – communication, collaboration, user generated content, social bookmarking, social networking - also occurred during Web 1.0, but looked different and were delivered with different applications to those currently popular.

Examples of services that popularly exemplify ‘Web 2.0’ are Facebook, MySpace, delicious, Flickr, YouTube, and tools such as wikis, 3D virtual worlds, and virtual classrooms – all of which can support collaborative learning and social networking opportunities.

In 2005 Tim O’Reilly, on his blog, ‘O’Reilly’, laid out his perception of the distinctions between Web 1.0 and Web 2.0:

He summarises the key elements that make up ‘Web 2.0’ as:

• the web as a platform
• harnessing collective intelligence
• data is the next Intel inside
• end of the software release cycle
• lightweight programming models
• software above the level of the single device
• rich user experiences

A simple, though not uniformly accepted, distinction between the ‘versions’ is:

• Web 1.0: read only
• Web 2.0: read and write
• Web 3.0: read, write and execute
Recent research\cite{141} from Becta in the UK suggests that Web 2.0 tools do impact on students’ learning experiences in a positive way.

Becta reports that while young learners are prolific users of Web 2.0 technologies in their leisure time the use of Web 2.0 in the classroom was limited. However, schools and teachers who are innovating in this area have found benefits, such as:

- Web 2.0 helps to encourage student engagement and increase participation – particularly among quieter pupils, who can use it to work collaboratively online, without the anxiety of having to raise questions in front of peers in class – or by enabling expression through less traditional media such as video.
- Teachers have reported that the use of social networking technology can encourage online discussion amongst students outside school.
- Web 2.0 can be available anytime, anywhere, which encourages some individuals to extend their learning through further investigation into topics that interest them.
- Pupils feel a sense of ownership and engagement when they publish their work online and this can encourage attention to detail and an overall improved quality of work. Some teachers reported using publication of work to encourage peer assessment.\cite{142}

Already there is talk about the possible impacts of Web 3.0, what Web 3.0 might be\cite{143} and the future of the internet\cite{144}. The important point is at a national and systemic level that we are able to successfully manage and adapt to constant change and take advantage of innovations in technology.

### 6.5 Text based communication tools

Most ICT tools can be used in some way to support collaborative learning. Text-based communication tools are a good example of this. Tools such as email, instant messaging, blogs, wikis and short messaging services (delivered by mobile phone, web-based social networking status updates, or through microblogging services delivered to the web, phone or PDA) all have a potential use. They have obvious advantages such as ubiquity and ease of use. Further, most can be used to send documents and files to others. Some are asynchronous and others synchronous, though the ability to access email through mobile devices has changed the landscape. Email may once have been considered to be asynchronous but if the sender and receiver are simultaneously connected then email, for example, can have a similar feel to synchronous communications such as instant messaging.

**Email**

Email is ubiquitous in mainstream society as a general mode of electronic communication and 210 billion messages are sent each day\cite{145}. Emails can be accessed via PDAs and mobile phones, as well as via a computer. It has had limited formal educational use, but is a ‘killer application’ in the sense that it is widely used as a basis for informal learning opportunities, knowledge and information exchange, document sharing, and collaboration - frequently through formal community-based discussion lists that are comprised of members and an owner/facilitator.

Web-based discussion forums frequently have an option that enables web-based forum posts to be sent simultaneously as emails to email addresses so that list members do not have to visit a website to access forum posts. These email services are also available for status updates made in social networking sites such as Facebook and from microblogging services like Twitter. Although once reliant on computer-based email software applications, web-based email by providers like Google (gmail), Yahoo (Yahoo mail) and so on means that people can access their email from anywhere and have become location independent.\cite{146}
Example

Oz-Teacher email list.

The Oz-Teacher email list has been running since 1995 and has more than 1000 members. Members range from undergraduate education students, teachers from Australian and international schools, tertiary educators and other professionals in the education field.\(^{147}\)

edna lists (lists.edna.edu.au)

The free edna lists service has been running for 10 years. In 2008 it supported more than 750 lists with more than 98,000 registered list members.

Blogs

A blog is essentially a website that can be published by an individual or organisation and is made up of short articles, called ‘posts’ which are displayed in date order with the latest date or news displayed at the top of the page. Posts can be categorised by the author using their own set of categories and many blog software applications support the addition of video, music or photo files. Some can be updated via mobile phone.

The person who writes a blog post is a blogger and some bloggers have built considerable reputations around their blogs. Subject matter for blogs varies widely from serious commentary on public issues, to family diaries, to personal exposes. Blogs were initially focused around the publication of material by individuals and others would comment on those posts. In the education sector a collaborative environment has developed around education-focused bloggers where bloggers post on each other's blogs, are members on some of the same online communities and social networking services and share information and knowledge about issues in teaching and learning from their individual perspectives – that is their bloggers network becomes part of their personal learning environment or personal learning network (PLN).

For example, Tomaz Lasic, a teacher and ICT integrator at Belmore City College in Perth lists a number of blogs, largely focused on K-12, are part of his professional conversations. Some of his examples:

- Darcy’s Blog http://darcymoore.wordpress.com/
- Journeys on the Road http://roadster5555.blogspot.com/
- Betchablog http://betch.edublogs.org/
- SlicedBread http://tsearl.edublogs.org/

Blogs are being used for teaching and learning with students writing reflective pieces\(^{148}\) about their learning journeys and delivering reports for assessment. Some examples of uses of blogs in school education can be found at the Western Australian Department of Education and Training\(^{149}\).

Recently a finalist in the 2008 IMS Learning Impact Awards\(^{150}\) Hawkesdale P12 College has a school blog\(^{151}\) which it uses for teaching and learning and for development and supporting the development of the community around the school. The blogs started out as personal journals but are now a hub for local, state, national and international visitors.

Blogs are being used by learning organisations as methods of communication with their staff\(^{152}\), students and local community\(^{153}\).

Lifestreams

From the blogosphere emerges the ‘lifestream’ – as an emerging publishing service. Lifestreams can aggregate the user generated content of an individual into a single service or life stream: so content
generated on, for example, at Flikr, YouTube, Twitter, Facebook, can all be viewed at one location. This is like a blog that contains ‘everything’ the user has generated on all the services that they use.

Examples include me.edu.au which enables professional educators to aggregate their posts from Twitter and delicious – in fact any service that is made available via RSS.

The beta service Lifestrea.ms says:

lifestrea.ms brings together all kinds of things that you and your social network create on the web in one place. There you decide who sees what. You can share and re-publish your contents and even add additional texts and media from your lifestrea.ms dashboard. To make sharing your life easier, lifestrea.ms breaks down your social life into seven of the most important parts: public, family, friends, local, professional, romantic and secret. You have one fully adjustable profile for each of your networks. The same way you share your life with others, your network contacts share their life with you. To keep you in the loop, you can even read your newsfeeds (’cause these are written by people you follow) and your emails (’cause these are people that contact you) from inside your dashboard. Staying on top of what’s going on has never been more effortless, so come and join today and start communicating with all your friends, family and colleagues in a new way.

Wikis

Wikis are collections of web pages that are linked to each other. There is nothing new about that in itself. Where a wiki diverges from a standard static website is where it enables ‘anyone’ to edit the content of with wiki pages using a web browser to do that editing. Editing includes adding content, creating pages, adding new links and editing existing content created by others. And that’s where the concept of a wiki is different from other web publishing: content is collaboratively created or created by a group of users, rather than by a single author. This makes wikis useful for group work where a number of people are contributing.

However, although wikis enable collaborative content creation, the process is sequential rather than simultaneous: one editor ‘improves’ the work of the work by others that has gone before with the changes recorded for reviewing and previous versions available for ‘rolling back to’ if necessary. Public wikis can also be subject to ‘wiki wars’ - where groups of users have differing ideas of what is ‘true’ and should be published on a wiki. The discussion pages of Wikipedia, probably the world’s best known and largest wiki, demonstrate the many heated arguments over content: sometimes minor disagreements that descend into personal attacks, to complex arguments about accuracy and correctness. As a result Wikipedia is considering bringing in the same kinds of editorial practices used in book or article publishing – that is, an editor approves the content before it can be published.

In the education sector they can have useful roles in group work. The Wikis in Education wiki says that wikis can be used for:

- Students work together in one place to research, outline, draft, and edit projects within the wiki
- Post homework, course materials, study guides, and more.
- Organize articles, websites, videos, and other resources for students
- Post questions for student brainstorming, or have students post papers for peer feedback
- Students and/or teachers post and respond to questions on a given topic
- Give parents a chance to be a part of the classroom and stay up to date on classroom news and events

The content is held in a database along with the information about what was edited and by whom (which user) and most wikis require users to register before they can do that editing.
Instant messaging/chat (IM)

Instant messaging is a component of many other kinds of applications that can be used to support collaborative learning and, what were standalone messaging services like ICQ\(^{157}\) or MSN chat, have expanded to include, in the case of ICQ, the provision of blogs, forums and groups, a web-cam facility as well as file sharing through the IM interface. IM messages can also be sent to mobile phones in supported countries.

Instant messaging and chat services are also integrated into:

- voice over IP services, like Skype\(^{158}\), to enable messaging as an alternative to voice.
- 3D virtual world applications like Second Life as a primary method of communication
- groups services like edna groups which support instant messaging within groups
- social networking services like Facebook which enable live chat with your friends when you are online.

Instant messaging has been used successfully for supporting error correction in second language learning\(^ {159}\). Sparks and Mentz\(^ {160}\) suggest that IM has multiple benefits, not just to students but staff as well including real time clarification of content, facilitation of group project work, social networking, homework support, and faculty collaboration, amongst others.

In 2007, Victoria University developed a prototype of its own browser-based instant messaging service, Olly, following a pilot project in 2006 when 50% of teaching materials had been delivered by MSN chat\(^ {161}\).

Microblogging

By sending 140 characters or less by an online service like Twitter\(^ {162}\) or Plurk\(^ {163}\) makes you a microblogger. These short updates provide your ‘followers’ with information about what you are currently thinking and doing. Most microblogging services are both web based and mobile phone based using a gateway between the internet and telephony infrastructures.

A bit like instant messaging, but without the broader range of tools, most instant messaging services now provided are limited to 140 characters per message, so microblogging provides a communication channel that sits somewhere between email and instant messaging.
It can be both synchronous – when you and your followers are online at the same time – and asynchronous, when you are not.

This image of Twitter synchronicity created by Tom Barrett and available under a Creative Commons license.

On his blog, ICT in my Classroom, teacher Tom Barrett talks about the possible uses of Twitter as a component of a personal learning network, and ways of using that network to enrich class work practice.

The Twitter education pack provides Twitter addresses for educators from most sectors of education and training. This is a user-generated wiki where people can add themselves to a subject area twitter-pack.

Academic blogger academhack suggests there are a range of useful applications for microblogging in teaching and learning. Those relevant to collaborative learning activities are:

- class chatter: conversations continue inside and outside of class
- classroom community: Students developed a sense of each other as people beyond the classroom space
- get a sense of the world: students can get a sense of how varied are the things people are doing around the globe
- instant feedback
- public notepad: Twitter is really good for sharing short inspirations
- writing assignments

6.6 Immersive Learning Environments

Electronic Games

Game: An active interest or pursuit, especially one involving competitive engagement or adherence to rules.

What is a game? We tend to think about games, electronic ones in particular, as a form of entertainment rather than opportunities for learning. Various definitions of a ‘game’ have been put forward, and there are various classifications of game types.

The focus of this section is to consider the possibilities of electronic games for collaboration in teaching and learning.

Australia is a national of gamers, the average age of gamers is increasing and is now around 30 years and women are making up 40% of gamers. This means that the use of games for teaching and learning could be widespread and have many applications. The Education Arcade in the US is
specifically exploring the use and development of games for education purposes, as is Serious Games Initiative in the UK.

The 2009 Interactive Australia report finds the following:

- 88% of homes have a device for playing computer or video games
- 68% of Australians play computer or video games.
- 46% of gamers are female
- the average age of an Australian gamer is 30 years.
- 84% of Australians aged 16-25 compared with those 50+ play computer and video games.
- the average adult gamer has been playing for 11 years
- half of all gamers play daily or every other day, a quarter play once a week
- the average game play session is one hour.
- 70% of parents in game households play computer and video games, 80% of these parents play them with their children.

Dr Henry Jenkins, Director of Comparative Media Studies at MIT, argues that the use of electronic games provides a range of opportunities in teaching and learning. Games enable players to:

- drill deep into subject matter
- explore choice and consequence
- play with complex variables
- simulate real world processes
- create peer to peer teaching opportunities
- engage in an immersive and highly motivated mode of learning.

Game theory and taxonomies of player types are also important in the area. Bartle’s simple taxonomy of player types divided them into four: achievers, explorers, socialisers and killers. Yee’s further work on player types suggests a more complex set of player motivations.

Some games have been developed specifically for learning and many interactive learning objects include game elements which are informed by game theory.

The term ‘serious game’ is often used to indicate a game that has a serious educative purpose. ‘World without Oil’ is an example of a serious game, as is the Australian-developed game ‘Murder under the Microscope’. Murder under the Microscope is “an educational game in which teams of students compete to solve a fictitious ecological crime”. It has run ten times since 1995, is an online interactive experience, and involves intense in-class work over a 6-week period. It provides access to real world scientists who respond to student questions about specific aspects of the game. It includes video content, web animations, live and asynchronous online communications.

While many electronic games may enable two or more participants to compete with each other (road racing games are a good example), Massively Multiplayer Online Games (MMOG) and Massively Multiplayer Online Roleplaying Games (MMORG) are of particular interest in relation to collaboration in teaching and learning.

These kinds of games are played across the internet. They can be commercial services to which users pay a subscription fee to provide them with access to the game. Others are free, others are pay
as you play. 10s of thousands of users can be online playing the game at any one time and success in 
the games frequently requires elements of team building, and cooperative and collaborative 
behaviour.

Well known examples of MMOGs, that do not have any explicit educative purpose, are World of 
Warcraft and Everquest. World of Warcraft has around 10 million paid subscriptions per month, 
though there is some debate about whether these are individual users. It has also been studied by 
academics in relation to how it supports the development of collaborative behaviours.

Nardi, Ly and Harris found a range of learning occurred through the playing of an MMOG: fact 
finding, devising tactics/strategy, and acquiring game ethos. The study shows that existing 
commercial games can have an application for skills development, communication and collaboration.

Some games are made available by the games developer for modification – called a 'mod'. So 
eexisting well-known and widely used games could be modded for structured and intended teaching 
and learning purposes.

A study under the auspices of Future Lab looked at what factors would have an impact on a 
teacher’s ability incorporate existing off-the-shelf commercial games into schools, making their use 
relevant to the curriculum. The study found that the factors were:

• the technical infrastructure and support available to teachers in schools;
• the professional culture of the school, including approaches to lesson planning, knowledge 
exchange and organisation of timetables;
• the expectations held by teachers of children’s levels of games literacy and expertise.

The Queensland Department of Education, Training and the Arts supports the use of games for 
learning and provides some professional development opportunities in that area.

Games for professional development

Games can be used to support professional development for adults, for adult formal learning, as well 
as across each of the sectors of education.

The School Leadership Game provides school leaders, or aspiring school leaders, with a game to 
help them develop their skills, knowledge and confidence in running a school. The developers, the 
Games, Learning, and Society Group (GLS) at the University of Wisconsin-Madison, USA, suggest 
that:

These games will offer complete simulated school leadership experiences, and will 
ultimately be configurable into a comprehensive game of school leadership in which players 
will have the opportunity to run schools and learn the necessary skills and qualities of 
successful school leaders through game play.

3D virtual worlds

VWs can provide a platform for collaboration, community, and commerce, but so can a sofa.

Another Life: Virtual Worlds as Tools for Learning, Jay Cross, Internet Time Group; Tony 
O'Driscoll, IBM; and Eilif Trondsen, SRI Consulting Business Intelligence, Reference: 
http://elearnmag.org/subpage.cfm?section=articles&article=44-1

If you don’t have a sofa, if your student cohort is undertaking distance education, if your students are 
in remote or regional areas, then a well planned out learning experience in a 3D virtual world may be 
as good as chatting on the sofa. At their core, the sofa and the 3D virtual world provide opportunities 
for students to communicate and collaborate.
‘3D (three dimensional) virtual world’ has become a shorthand term for software applications that provide users with an experience of being agents in an online environment with their ‘self’ represented with an avatar or online persona. The avatar is able to move around in a 3D environment. The ‘extent’ of the environment depends on the application. Some are room-based and have a single room that a user can modify, and others have extensive landscapes and multiple locations. As the avatar, the user has a sense of physicality in the online space and moves through the world using the keyboard in a similar way to a real person moving through the real 3D world. Some 3D virtual environments provide for additions to real behaviours such as enabling flying.

3D virtual spaces are common in electronic games. 3D virtual worlds have moved to the internet and some are available as services to anyone who wishes to register, subject to their access policies. They are generally not games but environments, though users may construct game-type activities within the virtual world.

Some applications provide for a high level of customisation of avatars, and others less so. Some enable users to script or program their own environments and others provide a set of environments and customisations to choose from. Others provide a drag and drop development environment for new world locations and/or access to 3D resources from 3D libraries that can be added to the virtual world. They enable real time instant messaging between those in the environment, and frequently support Voice over IP for real time talk.

In teaching and learning, 3D virtual worlds provide rich opportunities for collaboration and communication, and possibilities for students’ immersion in the learning experiences.

The use of a 3D virtual world for teaching and learning is usually seen as providing opportunities that are not otherwise available or providing simulated role-play experiences where students can test out their behaviours in professional environments and improve them in response to feedback from other participants.

Uses can include providing simulations of emergency situations, fulfilling the practical aspects of education and replacing expensive laboratory equipment that is expensive to set up and maintain.

A JISC virtual world scoping study argues that:

Decka’s Decks: Second Life and TAFE SA. Excerpts from Jacinta Ryan’s blog
http://me.edu.au/p/jacintaryan

It was during this time that we discovered, almost by accident, that the various lobbying that had been happening across TAFESA had been successful and we were granted access to Second Life on both the Admin and Education servers - which meant that we had access from our desks and in the classroom. We were amazed - especially when we had been informed so categorically at the beginning of our project that this couldn’t happen because of DFEEST rulings, duty of care and various other reasons. How much more time could we have spent on the educational aspect of our project if we had not expended energy in finding ways to get access to SL. Just the event of the 11 and 12 August needed so much time and organisation to get access to cars (from Panorama campus) back to Adelaide campus to pick up students then down to Noarlunga campus to get access to SL - over 2 days!! However, that is all in the past now - access has been granted and so we can move on....

... A few of the trainees experienced slow speed problems, something that they were going to discuss with their ICT people after the session. A couple had to log out and then back in again. Unfortunately, we had lots of trouble with our laptops freezing and crashing. At one point the trainees were all running around and we almost couldn’t move. Ruth decided to see if there was anyone in the computer room upstairs on the 5th floor and soon we received an IM from her saying that the room was empty and that the computers there were working fine. So we abandoned our laptops and ran upstairs to finish the session. Most of the trainees managed to get through most of the questions and all stayed until about 12.45 ...

... I have called this entry the rollercoaster ride because the thrill of watching the students interacting and participating was tempered by - again - the poor technology. The thrill of the trainees actually having access from their workplace is a wondrous miracle since we still do not have this luxury.
To summarise, these worlds can be used to support virtual events, seminars, campuses and lectures, they can be used to produce hybrid events and experiences that traverse between real and virtual experiences and can be used to integrate a range of applications from document sharing to content production. The potential is being revealed in engaging new learners, supporting scientific simulations and for supporting distributed and international research and learning communities. Virtual worlds will not replace face-to-face learning but will supplement traditional approaches, offering new scope for role plays, scenarios and more learner-driven opportunities for creating learning activities and experiences.¹⁹⁰

Many learning organisations are using proprietary commercial web-based solutions for their trialling of 3D virtual worlds for teaching and learning. Second Life¹⁹¹ is the best known and is used in both higher education and VET; the open source built-for-education product Croquet¹⁹² is being used in the VET sector,¹⁹³ and VastPark¹⁹⁴ in higher education.

This video from Gary Hayes provides a quick tour of 50 of the most popular online 3D virtual worlds.

More than 300 million people are registered in non-games related online worlds.

The use of commercial, open 3D virtual worlds provides a number of challenges for learning organisations:

- students under 18 can’t be allowed to access open environments where adults may be which makes them unsuitable for school education and TAFE, and to a lesser extent higher education where a small number of students would be under 18.
- there is no guarantee the service will continue, even if an organisation invests considerable resources into the development of content specific to your needs
- most are not standards based or interoperable so users are tied into that proprietary environment.
- most do not support exporting of content from their environment, archiving or record keeping.
- backups and disaster recovery are out of the control of the learning organisation which could affect students’ ability to complete or participate in assessable tasks.
- IP issues for content developed within the system can be unclear, or the materials can be claimed by the 3D virtual world provider
- some have significant amounts of offensive content and/or the environment may be difficult to police
The Virtual Worlds Real Content project funded by the Australian Flexible Learning Framework outlines the challenges faced by that project. These included IT issues of substantial complexity, issues related to management of students, and the appropriate use of the environment and physical location of students.

### 6.7 People networks

**Discussion forums – web (+email)**

Web forums, sometimes called Internet forums, message boards, discussion boards, or bulletin boards, are available on the web and provide a mechanism for asynchronous communications. Web forums can be public or private. Some web forum software enables users to receive and contribute via email and the contributions are published in the web forum automatically. Forums enable threaded discussion on particular topics. Some software also enables the web forum to be archived.

In an educational context web forums can be used to provide a means for students to discuss issues in a way which enables considered and researched responses, or as a means of reflecting on learning experiences. This can be effective in supporting contributions from students who do not respond well to time pressure, or who have difficulties expressing themselves publicly in a face-to-face class. Web forums enable teachers/tutors to assess student contributions to class discussions in a considered way. Students are also able to contribute at a time convenient to them.

The use of online forums now has quite a long history in web terms. Web forums were first provided by Education Network Australia (edna) to the education and training community in the late 1990s. edna groups, the web forums descendant, currently supports more than 1000 education-related groups and more than 10,000 registered members.

Web forums are a common tool provided by learning management systems such as Blackboard and Moodle.

Markel provides a summary of the benefits of using web-forum in teaching and learning:

> Students draw upon their own experiences and interpretations and share these with the group discussion. They draw on their own teacher stories to relate to the course content. They read other student responses and interpretations and compare these with their own thoughts. This involves the processes of reflection and the construction and re-construction of domains of knowledge. The resulting kinds of learning from these processes are not a regurgitation of a lecture or reading. It is a negotiated interpretation of knowledge with student ownership. The learning is deeper and more long lasting and students refine their thinking and their voice.

### 6.8 Groups and communities services

An online community is “a group of people with a common purpose whose interaction is mediated and supported by computer systems, and governed by formal and informal policies.”

Groups and communities services provide an online space to initiate, support, enable or continue the development of a community of users with a shared interest. These online spaces can be described by a number of different terms, all referring to similar kinds of services: groups, collaborative workspaces, online community spaces, communities, communities of practice.

These services provide users with a set of online tools to support their communication and collaboration. Generally users have to register with the service and then register with a particular group. Groups can be private or public.
Toolset

The toolset made available within a group service depends on the software application used, but is likely to include:

- forums/discussion boards
- chat room
- instant messaging
- shared calendar
- document storage
- wiki
- blog
- HTML editing

The advent of Web 2.0 social software services such as Flikr\textsuperscript{202}, YouTube\textsuperscript{203}, MySpace\textsuperscript{204}, Facebook\textsuperscript{205}, Delicious\textsuperscript{206} and many others has altered the perception of the functions and tools within a group or a community and how an individual may interact with a group. Services specific to education and training are also available: examples include Teacher Tube\textsuperscript{207} for video sharing, academi\textsuperscript{208} for academics, and me.edu.au\textsuperscript{209} for professional educators.

Groups

In group and community services the ‘group’ is the primary organisational module and a user belongs to ‘groups’ which are separate from each other and content is not shared between groups. Content is shared within a group and becomes part of the group’s repository. The online space is usually exclusive to members who register with the group service and then with the individual group through the provision of an invitation key or by being added as a member by the group owner. Groups are frequently ‘closed’ rather than open and a group owner(s) controls membership. The group service will generally provide a range of tools to support collaboration and communication between members of the group.

An example

edna groups (www.edna.edu.au) provide a free groups service specifically targeted at supporting collaboration in education and training. It is based on Moodle open source software\textsuperscript{210} and provides a range of online tools for each group including forums, chat, instant messaging, wikis, a shared calendar, document storage, a blog for each group member, and HTML editing of group pages. It also provides a range of tools to support teaching and learning as it is, at its heart, a course management system. edna groups currently hosts more than 750 groups across all sectors of education and training with 18,000 registered members. Users use the group services for different purposes: some groups are short term with a particular focus around a project output or outcome. Others are communities with shared interests and the group space does not have a finish date.

Social software vs Groups/communities

In social software services it is the individual that is the primary organisational module and individuals create networks with other individuals and content is provided on an individual’s page by the individual – the so called ‘user-generated content’. Other members of the network can then see it or interact with the content by commenting or rating or responding to it in some other way, though their capacity to do so will be limited according to the security settings an individual has set on the social networking service. For example, an individual person’s content might be made available to only their friends (who have been friended within the social software service), the friends and their friends, or everyone.
In social networking services such as YouTube which supports the sharing of videos, the provision of a video can result in responses in video format providing a commentary on or variation of the original content, rather than a text response.

**An example**

Me.edu.au is a social networking service for professional educators. It provides users with a blog, the ability to friend others in the network, the capacity to create and join networks around specific areas of interest, and enables users to bring in RSS feeds from other services – such as a blog feed from another service.

**The group/social software hybrid**

Now a hybrid model has emerged, with some social networking services also providing a groups function and many groups’ services have social networking tools such as ‘ friending’. The distinction between social networking and groups is becoming difficult to maintain and the tools provided by the respective services are overlapping.

Social software services, like Facebook211, usually have the capacity for a registered user to create a group, however, their groups services do not necessarily provide the same breadth of tools as an old style ‘group’ service.

Examples of the hybrid group/social network are ning212 and the ALTC Exchange213. In these services a distinction between an online group, collaborative workspace and a social network is more difficult to make214.

The main distinction is in how content is contributed and organised. In group and communities services content is organised around the group and is associated with the group and stored/viewed in that context. In social software services the content is always identified with the contributor – is user generated - and stored/viewed in that way.

The benefit of groups and community spaces online is that they can generate and support communities of practice (CoP).

According to Etienne Wenger, who coined the term, communities of practice are “formed by people who engage in a process of collective learning in a shared domain of human endeavour”.215

Membership of the group means that the members have a commitment to that domain, even though members may not know or interact with all other members – that is, the group is organised around the domain, rather than around the individuals, and the CoP involves the members interacting with each other.

**Social software/Social networking**

‘Social software’ is an imprecise term but refers generally to software that has some component that enables the development of a social network and is based around some level of social interaction that may enable collaboration216.

In the context of this investigation, social software includes software that has the development of personal networks as its core purpose.

That is, users register, contribute content, rate, bookmark and comment on content, reuse and remix content, and ‘friend’ each other into broader social networks. The social software may include a range of other services, and software integrated from third parties. So for example, Facebook217 enables numerous non-Facebook-developed third party software services to be integrated into a user’s Facebook environment. These include calendaring, games, Likeness quizzes and 3D virtual environments. Social software can be used to support existing networks of friends, and is frequently
used this way, is used for advertising of products and services (becoming a ‘fan’ of a service), and to support causes.

As with groups and community services, social networking services depend on relevance to their users for popularity. Some are targeted to professional communities: me.edu.au\(^{216}\) is for professional educators; Facebook had its start with college students, LinkedIn\(^{219}\) is for business networking. YouTube is for those who wish to share videos, Flickr for those who want to share photos, Delicious for those who want to share bookmarks.

What is key is that the social network, and the tasks and activities associated with using it are relevant to student learning, and to their world\(^{220}\).

The 2007 VET sector research report, Networks, Connections and Community\(^{221}\) found:

> There was compelling evidence from the research that social software is valuable in enhancing and enriching knowledge sharing, capability development and the teaching and learning experience, and it should be seen as ‘another tool’ in the organisation’s and VET practitioner’s toolkit. For it to be used successfully however, it relies on a spirit of openness and a willingness to share and collaborate, supported by an enabling culture both within the organisation and the ‘classroom’ environment.\(^{222}\)

### 6.9 Interactive whiteboards

The ‘collaborative’ use of an interactive whiteboard is dependent on how it is used by teachers – as is the case for most ‘collaborative’ software. The collaboration is a function of the use, not of the software itself. At the basic level an interactive whiteboard functions in the same way as a blackboard or non-interactive whiteboard: that is, the teacher can write on it so that the class can all see what is written.

Research by Dr Trudy Sweeney from Flinders University\(^{223}\) describes an Interactive Whiteboard Development Framework for teachers, based around how they develop their use of interactive whiteboards with their students. Based on the work of Gary Beauchamp\(^{224}\), Sweeney suggests that teachers, and their use of interactive whiteboards, transition through five stages: whiteboard replacement, supported didactic, interactive, enhanced interactive, and synergistic user.

At the point of stage 5 - synergistic user - pedagogical transformation has taken place. According to Sweeney the following identifies this stage:

- students determine many significant aspects of lessons either independent of, or dependent on, teacher approval (eg the direction, momentum and scale of the next step in the lesson).
- the interactive whiteboard is an integral part of spontaneous, non-linear, fluid learning activities that support intended learning outcomes.

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**Challenges**

Before the arrival of the first whiteboards at the commencement of the project, each neighbourhood already had about 15 desktop computers and a mobile laptop lab.

The two Promethean whiteboards were placed in two of the neighbourhood spaces. However, because of difficulties with installing them, the teachers did not obtain access to them until three months after the commencement of the project; and all the teachers commented on problems with the location of the whiteboards, stating that the space was too open, or too hot in summer, for effective working with whiteboards.

Hedberg and Freebody “Towards a disruptive pedagogy: Classroom Practices that combine interactive whiteboards with TLF digital content”
• the available technology is deliberately used to support Assessment for, as, and of learning (eg the teacher incorporates voting quizzes to assess progress and design a range of intellectually challenging assessment tasks to cater for individual needs).

• teachers are able to articulate and apply their comprehensive knowledge of contemporary learning theories, strategies, various curriculum and planning frameworks and skills to provide an inclusive and differentiated curriculum for students. (eg projects based on an Inquiry approach or ‘Backwards by Design’ model involving essential questions, authentic tasks and assessment, collaborative problem solving, higher order thinking and Multiple Intelligences).

• teachers work collaboratively to plan, reuse and refine high quality comprehensive units of work. These units link a range of high quality resources, activities and assessment tasks to stimulate and support learning using the interactive whiteboard over extended periods. Emphasis is on the use of the interactive whiteboard to do new things in new creative and innovative ways.

• use of synchronous and asynchronous communication tools to connect with other students or external experts globally on collaborative projects or to seek information and compare multiple perspectives.

• Spontaneous use of the board to accumulate evidence of learning (e.g. use of the ‘camera’ or ‘record’ tools to capture learning moments as they occur for use in the plenary session).

Sweeney suggests this 5-stage model can apply to technology in general, not just to whiteboards.

6.10 Voice over Internet Protocol (VoIP)

Voice over IP is a mechanism for making telephone calls using a broadband internet connection. Its great advantage is cost saving, particularly for international calls. You can download some software and then make voice and video calls from your PC using that software. Skype is one of the best known free VoIP services. Although used largely for personal use it has possibilities for teaching and learning online. The Skype in Education wiki\(^\text{225}\) says:

Skype will allow you to:

• network with other instructional technology teachers
• connect students with experts worldwide
• connect students who are learning similar & related content
• allow parents to see their students presenting
• allow students who are absent a chance to participate
• allow teams of teachers to meet virtually
• allow administrators to connect with classrooms from their office
• become the ‘teacher as facilitator’

VoIP technology also enables voice communication in other environments – such as the 3D virtual world, Second Life.\(^\text{226}\)

6.11 Online conferencing (virtual classrooms)

Online conferencing software provides the opportunity to provide virtual classrooms for students and this kind of facility is widely used in Australian for multicampus teaching.

Well known tools include Wimba Live Classroom, Centra, and Elluminate\(^\text{227}\).

The University of Southern Queensland is implementing Wimba Live Classroom in 2008/9. The goal for the project is to:
• enhance educational experiences of external and remote students
• enable cross campus teaching
• enable recording and playback of educational events
• support student learning communities both within courses and within programs
• support communication and collaboration between people on all campuses and external people

The Victorian Government, through the Department of Education and Early Childhood Development’s Knowledge Bank project, has supplied Elluminate free to all schools in Victoria.

The Department of Education and Children’s Service (DECS) in South Australia uses Centra to:

provide Internet-based video conferencing and learning collaboration tools. Centra is a real-time, web-based learning software incorporating tools for lesson delivery, professional development and meetings and features voice-over-IP capabilities, a shared workspace environment and an intuitive user interface permitting live conversations as well as text chats. Centra is best used where a rich, live online learning environment with the ability for interaction amongst all participants and presenters is required and where demand on high quality ‘live’ video input is low.

DECS says it can be used for:

• daily classes
• sharing teachers (local delivery)
• distance education
• access to content experts
• virtual field trips
• interactive student projects

6.12 Learning management systems

Most educational organisations support a Learning Management System (LMS). These may also be known as virtual learning environments (VLE).

An LMS is:

Internet based software that deploys, manages, tracks and reports on interaction between the learner and the content & the learner and the instructor. In particular, learning management systems perform student registration, track learner progress, record test scores, and indicate course completions, and finally allow instructor trainers to assess the performance of their students.

As well as the administrative function, LMSs generally also include tools that support communication and collaborative activities such as email lists, threaded discussion forums, and wikis – that is, activities to support teaching and learning. This has meant most collaborative learning activities in learning organisations occurred within an institutional LMS using the tools provided there, except where individual teachers were experimenting outside the LMS.

However, the rise of Web2.0 applications has challenged the role of institutional LMSs which tend to be closed applications specific to an institution or jurisdiction, and challenged the policies of organisations and systems as teachers test, trial

Moodle case study
Belmont City College: Can Moodle transform a school?
See the video at http://www.edublogs.tv/play.php?vid=374
and experiment with collaborative tools that are only available outside their learning organisation.

**How LMSs are used**

The use and take up of LMSs within institutions by teachers has varied considerable. For example, some universities’ main goal is to get minimum core information about unit or course into the LMS. In large universities, for example, this can be a significant ongoing investment of time and effort, as information needs to be checked and updated regularly and can change on a semester-by-semester basis.

In other organisations LMSs are used for distance education and flexible delivery of courses as well as providing access to lecture recordings and slides. In others they are used for students’ collaborative learning activities through wikis, discussion forums and similar tools, and many organisations use the LMS in all these ways.

In the higher education sector it is not unusual for a university to have more than one LMS for historical reasons, with individual faculties or campuses supporting their own.

**6.13 The future of the LMS**

**3rd party integration**

Web 2.0 applications tend to be open and/or porous, and integrate with other applications using a mashup or API model. This enables third party developers to provide add-ons to the Web2.0 application to enhance the range of functionality available, to provide single sign on between multiple services to provide an integrated experience for users, or to integrate two different applications to provide some kind of value-added service.

The result is that some LMSs are now looking to enable the integration of 3rd party applications and the idea of a closed system is likely to be unsustainable in the longer term. The demand by students and teachers to use new tools not available within the learning organisation, and to develop and take advantage of their personal, professional and subject-area networks that exist within these external services – such as Facebook, Ning and the like - are likely to force a rethinking of what an LMS means.

A specific example would be the integration of Moodle, an open source class management system, and Second Life, a 3D virtual world, through the SLoodle plug-in.

This integration of an LMS, which provides administration and collaborative text-based tools and a 3D virtual environment, is a powerful combination for teaching and learning, and it is likely that this kind of integration between 2D and 3D modes will become commonplace.

**Open source and proprietary LMS**

Open source LMSs are in a better position than proprietary LMSs in this kind of context as the open source LMS developer community is interested in functionality, not in the necessity of maintaining and building market share or cash flow. Open source LMSs are able to harness a world-wide network of contributors, where commercial LMSs have to pay, train and support their development teams, and develop a sustainable business model that provides support to clients.

In the Australian higher education sector many universities are in the process of reviewing their commitment to their LMSs and a number are moving to open source software – particularly to Moodle and Sakai. Each has been built and designed with the education in mind: Moodle specifically to support social constructivist approaches to learning. Both can be supported and maintained within
an organisation, support packages can be bought from organisations that support the software locally\textsuperscript{235}, or can be made available as hosted services\textsuperscript{236}.

**Future provision of LMS services**

Ian Reid from the University of South Australia posits that universities will have three options in the future for the provision of LMS services\textsuperscript{237} - these are to develop in-house, purchase a product either open source or proprietary, or undertake a ‘comprehensive strategy’ that includes the development or purchase of a product combined with the provision of Web 2.0 services.

The latter is the most likely long term solution as it provides a capacity to incorporate the best of the web into an organisation’s learning environment without significant new investment or risk taking.

However significant challenges remain from a policy viewpoint: reliability (who’s responsible, is there a service level agreement), sustainability (Google Lively, Google’s 3D web environment, is closing down at the end of 2008 after only six months of trialling), record keeping and archiving, intellectual property, security, disaster recovery and so on need to be addressed. This approach is also predicated on the LMS being sufficient open with APIs that would enable some level of connection between the organisationally endorsed LMS and external services.

**Cloud computing**

Cloud computing also has value in this kind of environment.

Cloud computing is a model of computing where:

- the data or software applications are not stored on the user’s computer, but rather are accessed through the web from any device at any location a person can get web access\textsuperscript{238}.

But again cloud computing is another buzzword that needs to be challenged and unpacked. It is not conceptually different to an ASP (application service provider) or hosted service and is also known as SaaS (software as a service). That is, someone else is doing everything for you and you, as the user, just use the services and use the internet to access that service.

It’s a move away from the desktop and organisationally provided services to the hosting of all services provided by many providers in the ‘cloud’.

Cloud computing services could, and are, being offered by major IT providers such as Microsoft, IBM and Google. Microsoft is currently ramping up to handle an expected surge in cloud computing service demand with the development of its ‘cloud operating system’, Azure\textsuperscript{239}, and the Live Framework\textsuperscript{240}.

Google is providing in the ‘cloud’ email to students in the NSW government school system, to students at Macquarie University, and to the University of Auckland.

Some 69\% of online Americans use web mail services, store data online, or use software programs such as word processing applications whose functionality is located on the web. In doing so, these users are making use of ‘cloud computing,’ an emerging architecture by which data and applications reside in cyberspace, allowing users to access them through any web-connected device\textsuperscript{241}.
A concern with cloud computing centres on the storage, management and possible re-use of personal data. Cloud computing brings with it the fact that most of the creations that we (or our organisations) would regard as our/their personal intellectual property, will be stored at mega-data centres stored around the world.

The attraction is that we don’t have to install software.

An example of cloud computing is the edna services where edna Groups, edna lists and me.edu.au, the social networking site for Australian educators, all intersect. Access to personalised spaces for each of these services is through a browser, using Education.au’s locally created Single Sign On process.

None of the data that people access in these web services is stored on the user’s local computer – it is all stored on the edna services managed by Education.au and hosted by the University of Adelaide.

What is stored on their personal computer is a cookie that makes the login process easier. What users like is the fact they don’t actually need to worry about the software that provides these services.

Some of the other concerns that have been raised about cloud computing

- reliability of the service - if the service goes down for whatever reason what can you do? How do you access your documents stored in the cloud then?
- what if the data centre where your data is stored collapses or disappears?
- what if you want to move your content from one data centre to another? Is there interoperability?
- Storage concerns. Is storage finite? The world needs more and more storage, demand doubles every 18 months. the Petabyte Age. A petabyte is a quadrillion bytes. It’s reputed that Google processes 20 petabytes of information a day
- data centres mean server farms, using vast amounts of energy. They cost enormous amounts to build and need uninterrupted power supplies. They generate significant amounts of heat. Most of the buildings are actually air conditioning units
- legal and contractual obligations of the service provider may be incompatible with your organisation’s

6.14 Horizon Reports

The Horizon Project\(^2\) and the Horizon Reports are part of the Emerging Technologies Initiative managed by the New Media Consortium in the UK. The reports chart emerging technologies that are likely to have a major impact. They are collaboratively developed by largely volunteer participants who are invited to be members of Horizon Project teams. Australia now has its own Horizon Report focusing on the technologies likely to have an impact in Australia.
### International

The Horizon Reports summarised here from 2006-2008 identify the technologies expected to have an impact on education until 2012. Education.au’s CEO, Greg Black, provides an Australian perspective on four from the 2008 Horizon Report which he believes are the most relevant to teaching and learning: grassroots video, collaborative webs, mobile broadband, and mashups.

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### 6.14.2 Australia 2008

The Australian Horizon project for 2008 has identified the trends specific to Australia. Those most relevant to teaching and learning are most likely to be virtual worlds/immersive learning environments, cloud-based applications, alternative input devices and next generation mobile.

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6.15 Gartner Hype Cycle

Gartner\textsuperscript{248} is an international consulting company specifically in the area of technology. It has become well known for the Gartner Hype Cycle which identifies a set of stages in the development, uptake and acceptance of technologies, and the time scale for mainstream acceptance. These stages are:

- technology trigger
- peak of inflated expectations
- trough of disillusionment
- slope of enlightenment
- plateau of productivity

The 2008 Gartner Hype Cycle finds that virtual worlds and Web 2.0 are heading towards the Trough of Disillusionment and microblogging is hitting the Peak of Inflated Expectations.

It's important to note that the Gartner Hype Cycle is international and crosses all industries. For Australian education local variations and needs should be kept in mind.
Appendix 3: Metadata standards

A list of metadata standards

- edna metadata standard http://www.edna.edu.au/metadata
- Vetadata http://e-standards.flexiblelearning.net.au/
- NZGLS http://www.e.govt.nz/standards/nzgls/standard
- CanCore http://www.cancore.ca/
- Gateway to Educational Materials (GEM) http://www.thegateway.org/
- Jorum http://www.jorum.ac.uk/docs/pdf/japv1p0.pdf
- MERLOT http://www.merlot.org/merlot/index.htm
- UK-LOM http://www.cetis.ac.uk/profiles/uklomcore/
Appendix 4: Impacting on privacy

Cookies

The term "cookie" commonly refers to a text file containing a unique identifier that is sent to a person’s computer by web servers as they serve up pages requests. Cookies enable the tracking of a person’s online behaviour and build up a personal profile based on their interests. Although the expressed objective is to provide a better browsing experience, profile information is bought and sold many times to organisations, particularly advertising agencies.250

Web bugs

Web bugs are invisible plants on pages (very small, 1x1 pixel in size) and function as hidden tracking devices. As requests are made to servers certain information is being transmitted back to the servers – such as your IP address, what browser you use, your operating system, the date and time the text or image is being viewed, cookies and other information. Like cookies this information may be cross-referenced and matched up with personal information that has previously been collected and analysed by tracking firms, or even your internet service provider (ISP).

Web bugs are also in email and other documents. Trackers embed web bugs in email in order to find out when emails are read and if emails are forwarded. The web bug can send information back to the server about the recipient of forwarded emails along with a date stamp and the actual content of the email can be send back to the server.

Scripts

Common scripting languages such as JavaScript and Microsoft’s JScript and VBScript make it very easy to steal even more information. Simple code embedded in a web page or in an email can grab any document or file from a hard drive and sent back to a server. These simple scripts can steal personal information, contacts and financial documents. Furthermore the scripts can write files and embed viruses.
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Endnotes


9 FRODO (Federated Repositories of Digital Objects) http://rubric.edu.au/relproj1.htm#id1 Accessed 22 November 2008


11 This is supported by Recommendation 16 of the Bradley Review of Higher Education which says: That, after further consideration of current problems with regional provision, the Australian Government provide an additional $80 million per year from 2012 in funding for sustainable higher education provision in regional areas to replace the existing regional loading. This should include funding to develop innovative local solutions through a range of flexible and collaborative delivery arrangements in partnership with other providers such as TAFE. Reference: http://www.deewr.gov.au/HigherEducation/Review/Documents/PDF/Higher%20Education%20Review_one%20document_02.pdf Accessed 9 February 2009


13 Research undertaken by Access Economics for the Bradley Review of Higher Education found that “from 2010 the supply of people with undergraduate qualifications will not keep up with demand. To increase the numbers participating we must also look to members of groups currently under-represented within the system, that is, those disadvantaged by the circumstances of their birth: Indigenous people, people with low socio-economic status, and those from regional and remote areas.” Reference: http://www.deewr.gov.au/HigherEducation/Review/Documents/PDF/Higher%20Education%20Review_one%20document_02.pdf, page xi, Accessed 9 February 2009

The Bradley Review of Higher Education has recommendations that recognise the disparity of access experienced by regional and remote Australians. Its recommendations suggest the following: Recommendation 16 That, after further consideration of current problems with regional provision, the Australian Government provide an additional $80 million per year from 2012 in funding for sustainable higher education provision in regional areas to replace the existing regional loading. This should include funding to develop innovative local solutions through a range of flexible and collaborative delivery arrangements in partnership with other providers such as TAFE. (Chapter 3.7) Recommendation 17 That the Australian Government commission a study to examine the feasibility of a new national university for regional areas and, if the study indicates that a new national regional university is feasible, the Australian Government provide appropriate funding for its establishment and operation. (Chapter 3.7)


This could be with a specific university. For example the Bradley Review of Higher Education suggests the establishment of a national university for regional areas, subject to a feasibility study.


The ‘e’ in e-learning is for ‘electronic’. There is some debate about whether the term should be used, as the focus should be on learning, not on whether or not technology is involved.


FRODO (Federated Repositories of Digital Objects) http://rubric.edu.au/relproj1.htm#id1 Accessed 22 November 2008


Education.au’s InspiRED (www.inspired.edu.au) initiative is a starting point for this but at present is focused on the school education sector and a limited number of topic areas. The MCEETYA ICT in Schools Taskforce ICT Research in Education project (now a category in edna at ictresearch.edna.edu.au) provides an aggregation point for research generated around ICT in education.


37 One of the difficulties with TLF curriculum resources has been with access. This has been partly addressed with the development of Scootle (www.scootle.edu.au), however, some states/territories still have interfaces to the exchange which make it tiresome to access, download and use TLF resources.


58 This is supported by Recommendation 16 of the Bradley Review of Higher Education which says: That, after further consideration of current problems with regional provision, the Australian Government provide an additional $80 million per year from 2012 in funding for sustainable higher education provision in regional areas to replace the existing regional loading. This should include funding to develop innovative local solutions through a range of flexible and collaborative delivery arrangements in partnership with other providers such as TAFE. Reference: http://www.deewr.gov.au/HigherEducation/Review/Documents/PDF/Higher%20Education%20Review_one%20document_02.pdf Accessed 9 February 2009


60 Research undertaken by Access Economics for the Bradley Review of Higher Education found that “from 2010 the supply of people with undergraduate qualifications will not keep up with demand. To increase the numbers participating we must also look to groups currently under-represented within the system, that is, those disadvantaged by the circumstances of their birth: Indigenous people, people with low socio-economic status, and those from regional and remote areas.” Reference: http://www.deewr.gov.au/HigherEducation/Review/Documents/PDF/Higher%20Education%20Review_one%20document_02.pdf, page xi, Accessed 9 February 2009


65 Student attitudes towards learning and their need for the ‘right answer’ was explored by participants in the CTL Tankette open conversation.


67 Conversation with a primary school principal who said that basic computing skills were taught to students, as well as the basics of any software they were using. That is, they were still learners of the technology. So the debate about what is an ‘immigrant’ and what is a ‘native’ is debatable.


For example, the ACT Government is undertaking a tender process (2008) for the delivery of a virtual learning environment in 2009 which is a single point of entry for services, applications, content to support online learning, administrative applications and data, collaborative tools and have an eye on the future. This is then going to be delivered to all government schools in the ACT, with ‘some school customisation’.


Learner Information security (unpublished)


138 For example, Geocities was a free open website building environment where anyone could create a website and publish their own content. Bulletin boards supported communities of interest. Free services provided visitor counters, search engines and other web services to build community around their website or brand.


144 Kelly, K, 2007, Predicting the next 5000 days of the web, TEDTalks, Reference: http://www.youtube.com/watch?v=yDYCf4ONh5M Accessed 22 November 2008


146 Education.au, 2005, SA, Emerging Technologies, A Framework for Thinking, ACT Department of Education and Training


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250 Callahan, K, Hacked by a corporation, PBS, Reference: