



## Building engaging physical and virtual learning spaces: a case study of a collaborative approach

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Research is somewhat divided as to whether today's younger students speak natively the language of social networks, mobile phones, and the Internet. What seems incontrovertible, however, is that current learners (from several generations) have readily embraced technology which allows them to share their experiences and knowledge through online sites such as Facebook, Twitter and ePortfolios. Universities often struggle to keep pace with the engagement offered by these largely commercial social networking sites. Large and devolved universities face the added challenge of integrating support services to build university-wide systems that integrate with curriculum. While universities cannot force engagement, it seems likely that student engagement and achievement will be optimized if curricula and next generation learning spaces work in concert, and are supported by collaborative partnerships. Curtin University has in recent years reevaluated its physical and virtual spaces based on research of its students' ownership and expectations. Recent initiatives reported in this paper demonstrate how central university support agencies have collaborated in an effort to design spaces and tools that optimise engagement incorporating Web 2.0 technologies and mobile platforms.

Keywords: student engagement, engaging learning spaces, eportfolio, mobile learning, Web 2.0

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### Introduction: Student engagement

Student engagement has become a 'hot topic' in higher education in recent years: it commonly refers to the 'time, energy and resources students devote to activities designed to enhance learning at university. . . . [using] a simple measure of time spent on campus or studying, to in- and out-of-class learning experiences that connect students to their peers in educationally purposeful and meaningful ways' (Krause, 2005). George Kuh's work is centred on the development and validation of the National Survey of Student Engagement (NSSE) which is used broadly across higher education in the United States. The instrument has more recently been adapted for Australian use, under the name Australian Survey of Student Engagement (AUSSE), a survey administered by the Australian Council of Educational Research (ACER), and now in use in the majority of Australian universities (Australian Council for Educational Research, 2008; Coates, 2005). As these instruments show, engagement is a broad topic, and students engage and disengage for a multitude of reasons, many of which are beyond the control of universities. That said, there are many aspects of the student experience where universities can intervene—namely the curriculum and the physical and virtual learning spaces in which it occurs. Learning spaces, physical or virtual, can at best complement the design of the intended learning experience—that is, the planned curriculum, or 'all the planned learning opportunities offered by the organisation to learners and the experiences learners encounter when the curriculum is implemented' (Print, 1993).

Research across the sector informs universities about what most students want and expect during their degree experience: an analysis of in excess of one hundred and sixty thousand comments made by graduates from 14 Australian universities in the Course Experience Questionnaire confirms that student comments, positive and negative, are not about classrooms, websites, or physical convenience on campus, although these things clearly make a difference to student wellbeing (Scott, 2005). The total university experience shapes productive learning—predominant themes are: learning is a profoundly social experience; multiple methods for active learning where students are asked to apply knowledge to

problem-solving in contexts such as debates, discussions, face-to-face activities, independent study, simulations and using information technology “to find, shape and share information” (p. 58); and make assessment relevant and engaging (and pitched at the level of expertise needed for the first five years beyond graduation), with clear grading criteria, and timely and constructive feedback (Fullan & Scott, 2009). These elements of engagement, reported frequently in the literature and often emanating from the face-to-face experience, are also at the heart of Web 2.0 technologies which are “all about moving beyond content delivery to personal publishing, ease of use, interactivity, collaboration, sharing, and customisation” (Cochrane, 2006). These “engaging” features are increasingly available in social networking sites and on devices such as laptops, smart phones and digital music players, all operating in a ‘wireless world’ and constituting the electronic habitat in which younger (and increasingly more mature) people connect and socialise (Johnson, Levine, & Smith, 2009). The initiatives described here attempt to marry the two concepts: that is, create physical and virtual learning spaces optimised for student engagement.

## Engaging learning space design at Curtin

This paper is a case study of Curtin University initiatives to harness cross-institutional services and work together to focus on providing the physical and virtual environment optimized for student engagement. Curtin embarked on its Curriculum 2010 (C2010) project in 2007, a three-year initiative which addresses issues to make the Curtin course experience more accessible, more engaging, and more efficient for staff and students. The task which, fittingly, occupied the lion’s share of the project resources was the implementation of Comprehensive Course Review focussing on improving the constructive alignment of the planned curriculum (Biggs, 2003). As the project unfolded, however, it became very clear that an engaging curriculum, of itself, was insufficient to facilitate a quantum leap in student engagement: the intended curriculum also requires physical and virtual spaces optimised for student engagement. For this reason, the Engaging Learning Spaces Working Party was formed, with membership comprised of stakeholders from Faculty representatives (students, teaching staff, the Deans of Teaching and Learning) and central support services (the Office of Teaching and Learning, Curtin Information Technology Services, Properties, the Library, Student Services and Student Support). The particular task of the working party was to forge a stronger connection between those who design and support physical and virtual learning spaces, and those who use them, all the while being informed by recent scholarship and best practice in the creation of engaging physical and virtual learning spaces.

## Scholarship on engaging learning spaces

JISC’s *Designing spaces for effective learning* promotes seven principles for contemporary learning space design. Educational buildings need to be: flexible, to accommodate both current and evolving pedagogies; future-proof, to enable space to be re-allocated and reconfigured; bold, to look beyond tried and tested technologies and pedagogies; creative, to energise and inspire learners and tutors; supportive, to develop the potential of all learners; and enterprising, to make each space capable of supporting different purposes (Joint Information Systems Committee, 2006). JISC further suggests that key outcomes are motivation (particularly through effective lighting), collaboration (and open plan design) and personalisation and inclusion (particularly ubiquitous wireless access and using moveable furniture) (Joint Information Systems Committee, 2006). The Scottish Funding Council’s *Spaces for Learning* distils twelve key steps for creating and maintaining effective learning spaces. The report provides suggestions on generic teaching and learning spaces such as group teaching and learning spaces, simulated environments, immersive environments, peer-to-peer and social learning spaces, learning clusters, individual learning spaces and external spaces (Scottish Funding Council, 2006). In the United States, Educause’s *Learning Spaces* asserts that ‘many of today’s learners favour active, participatory, experiential learning—the learning style they exhibit in their personal lives’ (Oblinger, 2006). In a student survey investigating the qualities students seek when selecting a workspace, five characteristics emerged most frequently—convenient location, low level of distractions, open late hours, quiet, and comfortable furniture (Nixon, 2009). In Australia, the focus of attention on university learning spaces has been supported by the Australian Learning and Teaching Council (ALTC), particularly through the University of Queensland’s Next Generation Learning Spaces project (University of Queensland, 2007): the Pedagogy-Space-Technology (PST) Framework for Designing and Evaluating Learning Places poses a core question: what is the motivation for the initiative, and what types of learning and teaching are we trying to foster? Because the goals are student engagement and outcomes, pedagogy drives the other two key considerations – technology and architecture (Radcliffe, 2008).

The literature confirms that changes in technology and student ownership and use of devices have largely driven interest in reviewing the design of physical learning spaces. Australian studies of undergraduate

use and ownership of mobile devices have found mixed results which is unsurprising given the rapid shift in technology adoption world-wide: research at Curtin in 2005 and 2007 found that first year undergraduates had high levels of access to the Internet off-campus, a very high level of ownership of mobile phones and digital music devices; some had laptops (and relatively few had handheld computers)—all of these devices were used “on the go” for instant messaging, blogging and podcasting and other emerging Web 2.0 applications (Oliver & Goerke, 2007). However, studies at Melbourne University, also with first year students, found that those students were not really ‘digital natives’ as suggested in American studies (Kennedy, Judd, Churchward, Gray, & Krause, 2008). Clearly, the changing nature of technology, and of its consumers, make this a difficult topic to research definitively—nevertheless, the trend appears to be that the internet continues to evolve at a rapid pace, and with Web 2.0 enhancements is now more interactive, more engaging, more powerful, and more mobile—since 2008 there has been exponentially increased use of social networking sites such as Facebook, MySpace, and more recently, Twitter. A large 2007 US study found that 80.3% of about 27,000 undergraduates reported daily use of social networking sites such as Facebook and MySpace (Caruso & Salaway, 2007). Similarly, about 41% of the Australian population have at least one online profile in a social networking site (ABC Television, 2008). The potential of mobile learning and microlearning—that is, learning involving small chunks of content, often using mobile and wireless devices (Hug, 2005)—to enhance student engagement has been explored with growing intensity in recent years (Cochrane, 2006; Kukulska-Hulme & Traxler, 2005; Nyiri, 2002; Oliver, 2007; Prensky, 2005; Stone, Alsop, Briggs, & Tompsett, 2002; Traxler, 2002; Trinder, 2005; Wentzel, Lammeren, Molendijk, Bruin, & Wagtenonk, 2005). While there have been many initiatives involving formal curriculum using mobile phones, some universities have begun to create purpose-built mobile websites and alerting systems to engage in student support. Recent examples in the United States are Stanford University and MIT. Stanford has invested heavily through a student-led creation of an iPhone Application (iStanford) which enables staff and students to access a Directory, Campus Maps, Courses (units), Athletics and other Events, as well as pay bills. The same company, under the brand name MobilEdu has created similar sites and applications for Duke and Texas A&M University, and has recently been subsumed into BlackBoard (see <http://www.medu.com/>). Massachusetts Institute of Technology have taken a slightly different approach: because iPhones are not ubiquitous on that campus (largely to due to the carrier and coverage in that location), the iPhone ‘app lookalike’ is emulated in a similar web-based solution accessible by web-enabled phones such as Blackberry, Symbian devices, Google Android, and so on: students use any web-enabled phone, including the iPhone, to access a website especially designed to enable rendering for whatever device the student uses (see <http://m.mit.edu>).

Regardless of technology for personal or leisure use, there has been extraordinarily rapid adoption of learning management systems in universities worldwide in the past ten years, with varying degrees of success, and varying degrees of engagement from staff and students. Beyond the adoption of systems such as Blackboard, institutions worldwide have also engaged in rapid deployment of eportfolio systems (including commercial products such as PebblePad and Mahara) (G. Hallam et al., 2008). ePortfolios have been defined as “a purposeful aggregation of digital items – ideas, evidence, reflections, feedback – which ‘presents’ a selected audience with evidence of a person’s learning and/or ability” (Sutherland, 2007). ePortfolios have become increasingly popular in recent years as a vehicle for the collection of learning artefacts, and for reflection on those artefacts, in order to develop graduate attributes and employability skills (Knight & Yorke, 2006). Studies suggest that employers prefer a portfolio approach and recognise that ePortfolios have potential benefits for both graduates and employers, and that employers are able to obtain “a more informed picture of a job candidate than is usually provided by a traditional curriculum vitae” (Business Industry and Higher Education Collaboration Council, 2007). The ePortfolio has been recognised as both a tool and a process that can help students trace their learning journey by providing the opportunity to demonstrate and reflect on learning outcomes to enhance the educational experience (G. Hallam, Harper, W. & McAllister, L., 2007). Student feedback on ePortfolio experiences indicates that students value the opportunity to focus on personal and professional strengths and weaknesses and to explicitly align learning and the workplace (G. Hallam et al., 2008). Concepts of ePortfolios as static repositories are predicated on a Web 1.0 environment; in Web 2.0, the ePortfolio has the potential to become a far more interactive and engaging space.

Recent research at Curtin informed the initiatives reported in this paper: in February 2009 a web survey was available to all Curtin students for a two-week period through the student portal. It sought information on student access to the Internet off-campus, current and planned ownership and use of mobile devices and perceptions as to how the learning experience at Curtin might be enhanced with devices, network services and online tools. At the close of the survey 1536 responses had been submitted. The vast majority of students (87.8%) were undergraduate students, and fulltime students (88.9%), and over 70% of respondents indicated that they were just commencing or about half way through their

course. This means that the survey results were skewed to younger undergraduates at the Bentley campus. The results, in summary, showed that

- The vast majority of these students (about 94%) had access to the Internet off-campus;
- Three quarters (76%) had laptops or netbooks (even though the terms were not always clearly understood). When asked about their plans to upgrade within the next year, 30% of respondents said they intended to do so, and many had a “wait and see” attitude commenting that entirely new devices appear without much notice;
- Approximately 99% of respondents had mobile phones: three-quarters of those (75%) were web-enabled. Nearly 80% reported that their phone was less than two years old, and almost a third (30.3%) intended to upgrade within the next year. At the time of the survey, about a quarter of those students were unsure what they would buy: roughly a quarter planned to upgrade to a Nokia (which was already the most commonly-owned brand), and about 20% planned to buy an iPhone. The remainder would ‘wait and see’.
- About three quarters of the respondents (74.2%) had a digital music player, and three quarters of those (76.3%) were iPods of every description. Of the 12% who planned to buy or upgrade, the vast majority planned to purchase an iPod. This suggests that a high proportion of the respondents use iTunes which is free and cross-platform;
- Facebook and MySpace were the clear favourites in social networking sites with about 80% of respondents reporting access to Facebook and about a third reporting use of MySpace. About 10% used Blogger, and at the time of the survey (early 2009) less than 5% used Twitter and less than 1% used Second Life. Given the media exposure of Twitter in the last six months, this figure is unlikely to be a guide to current usage).

Students were asked to report what they used their phones for (web access, SMS, MMS, and so on). Table 1 shows that students reported highest use of phones (occasionally or frequently) for SMS and taking photos (more than 85%), music, MMS and making videos (more than half), recording audio and accessing the web (about one-third):

**Table 1: Usage of mobile phone**

	% Agree	SMS	Take photos	Music/ audio	MMS	Make videos	Record audio	Access web	Access wireless	Watch movies	Instant messages
No	Phone can't do this	0.5	5.7	10.3	9.5	13.2	9.8	15.3	38.9	32.5	30.2
	Phone does this but I don't use it	1.5	8.5	29.6	32.6	31.3	44.5	48.7	38.7	45.5	53.6
Yes	Occasionally	9	52	38	32.7	41.5	36.6	23.4	13.2	16.2	9.3
	Frequently	89	33.8	22.2	25.2	14	9	12.7	9.1	5.8	6.8
	Overall Yes	98	85.8	60.2	57.9	55.5	45.6	36.1	22.3	22	16.1

These levels of ownership and use drive student expectations on campus: students tended to report the laptop as the “must have” device for learning, and whatever the brand, the desired product should be small and light, good looking (!) with an easy and reliable connection to wireless. Students wanted to be able to sit somewhere comfortable, often informally with friends, to use their devices, with easy access to power, printing facilities directly from their laptops, and wireless (better coverage, easier login and use on a range of devices, particularly mobile phones and iPod Touches). Many students were very positive about the online environment at Curtin, expressing high satisfaction. However, respondents generally wanted more and faster computers, and more printing facilities. Smart devices are clearly popular, and students expect to be able to use them in their learning within and beyond the classroom—for example, to find their friends on campus and to access information on timetable changes, and to view streamed iLectures.

Recent large sample research suggests these levels of ownership are very similar in the United States (Smith, Salaway, & Caruso, 2009): ECAR reports in October 2009 that:

- For the 39 institutions that participated in each of the last four years’ studies, desktop ownership decreased 27 percentage points, while laptop ownership increased almost 23 points to 88.3% (p. 3);
- Two-thirds (67.9%) reported owning a machine two years old or less (p. 4)

- Whereas 18- and 19-year-old respondents from the 39 institutions that participated in each of the last four years' studies reported a consistently high use of SNSs, use by those ages 30 to 39 more than tripled (a 236% increase) (p. 4), and among the respondents 40 and older, SNS use more than quadrupled (a 326% increase) (p. 5)

ECAR identified four emerging types of student adopters of mobile Internet use:

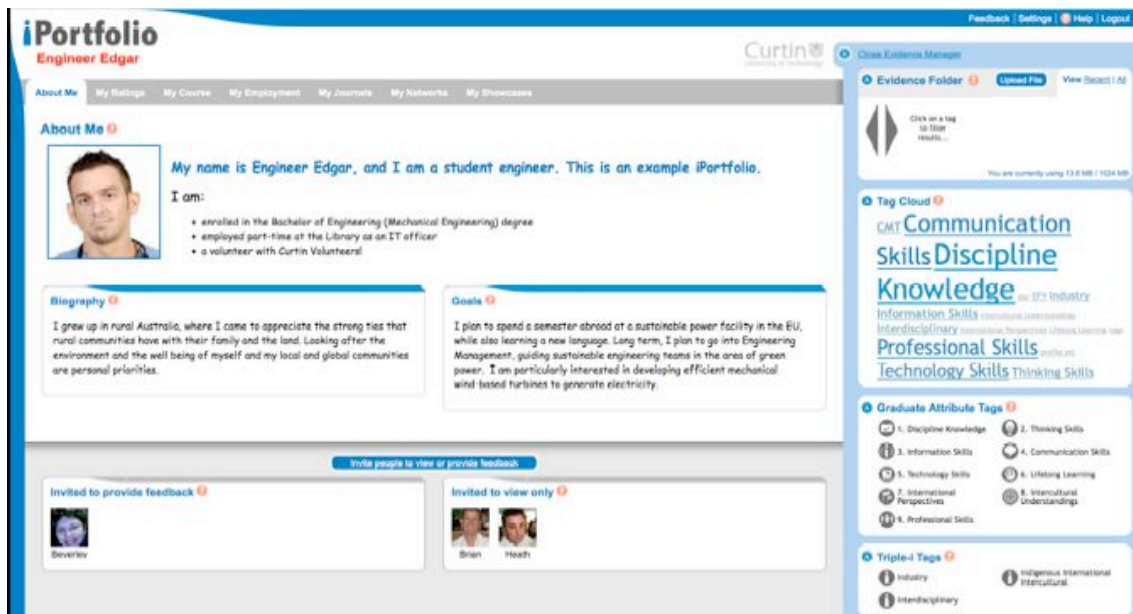
- *Power users.* More than a quarter of respondents owned handheld devices and used them to access the Internet weekly or more often.
- *Occasional users.* Fewer than 1 in 10 respondents owned handheld devices but used them to access the Internet monthly or less frequently.
- *Potential users.* About 30% of respondents either currently owned an Internet-capable handheld device but never used it to access the Internet or didn't own an Internet-capable handheld device but said they planned to purchase one in the next 12 months.
- *Non-users.* One-third of this year's respondents didn't own an Internet-capable handheld device and didn't plan to own one in the next 12 months (p.10) (Smith et al., 2009).

### Three initiatives at Curtin

Curtin's internal research findings informed three strategic initiatives. The first initiative was an *Engaging Learning Spaces Forum* conducted in each Faculty. The C2010 working party agreed that consultation with students and teaching staff was essential to ascertain current perceptions of spaces, and how those spaces might be enhanced to increase learning. To this end, each Faculty hosted an Engaging Learning Spaces Forum designed to consult with teachers and learners as to their aspirations and needs with regard to formal and informal learning spaces, both physical and virtual. Each Forum consisted of a brief introduction to the literature in engaging learning spaces, and a presentation on latest developments and plans on the Curtin campus. The focus of the participant discussion was then on formal and informal learning spaces, with recognition that each was vital to both staff and students. Participants were then asked to give feedback on their views on the physical and virtual aspects likely to lead to greater student engagement, current use of space (including the best aspects and what needs improvement) and participants' hopes and needs in regard to learning spaces in the future. Attendees were invited to contribute to large group open discussion as well as written feedback on key questions. Just over one hundred staff and students attended the four Forums. Feedback has been collated and presented to the University with recommendations for immediate action: these include plans for the provision of informal spaces for engaging with learning and with others. Drawing on the students survey results, these spaces need power, comfort, flexibility and effective heating and lighting. These recommendations have now been built into Curtin's new Teaching and Learning Plan.

A second initiative was the implementation of the *iPortfolio*, a university-wide Web 2.0-style ePortfolio system. In 2008, Curtin's Academic Board endorsed a paper recommending that graduate employability be a defining characteristic of teaching and learning and the student experience. Subsequently, the idea of a student portfolio for documenting evidence of achievement emerged from discussions among staff and students. An Academic Board Forum explored staff and student feedback on the concept. Over one hundred staff and students registered their attendance. Participants were informed that the Forum was the beginning of a conversation about the possibility of implementing an ePortfolio at Curtin, and an exploration of the key factors to be considered. As well as sharing ideas at the Forum, participants were asked to provide written comments on key questions. Again, collated feedback was presented to the University, and advice was sought from leading international experts on a concept for Curtin's ePortfolio (which operates under the brand name of iPortfolio to mesh with Curtin's adoption of a triple-i curriculum) and work commenced on building the system.

Curtin's iPortfolio has now been piloted with 2000 users. The creation and refinement of the iPortfolio has been undertaken by the iPortfolio Working Party which again includes members from across the University (Guild, Student Services, Student Support, Digital Media Unit, Library, Centre for Aboriginal Studies, Faculties, Curtin Information Technology Services and the Office of Teaching and Learning). Up to two thousand staff and students have been invited to participate in the formal pilot, both through specified units and as individuals. The iPortfolio is designed to use Web 2.0 technologies to optimise the 'stickiness' of the system (a term used to indicate the system's power to get the user to continue to use the system) as well as to connect with others for a 'profoundly social learning experience' (Scott, 2005). It also attempts to address students' seemingly insatiable appetite for feedback. Students and staff can create an iPortfolio upon subscription and use the:



- *About Me* tab to create, share and manage a profile picture, an introduction, biography and goals;
- *My Ratings* tab to self-rate and provide evidence of achievement of Curtin's Graduate Attributes and the triple-i curriculum, then invite others to view or provide ratings and feedback;
- *My Courses* tab to create, share, manage and collaborate on assignment tasks, as well as create, share and manage evidence of learning against generic and specific professional competencies;
- *My Employment* tab to create, share and manage a resume and evidence of work-related skills, experiences and professional development;
- *My Journals* tab to create, share, manage and collaborate using reflective journals;
- *My Networks* tab to create, share and manage evidence of achievements gained through clubs and networks; see an overview of those who are invited to view, provide feedback or collaborate (as well as those who have requested them to provide feedback); access exemplar portfolios; and see a comparison of their self-ratings with an average of others' ratings of their of their achievements;
- *My Showcases* tab to create, share and manage polished evidence of learning and publish showcases to the iTunesU.

Users are strongly encouraged to match claims of achievements with evidence using text, image, movie and audio files, all of which can be "tagged" according to the Graduate Attributes, the Triple-i and custom tags. A tag cloud shows the emphasis of evidence at any time. The following features are envisioned for the iPortfolio in the near future:

- Graphical comparisons of self-ratings, and peer ratings;
- The option to make any of the current tabs invisible or adaptable;
- Links to popular social networking sites such as Facebook and LinkedIn
- Provision of iPortfolios to alumni and prospective students
- Embedding self-directed career development learning
- The facility to show published Showcases such as video resumes on mobile devices through a CurtinMobile link (see below).

Feedback during the pilot will be used to enhance the system with the intention that it is optimised for easy, engaging and accessible student and staff use ready for full implementation in 2010. Early indications suggest a very positive attitude of students towards the iPortfolio.



The third initiative was *CurtinMobile*, a mobile website designed as ‘help at your fingertips’ for Curtin students, staff and visitors. Student focus groups provided guidance for the creation of the site at [m.curtin.edu.au](http://m.curtin.edu.au) which enables students to easily connect with the student experience ‘on the go’. The initial feature-set is comprised of access to the student portal, campus maps (including building photos), campus news and events, Library (opening hours, catalogue and more), facilities (food and drink, gym timetables, access to support (financial, career, study and personal support services), information technology (where to find an available computer on campus), public transport information, People (find Curtin staff and departments), and Emergency. This project has been supported by many areas of the University including the Office of Teaching and Learning, Library, Digital Media Unit, Student eServices, Support Services, Guild Services, Properties and Recreation Services. It is envisaged that CurtinMobile will be reviewed with students in an ongoing way to ensure that it

incorporates advances in mobile technology and meets the expectations and needs of Curtin students. Features which are expected to be included in the future are Student Email, Blackboard, iPortfolio, Student Timetables and iLectures.

## Conclusion

Using an iPortfolio or a mobile website is not necessarily engagement, and nor is sitting listening to a lecture—whether it takes place in a traditional or innovatively designed space, or is streamed on a mobile device. Time on task is increasingly used as a measure of engagement in instruments such as the NSSE and the AUSSE; some contest this. What is irrefutable, however, is that students and the community expect that universities will not only educate but prepare their graduates for a constructive and productive working life as engaged citizens. While universities cannot force engagement, it seems likely, drawing on the literature synthesised here, that student engagement and achievement will be optimised if curricula, learning spaces and technology aids are purposefully designed with the appropriate goal in sight. This paper describes three initiatives at Curtin University which have been achieved through consultation with the student body, and collaborative partnerships between the faculties and central support services to build physical and virtual spaces for engaged learning. They have attempted to exploit Web 2.0 features in virtual spaces to emulate the conditions of the most engaging learning in the physical world.

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## References

- ABC Television. (2008). My Face: Will you end up regretting what you reveal about yourself online? On *The Hack Half Hour*.
- Australian Council for Educational Research. (2008). *Attracting, Engaging and Retaining: New Conversations About Learning--Australasian Student Engagement Report*.
- Biggs, J. (2003). *Teaching for quality learning at university: What the student does* (2nd ed.). Buckingham: Society for Research into Higher Education and Open University Press.
- Business Industry and Higher Education Collaboration Council. (2007). *Graduate employability skills*. Melbourne: Business, Industry and Higher Education Collaboration Council.
- Caruso, J. B., & Salaway, G. (2007). *Key findings: The ECAR Study of Undergraduate Students and Information Technology, 2007*: Educause.
- Coates, H. (2005). The value of student engagement for higher education quality assurance. *Quality in Higher Education*, 11(1), 25-36.

- Cochrane, T. (2006). Learning with wireless mobile devices and social software. In *Who's Learning? Whose technology? Proceedings ascilite Sydney 2006*.  
[http://www.ascilite.org.au/conferences/sydney06/proceeding/pdf\\_papers/p50.pdf](http://www.ascilite.org.au/conferences/sydney06/proceeding/pdf_papers/p50.pdf)
- Fullan, M., & Scott, G. (2009). *Turnaround leadership for Higher Education*. San Fransisco: Jossey-Bass.
- Hallam, G., Harper, W., McCowan, C., Hauville, K., McAllister, L., Creagh, T., et al. (2008). *ePortfolio use by University students in Australia: Informing excellence in policy and practice*: Australian ePortfolio Project.
- Hallam, G., Harper, W. & McAllister, L. (2007). *The journey to work: the impact of the ePortfolio on student learning*. Paper presented at the Evaluation and Assessment Conference, Brisbane.
- Hug, T. (2005, June 23 - 24). *Microlearning: A New Pedagogical Challenge (Introductory Note)*. Paper presented at the Microlearning2005 :: Learning & Working in New Media Environments, Innsbruck (Austria).
- Johnson, L., Levine, A., & Smith, R. (2009). *The 2009 Horizon Report*. Austin, Texas: The New Media Consortium.
- Joint Information Systems Committee. (2006). Designing spaces for effective learning: A guide to 21st century learning space design from [http://www.jisc.ac.uk/eli\\_learningspaces.html](http://www.jisc.ac.uk/eli_learningspaces.html)
- Kennedy, G. E., Judd, T. S., Churchward, A., Gray, K., & Krause, K.-L. (2008). First year students' experiences with technology: Are they really digital natives? *Australasian Journal of Educational Technology*, 24(1), 108-122. <http://www.ascilite.org.au/ajet/ajet24/kennedy.html>
- Knight, P., & Yorke, M. (2006). *Employability: Judging and communicating achievements*: Higher Education Academy.
- Krause, K.-L. (2005). *Understanding and promoting student engagement in university learning communities*. Paper presented at the Sharing Scholarship in Learning and Teaching: Engaging Students, James Cook University Symposium, from [www.cshe.unimelb.edu.au/pdfs/Stud\\_eng.pdf](http://www.cshe.unimelb.edu.au/pdfs/Stud_eng.pdf)
- Kukulka-Hulme, A., & Traxler, J. (Eds.). (2005). *Mobile learning: A handbook for educators and trainers*. London: Routledge.
- Nixon, A. L. (2009). Aligning Learning Space Designs and Student Work: Research Implications for Design Processes and Elements. *EDUCAUSE Quarterly Magazine*, 32(1).
- Nyiri, K. (2002). *M-Education: Bridging the gap of mobile and desktop computing*. Paper presented at the EEE International Workshop on Wireless and Mobile Technologies in Education, Vaxjo, Sweden.
- Oblinger, D. G. (Ed.). (2006). *Learning spaces*: Educause.
- Oliver, B. (2007). What is quality university learning and how might micro-learning help to achieve it? In T. Hug (Ed.), *Didactics of Microlearning* (pp. 365-378): Waxman.
- Oliver, B., & Goerke, V. (2007). Australian undergraduates' use and ownership of emerging technologies: Implications and opportunities for creating engaging learning experiences for the Net Generation. *Australasian Journal of Educational Technology*, 23(2), 171-186.  
<http://www.ascilite.org.au/ajet/ajet23/oliver.html>
- Prensky, M. (2005). What Can You Learn from a Cell Phone? Almost Anything! *Innovate*, 1(5).
- Print, M. (1993). *Curriculum Development and Design*. Sydney: Allen and Unwin.
- Radcliffe, D. (2008). *A Pedagogy-Space-Technology (PST) Framework for Designing and Evaluating Learning Places*. Paper presented at the Learning Spaces in Higher Education: Positive Outcomes by Design: Proceedings of the Next Generation Learning Spaces 2008 Colloquium, Brisbane.
- Scott, G. (2005). *Accessing the student voice: Using CEQuery to identify what retains students and promotes engagement in productive learning in Australian higher education*: HEIP.
- Scottish Funding Council. (2006). *Spaces for learning: A review of learning spaces in further and higher education*.
- Smith, S. D., Salaway, G., & Caruso, J. B. (2009). *The ECAR Study of Undergraduate Students and Information Technology, 2009*: EDUCAUSE Center for Applied Research
- Stone, A., Alsop, G., Briggs, J., & Tompsett, C. (2002, 20-21st June, 2002). *M-Learning and E-Learning: A review of work undertaken by the Learning Technology Research Group, Kingston University, UK*. Paper presented at the Proceedings of the European Workshop on Mobile and Contextual Learning, The University of Birmingham, England.
- Sutherland, S., & Powell, A. (2007). CETIS SIG mailing list discussions.
- Traxler, J. (2002, 20-21st June, 2002). *Evaluating m-Learning*. Paper presented at the Proceedings of the European Workshop on Mobile and Contextual Learning, The University of Birmingham, England.
- Trinder, J. (2005). Mobile technologies and systems. In A. Kukulka-Hulme & J. Traxler (Eds.), *Mobile learning: A handbook for educators and trainers* (pp. 7-24). London: Routledge.
- University of Queensland. (2007). Next Generation Learning Spaces from <http://www.uq.edu.au/nextgenerationlearningspace/>



Wentzel, P., Lammeren, R. v., Molendijk, M., Bruin, S. d., & Wagtendonk, A. (2005). *Using mobile technology to enhance students' educational experiences: Case Study from the EDUCAUSE Center for Applied Research*. <http://net.educause.edu/ir/library/pdf/ers0502/cs/ecs0502.pdf>

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