Knowledge flow and the power of networks — a powerhouse for innovation

Judy O'Connell

The cliché for our education era is that 'there's an app for that', yet this slogan belies the intricacies and complexities of human communication and the learning and teaching environments in which we engage with our students — the global citizens of our future world. Literacy and information fluency in digital environments is our contemporary challenge and the 'app generation' is an expression of the power of networks and the pertinence of technology in the knowledge interactions of learning and teaching.

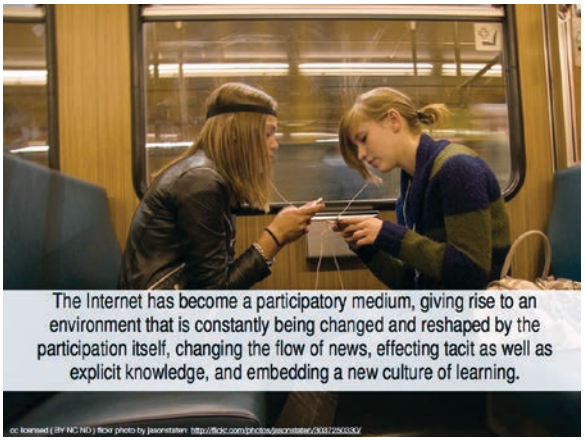
Most educators understand that digital convergence has begun to have a significant influence on teaching, learning and literacy, resulting in a need for all teachers to revisit and revitalise their understanding of the core influences that shape the pedagogical interactions in classrooms and beyond. This is not a technology issue or a BYOD device issue, so much as a pedagogically grounded need for innovative ways to think about old and new media, including the knowledge flow embedded in the power of our networks.

Information has long been a fundamental entity in the knowledge work domain of teacher librarians, resulting in a long-standing affiliation with models of information literacy as transactional processes for effective engagement with information in helping students acquire knowledge. For teachers and teacher librarians, domain knowledge involves information and also:

- knowledge of information resources such as publications, databases, search tools, web resources, and so on
- understanding of the community of learners, enthusiasts and professionals in that area
- tools needed to browse, explore and discover needed information
- methods for storing, managing, retrieving and sharing
- creating artefacts that demonstrate understanding of concepts and material.

This is where information literacy models come into their own as mechanisms to scaffold information as a knowledge flow, nurturing information fluency and the capacity for critical thinking and cognitive engagement with old and new media.

Computer and mobile device technology environments, social media, and ready forms of online communication drive our newly emerging knowledge ecosystems — and these have been significantly changing in the last 10 years! At the turn of the century, Mailman open source software was first being used to power listserv communication in text environments, just as the OZLT_NET listserv continues to operate today. When Skype was first released in 2003, the global face-to-face contact transformed the opportunity to communicate and collaborate in 'real time'. Now Apple's Face-time, Skype in the Classroom, and Google Hangouts (to name just a few tools) guarantee synchronous engagement, alongside collaborative text platforms such as Google docs. In other words, the mechanisms for the acquisition of new knowledge has become a deeper process of individual and collaborative learning activities, problem solving and artefact development — through an integration of face-to-face and online interactions within a community, involving absorption, integration and systemisation of the information received by the receiver in their own pre-existing cognitive structure, which are the result of personal experience, and earlier knowledge transactions (Trentin 2011, p. 159).



The Internet has become a participatory medium, giving rise to an environment that is constantly being changed and reshaped by the participation itself, changing the flow of news, effecting tacit as well as explicit knowledge, and embedding a new culture of learning.

Perhaps now communication and knowledge flow in digital environments such as forums, wikis and social networks, alongside search and filtering mechanisms of rich information sources, have become essential components of information fluency needs, practices and processes in every classroom and learning environment.

Knowledge networks and digital innovation

We have, without a doubt, had an extraordinary decade of change. In our fast-paced world, the priority of any educator is to fast-track professional learning about, and understanding of, knowledge networks and digital innovation. Our school students have not known a world without technology, and our newest students have always been in a world with hand-held and mobile devices. But as any educator knows, having a device, and communicating with a device is not 'the be all and end all' of learning.

So the role of educators today is to extend their professional capabilities of discipline or domain expertise by embracing knowledge flow within the power of their personal and professional networks — thus developing the capacity to be agile learners themselves, ready to nurture the emergent needs of the students in their care.

This is exactly why there is an urgency for teachers to engage with the concepts and practices needed in a digital age. Working with consultants in Australia and beyond, I have been fortunate to lead the development of a new degree offering from Charles Sturt University, the Master of Education (Knowledge Networks and Digital Innovation <http://www.csu.edu.au/digital>). This degree has emerged as a direct result of stakeholder consultations, which (amongst many things) identified a need for a credentialled pathway for developing agile leaders in new cultures of digital formal and informal learning, with expertise in navigating diverse information pathways, creative learning environments, and socially connected global networks.

In this degree we will undertake to meet the challenges of learning in a connected world, and helping our postgraduate students (who will in fact already be outstanding

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teaching practitioners) develop the capacity to be responsive to the challenges that this connected world brings. In examining the concepts and practices for a digital age, we will, of course, engage with as many of the recent developments that are influencing learning and teaching in an increasingly digitally connected world. By examining key features and influences of global connectedness, information organisation, communication and participatory cultures of learning, I hope that our students will be provided with the opportunity to reflect on their professional practice in a networked learning community, and engage in robust dialogue to develop an authentic understanding of concepts and practices for learning and teaching in digital environments.

But more than simply learning about online tools, spaces and activities in a participatory culture, learning about knowledge networking will require an examination of what ways the new online tools and techniques for handling information significantly change knowledge; how different knowledge interactions transform learning; and why these transformed activities are meaningfully different and justly describe as 'better' than those they displace.

This goes beyond the use of technology, to the use of information and knowledge in networked environments to articulate the real transformative potential of connected learning. The changing character of information and the social, participatory nature of knowledge construction in connected environments has created a new participatory culture and information ecology that we cannot ignore.

Thomas and Brown (2011), who explored this new culture of learning in our world of constant change, explained how much the Internet has changed the way we think about both technology and information. In this new culture of learning, the Internet has become a participatory medium, giving rise to an environment that is constantly being changed and reshaped by the participation, changing the flow of news, effecting tacit as well as explicit knowledge, and embedding a new culture of learning. They argue that traditional approaches to learning are no longer capable of coping with this constantly changing world. Teachers no longer need to scramble to provide the latest, most up-to-date information to students because the students themselves are able to take an active role in helping to create and mould it, particularly in areas of social information.

To support and nurture learning in these evolving environments is a challenge, and why using digital mediums to communicate, collaborate and curate in the management and dissemination of information is important. Academic and professional development programs should be designed to enhance personal professional networks and personal learning conversations.

What is the conversation?

Since 2002 the New Media Consortium (NMC) Horizon Project <http://www.nmc.org/horizon-project> has been undertaking international longitudinal research studies in higher education, museums and schools. This NMC Emerging Technologies Initiative charts the landscape of emerging technologies for teaching, learning, research, creative inquiry and information management. They have helped educators and thought leaders across the world to build upon the innovation happening at their institutions by providing them with expert research and analysis.

According to the near horizon (within the next 12 months) of the 2013 Higher Education Edition, *massively open online courses* (MOOCs) and *tablet computing* will see widespread adoption in tertiary level programs. Educational innovation, and hence the way that graduate and postgraduate students can engage with information in their discipline area, is taking a significant leap into online and multimodal environments. Blending formal and informal learning into the learning environments within the university also requires library services to engage with and be responsive to the style and demands of a participatory culture, which is device-driven and on the move.

According to the near horizon of the 2013 K–12 Edition, *cloud computing* and *mobile learning* will be the main areas of influence. These elements of emerging technology adoption are becoming more and more pervasive in everyday life in much of the world and, as a result, the increasing expectations of students to work, play and learn via cloud-based services and apps on their mobile devices is gaining prominence. *Cloud computing* has already transformed the way we are using the Internet to help us manage information, communication, data storage and access as well as collaborative work. *Mobile learning* provides gateways to endless learning, collaboration and productivity fostered by the Internet.

Project Tomorrow (2013) reveals that school students are using social media to connect, collaborate and create content in ways that are especially meaningful for them, and that are new to past generations. Students are adapting these tools and resources to enhance and extend the learning process, and to achieve learning goals. Where Internet access is steady and reliable, students are already busy personalising their education experiences through ubiquitous online interactions. Social media and digital tools and resources have transcended the classroom and are emerging strongly as key components of 21st century school to home communications.

The evidence is that technologies and social media platforms are driving an unprecedented reorganisation of the learning environment in and beyond schools and tertiary environments. These disruptive shifts are already reshaping the workforce landscape and the skills required (Davies *et al.* 2011), establishing *lifelong* and *life-wide* learning as the central paradigm for the future (Redecker *et al.* 2011, p. 10). Our work has to centre around helping to meet future learning needs by creating a sustainable learning ecology that is shaped by the ubiquity of information, globally responsive pedagogical practices, and driven by collaboration and informal learning in multiple access points and through multiple mediums.

Identifying new horizons

Three of our exciting new subjects for the Master of Education (Knowledge Networks & Digital Innovation) demonstrate how the degree program aims to encompass the most important areas of understanding

in knowledge network needs and digital innovation:

Literature in digital environments
Having opportunities for creative learning with, and co-creation of, literature and literacy experiences in digital environments is a foundational element of innovation in learning. By exploring digital creation modalities, and media tools such as e-readers, tablet devices, interactive programs and information-specific applications for fiction and information sources, it is possible to build new learning pathways and craft new knowledge interactions. The focus on creative environments, such as rich, interactive information and story engagement through iPad applications; flexible environments of online graphic interfaces; and digital storytelling or interactive multimedia stories, provides unique and rich challenges in pedagogy and complex issues in organisation and management in designing learning experiences that are responsive to diverse learner needs.

Knowing how to build these interactive learning pathways is an emerging and essential component of digital innovation in connected learning environments.

Designing spaces for learning
Numerous changes are occurring in the teaching and learning process, including rapid changes in technology and digital learning strategies. Effective practices are emerging around these very new technologies and digital environments, resulting in discussions of how 'space' design and utilisation can adapt and drive quality learning and teaching environments and experiences. Ideally, design principles should include a description of the learning activities in which students and teachers will participate. However, designing a vibrant learning space can be a daunting proposition. Design principles require a close understanding of the relationships between learning principles and design principles to shape the use of space. Institutions can create learning spaces that will transform their ability to teach current and future students by identifying the institutional context; specifying learning principles meaningful to the context; defining the learning activities that support these principles; and building the design principles founded on a critical reading of the literature and evidence-based practices that inform potential developments.

Knowledge and understanding of the principles and processes of designing spaces for learning has become an essential component in determining how best to build, update and modify learning spaces to meet the rapidly changing needs in education.

Information flow and advanced search
While the digital revolution is impacting everyone that works with information, the very nature of that abundance and accessibility requires a knowledge of the information structures and information-seeking strategies that impact on efficient information discovery. By providing an overview of the most important developments taking place in the production, distribution, storage and consumption of information, students will be able to critically evaluate the information flow that is becoming embedded in work and social lives. Now more than ever, working in education requires a deeper knowledge and understanding of the information environment, the developments in Web 3.0 and the semantic web, and the capacities of big data to provide opportunities for data mining and information analysis. This continual evolution of the Internet as a vehicle for information flow requires searchers, and researchers, who are able to respond to the nuances of information environments, and deploy advanced cognitive and technical skills for managing and searching for information.

With this knowledge, educators will be able to improve research skills, examine new and emerging theoretical and practical developments, and make informed decisions that will improve professional practice and the design of learning and teaching activities for ongoing digital innovation.

The future

Learning in a digital age requires practitioners who understand education imperatives in local and global settings, and who can demonstrate an agile response to novel technologies that may catalyse learning. Both technical and pedagogical innovation should be hallmarks of the best learning environments we can create, and which incorporate a wide variety of pedagogical approaches, learning tools, methods and practices to support students' diverse learning modes.

As professional learners within a global, digital commons, participants in the new degree will have the opportunity to work, network and learn together, in order to learn from leaders in the field, and become thought leaders in the professional practices of teaching and teacher librarianship in visible and connected ways.

Visit the full degree program at <http://www.csu.edu.au/digital>

Keep up to date with news and developments at the Facebook page <https://www.facebook.com/KnowledgeNetworksDigitalInnovation>

Judy O'Connell writes at <http://judyoconnell.com>.

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