USING WEB2.0 APPLICATIONS TO CLOSE THE DIGITAL DIVIDE IN WESTERN AUSTRALIA

Sue Trinidad and Tania Broadley

Curtin University of Technology, Perth, Western Australia

ABSTRACT

The research reported in this paper documents the use of Web2.0 applications with six Western Australian schools that are considered to be regional and/or remote. With a population of two million people within an area of 2,525,500 square kilometres Western Australia has a number of towns that are classified as regional and remote. Each of the three education systems have set up telecommunications networks to improve learning opportunities for students and administrative services for staff through a virtual private network (VPN) with access from anywhere, anytime and ultimately reduce the feeling of professional and social dislocation experienced by many teachers and students in the isolated communities. By using Web2.0 applications including video conferencing there are enormous opportunities to close the digital divide within the broad directives of the Networking the Nation plan. The Networking the Nation plan aims to connect all Australians regardless of where they are hence closing the digital divide between city and regional living. Email and Internet facilities have greatly improved in rural, regional and remote areas supporting every day school use of the Internet. This study highlights the possibilities and issues for advanced telecommunications usage of Web2.0 applications discussing the research undertaken with these schools.

INTRODUCTION

There is a whole new world on the web for the students Prensky (2001) calls 'digital natives'. These students are able to publish their work online and actively contribute to others work posted on the Internet using Web2.0 applications. Since 2004-2005 there have been proliferations of Web2.0 applications that have taken advantage of the changes in the way systems developers have used the web platform or as Hichcliffe (2006) calls "leveraging the convergence of IT and the next generation of the web". The web has, since 1995 enabled people to connect with other people regardless of place, space and time but from early 2005 additional tools have started to appear that allow people to collaborate over the Internet through the real-time posting of journals and comments (Blogs); collaborative writing (Wikis); social media (video on Youtube.com and photos on Flickr.com) and many other tools commonly now known as social computing (Microsoft Research Group 15, 2003). The promises of social computing include more effective knowledge generation, knowledge sharing, collaboration and collective decision-making (The New Media Consortium, 2006).

George Siemens (2005) talks about the new "connectivism" that is available through social computing networks and the Internet in his elearnspace Blog and Wiki websites found at http://www.elearnspace.org and

http://www.connectivism.ca/ stating that there are some significant trends in learning. Siemens describes the features of Web2.0 connectivist learning as:

- Many learners will move into a variety of different, possibly unrelated fields over the course of their lifetime.
- Informal learning is a significant aspect of our learning experience. Formal education no longer comprises the majority of our learning. Learning now occurs in a variety of ways – through communities of practice, personal networks, and through completion of work-related tasks.
- Learning is a continual process, lasting for a lifetime. Learning and work related activities are no longer separate. In many situations, they are the same.
- Technology is altering (rewiring) our brains. The tools we use define and shape our thinking.
- The organisation and the individual are both learning organisms. Increased attention to knowledge management highlights the need for a theory that attempts to explain the link between individual and organizational learning.
- Many of the processes previously handled by learning theories (especially in cognitive information processing) can now be off-loaded to, or supported by, technology.
- Know-how and know-what is being supplemented with know-where (the understanding of where to find knowledge needed).

The use of connectivist learning enables teachers and students to contribute to the growing global social knowledge in the 21st century by publishing and sharing their work online supporting social interaction and communication for the individual and the group. Free web-based Web2.0 collaboration and assessment tools allow collaborative ways of learning for teachers and students (Barrett, 2006). As Hichcliffe (2006) describes in his blog posting dated Monday, 19 March 2007, Web2.0 models are evolving driven by the latest developments in "Rich User Experiences". He provides a model of how users are adding value to the development of Web2.0 applications highlighting the social dimensions that enable users to interact, further adding value to the application (Figure 1).

Web 2.0 Apps: Networked Applications that Explicitly Leverage *Network Effects* via an *Architecture of Participation* (optionally) reinforced by a *Social Architecture*

Viral Feedback Loops
(content from one user spreads to other users, link propagation, reflected Database of Intentions)

syndication (RSS, ATOM)

Open Architecture (Turning Applications into Web Platforms)
- Open APIs
- Badges
- Wdgets
- Web Components

Social Architecture

Architecture of Participation

Social dimension that enables users to interact, further adding application value, and realizing Reed's Law

Encourage every user to add value, directly to the application with implicit and explicit contributions

Application Architecture

Database

All the old aspects of Web apps are still true including user interface, application logic, and database storage and retrieval

Web 2.0 App

Source: http://web2.wsj2.com (cc) (BY:) (O)
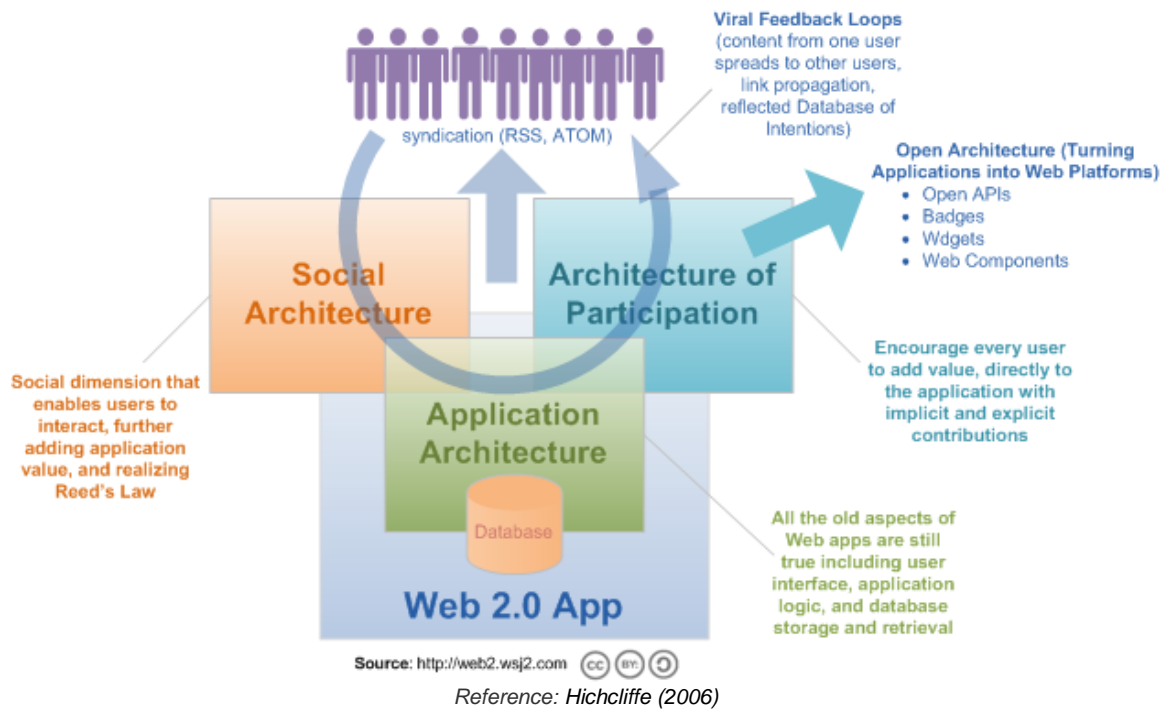
Reference: Hichcliffe (2006)

Figure 1: Development of Web2.0 Applications reinforced by a social architecture.

As teachers become more aware of the power of social interaction and communication to promote learning between peers, students and knowledgeable others, this has the potential to reshape learning. By sharing all stages of learning that is tracked, recorded, debated and commented online, such methods of learning could have the potential to blur the boundaries between teachers, learners and classrooms. The social computing phenomenon has been assisted by greater bandwidth, the ease of web communications and a better understanding of the power of social learning through constructivist pedagogies. It is proposed in this paper that web-based tools can be used to help promote learning through social computing both for teachers and students. But do our teachers have an understanding of Web2.0 applications and can they harness the power of social computing in their schools especially if they are regional and/or remote schools where such technology may have the most benefits?

The purpose of this research was to investigate the extent the professional learning communities or communities of practice - places where teachers learn and work together could help a group of regional and/or remote teachers. The term *Cybercell* was used to describe this grouping (Stevens & Stewart, 2005). In brief, *Cybercells* are comprised of virtual and actual groups linked by purpose built software that allows face-to-face and virtual groups to work together collaboratively with ease. As previously stated with the use of Web2.0 tools teachers can easily network with others extending the traditional boundaries of ongoing, learner-centred professional development and support. What is important to understand is how to create a supportive, reflective virtual learning community around school-

based goals, and trends toward teacher directed personal learning environments using Web2.0 applications.

RESEARCH QUESTION

The key research question explored in this study was: How might teachers be assisted in regional and/or remote schools by using *Cybercells*?

Methodology

The study focused on the experiences of six teachers who were working in regional and remote schools in Western Australia. The primary form of data collection was a self reporting questionnaire and used questions adapted from those used by Rabbit and Pagram in their research of regional and remote areas (Rabbit & Pagram, 2003; Rabbit & Pagram, 2004). The questionnaire was designed to gain information on: 1) general teaching experience; 2) teaching expertise; 3) biographical information; 4) experience with Web2.0 applications; 5) bandwidth; 6) equipment and infrastructure; and, 7) professional development opportunities.

Results

Biographical data

As part of the questionnaire, the six participating teachers provided biographical information. Four teachers were female and two were male. Four teachers were over 40 years of age with two were between 30 to 35 years of age.

Teaching background

Three were employed in government schools and three were employed in non-government schools. All were employed in primary schools. The range of total years of teaching experience was between 4 to 22 years with the mean number of years of teaching being 11 years. All teachers had taught in city schools prior to their move to the regional or remote school with the range being between 4 to 10 years.

Experience with Web2.0 applications

Participants were asked about their experience with Web2.0 applications. One of the teachers was very experienced with Web2.0 applications having used Blogs, Wikis, podcasting, video conferencing and many other tools like flickr.com. Four teachers had only used video conferencing and one teacher had no experience at all. A total of nine responses were provided by the six teachers are shown in the Table 1.

Table 1: Experience with Web2.0 Applications

Web2.0 Application	Frequency	
	N	%
Blogging	1	16.67
Wikis	1	16.67
Podcasting	1	16.67
Video conferencing	5	90.00
Other - Flickr	1	16.67

A subsequent open ended question asked the participants to explain why they had chosen to use the Web2.0 application. This information was important as all but one of the teachers had an understanding of Web2.0 applications and how they might be used in their schools. The main use had been video conferencing. The most experienced teacher with Web2.0 applications had set up his own website to assist his staff in gaining Web2.0 experience and valuable professional development. His explanation for this was "I am in a remote place and I use the technology to connect to others … but I also use the technology to help other teachers".

Availability of resources & infrastructure

A series of questions were included in the questionnaire that sought information from the teachers about their perceptions of computer resources and infrastructure availability in their location. All six teachers reported that they had computers readily available to assist them with their teaching, five out of the six reported they had good Internet access and connectivity. Four of the teachers were able to clearly articulate the importance of this connection to the outside world for example Teacher 2 stated:

> *Yes, we use the Internet mostly for research. For upper primary project work it provides most, if not all, the information students require to critically think about their tasks. I do some bridging work for proper investigation – book marking, recording URL's, cross source checking. Students are encouraged to find 3 sources of the same info - Google, Wikipedia, Ask.com, answers.com and/or actual webpage (T2).*

Only one teacher had difficulties with the Internet connection speeds. Comments provided by this teacher included:

> *I use the Internet for fairly basic things but we hardly use it as our school has only a 2 way satellite link. The main problems are inconsistent connection speed, cost of connection and the limited download (T1).*

The second area explored focused on availability and accessibility to relevant professional development for the teachers to answer whether *Cybercells* might be able to be used with these teachers to help them collaborate, share and support each other. Half of the teachers indicated that professional development was not readily available in their regional or remote place. The other three teachers stated that professional development and consultancy support was readily available for particular issues through their school virtual private network (VPN). These three

teachers were supported by their District office and video conferencing for professional learning. All agreed that extra support through *Cybercells* would be beneficial.

Life in a regional and/or remote area

The teachers were asked to identify the positives about living in a regional and/or remote school or community. All participants took the opportunity to respond to the question about the advantages of their regional and/or remote school (Table 2) and produced to total of 19 responses.

Table 2: Positives of a Regional and/or Remote School

Category of response	Frequency of responses		Examples of responses
	Number	**Percent (%)**	
Students	6	31.60	"I teach kids to think and to use the computer"
Teaching	6	31.60	"We do have a mentor kind of relationship happening"
Community	4	21.05	"One of the spin-offs is the community"
Environment	2	10.52	"School is a safe place [for these kids]"
Leadership	1	5.26	"We have been lucky in this school with leadership"
Total	**19**	**100%**	

The most frequently mentioned positive advantage of teaching in their regional and remote school was using ICT with students and opportunities to motivate students to attend school and to engage them in stimulating and relevant learning activities. ICT provides learning resources, activities and opportunities that would otherwise not be available to students living in regional and remote locations. This finding is consistent with research on regional and remote teachers (Frid et al., 2006; Lyons et al., 2006).

The teachers provided 16 responses describing the negatives of their regional and/or remote community and why connecting to the outside world was important (Table 3).

Table 3: Negatives of a regional and/or remote school

Category of response	Frequency of responses		Examples of responses
	Number	**Percent (%)**	
Community	4	25.00	"We have to all be able to work together, personalities must work"
Geographical	6	37.50	"A big disadvantage is the distance and isolation from support services"
Professional	3	18.75	"Distances to PD make it impossible - There have been technical issues and a lack of training that seems to have led to this not currently working"
Infrastructure	3	18.75	"We are with Bigpond 2 way sat – pay $249.00 per month for a 128kb upload/ 512 download. This gives us a 2 gigabytes of downloads – then every megabyte there after is charged at 15cents. We exceed this limit monthly and would love access to a cheaper unlimited download plan".
Total	**16**	**100%**	

Isolation issues and lack of professional development emerged as the significant negative for teachers in regional and/or remote areas. As one teacher stated when commenting on the lack of opportunities that may benefit from *Cybercells*:

> *See I just want to talk about educational issues and often teachers don't want to talk about school. Like I want to discuss what are we going to have as our spelling strategy or what are we going to do with the information we receive from assessment to make sure its improving our teaching practice(T5).*

KEY FINDINGS

The key findings from this research are listed below:

1. The majority of respondents were female (80%), all teaching in a primary school, over the age of 40 with an average teaching experience of 11 years. Just over 3/4 of the respondents had no country teaching experience before embarking on their current position. About 1/3 chose a regional and/or remote area for the quality of lifestyle and 1/2 chose a regional and remote area for career path/promotional reasons.

2. Life in a regional and remote school had many positives, but the geographical distance from resources, support and amenities was seen as a major negative factor for remote communities.

3. With regard to using ICT resources to support their students and their own professional learning the respondents could see the benefits of being able to connect via the Internet with their peers and the wider community.

The literature suggests that access to ICT resources are an important factor for regional and remote communities (Frid *et al.*, 2006). A snapshot of the six schools in regional and remote Western Australia showed that while email and Internet facilities have greatly improved in these areas with the systems supporting every day school use of the Internet there are currently limited opportunities for advanced telecommunications usage with Web2.0 applications due to lack of understanding of what these technologies can do. The findings of this study were that five of the six respondents had adequate Internet access and connectivity. Only one of the respondents said that Internet access available to them was not sufficient. Similarly, the literature suggested that professional development is difficult to access, as confirmed by three of the teachers. The other three teachers who all worked in the same school system had consultancy support available and additional support through the use of video conferencing to help reduce the geographical distance and isolation in regional and remote communities.

CONCLUSION

The evolution of Web2.0 tools can assist teachers and students to easily network with others extending the traditional boundaries of learning and ongoing, learner centred professional development and support. This study showed that five of the six teachers were unaware of how to harness the power of social computing through Web2.0 applications in regional and/or remote schools where such technology may have the most benefits. This study has allowed the researchers to connect with six teachers in regional and remote Western Australia to begin to investigate the building of *Cybercells*. *Cybercells* are important as they allow groups to create a supportive, reflective virtual learning community around school-based goals, and trends toward teacher-directed personal learning environments. For *Cybercells* to be successful resources and infrastructure have to be adequate for teachers to participate. This study highlighted the need for accessibility and availability of infrastructure and professional opportunities for teachers to overcome their perceived lack of professional support in regional and remote areas. It also showed that professional learning was a matter for concern as was the geographical distances from services and amenities. Adequate access to resources, professional development and fellow teachers was important as stressed by the teachers who had ready access to video conferencing professional support. The computing infrastructure, if well established was a positive aspect for the schools and the community. One of the major messages to emerge from this initial study was that life is made easier by providing better access to broadband connections and this will assist with the formation of future *Cybercells*.

REFERENCES

Barrett, H. (2006). Authentic assessment with electronic portfolios using common software and Web 2.0 tools. Retrieved 20 May 2007, from http://electronicportfolios.com/web20.html

Frid, S., Sparrow, L., Trinidad, S., Treagust, D. & McCrory, K. (2006). Somewhere different to go: Report from SiMERR Western Australia. In T. Lyons (Ed.), *Science, ICT and Mathematics Education in Rural and Regional Australia: State and Territory Case Studies: National Centre of Science, ICT and Mathematics for Rural and Regional Australia (SiMERR National Centre), University of New England*, (pp.6-29). DEST: Canberra

Hinchcliffe, D. (2006). Dion Hinchcliffe's Web2.0 Blog. Retrieved 4 May 2007, from http://web2.socialcomputingmagazine.com/

Lyons, T., Cooksey, R., Panizzon, D., Parnell, A., & Pegg, J. (2006). *Science, ICT and Mathematics Education in Rural and Regional Australia: The SiMERR National Survey. DEST: Canberra*.

Microsoft Research Group 15 (2003). Social Computing Group. Retrieved 20 May 2007, from http://research.microsoft.com/scg/

Prensky, M. (2001). Digital Natives, Digital Immigrants. *On the Horizon*, 9(5). Retrieved 20 May 2007, from http://www.marcprensky.com/writing/Prensky%20%20Digital%20Natives,%20Digital%20Immigrants%20-%20Part1.pdf

Rabbit, E. & Pagram, J. (2003). OK remote WA we're listening ... but can you hear us? *Australian Educational Computing*, *18*(2), 13-16.

Rabbit, E. & Pagram, J. (2004). OK remote WA we're listening ... but can you hear us? Part II, *Australian Educational Computing*, *19*(1), 21-23.

Siemens, G. (2005). elearnspace. Connectivism: A learning theory for the digital age. Retrieved 20 May 2007, from http://www.elearnspace.org/Articles/connectivism.htm

Stevens, K. & Stewart, D. (2005). *Cybercells: Learning in actual and virtual groups*. Victoria, Australia: Thomson Dunmore Press.

The New Media Consortium. (2006). The Horizon Report. Retrieved 20 May 2007, from http://www.educause.edu/ir/library/pdf/CSD4387.pdf

Trinidad, S. (2006) Closing the digital divide: education telecommunications systems and possibilities in Western Australia , in Anderson, N. (ed), *ACEC: Australian Computers in Education Conference: Its Up Here for Thinking*, Cairns: Queensland, October 2nd-4th 2006. ACEC, Belconnen ACT.