A Case Study Of Instructor Scaffolding Using Web 2.0 Tools To Teach Social Informatics

Catherine E. McLoughlin
Faculty of Education
Australian Catholic University, Canberra
ACT 2602, Australia
catherine.mcloughlin@acu.edu.au

Sultana Lubna Alam
Faculty of Business, Government and Law
University of Canberra
ACT 2601, Australia
lubna.alam@canberra.edu.au

ABSTRACT

In the 21st century, also known as the digital era, higher education needs to face the changing technological contexts and to adopt pedagogies and tools for more engaging forms of learning. Despite much publicized enthusiasm about new media and its role in transforming learning in ways aligned with advances and contemporary socio-cultural perspectives, limited changes have occurred. Nevertheless demand for eLearning worldwide is pushing the boundaries of education and professional activity systems. The central aim of this article is to gain a deeper understanding of how to create successful learning environments with technology-based tools. A model of scaffolded e-learning, based on current thinking and constructivist learning theory, was adopted for teaching social informatics in a university context. The focus was on evidence-based pedagogies including: (1) authentic learning by applying *Pedagogy 2.0* tasks and social media (2) the adoption of scaffolded pedagogy by the instructor to achieve learning outcomes. The methodology used was qualitative, based on teacher pedagogical tasks and activities designed for students in order to establish the success of the types of scaffolding offered and student perceptions of their effectiveness in promoting collaboration and learning. The research demonstrates that technological innovations which are accompanied by pedagogical scaffolding promote effective teaching of social informatics. The research concludes that while web 2.0 tools can enable engaged, self-regulated learning, students may not always be familiar with the tools or cognitive strategies to support their learning processes. Digital tools such as Twitter and blogs were found to engage students' in real-world activities to learn key concepts, and that task scaffolding was an effective pedagogical approach.

Keywords: Active learning, Critical success factors, Web 2.0, Faculty effectiveness, Instructional pedagogy

1. INTRODUCTION

The rising popularity of social media tools, such as Weblogs, wikis, Twitter, is the result of the qualities that characterise Web 2.0 software. Such digital tools are user-friendly, personalisable and allow for content creation and modification. In addition, they can be 'meeting places' for socialisation, sharing and collaboration. It is predictable then that using Web 2.0 tools to facilitate the learning process is encouraged in the educational literature (McLoughlin & Lee, 2007). In this networked age, the transmissive model of teaching is being replaced with constructivist, e-learning approaches, while the need to make the curriculum more relevant and engaging is imperative (Tapscott, 2009). This changing landscape has been referred to as 'Pedagogy 2.0'

and 'learning 2.0' (Lee & McLoughlin, 2010; Downes, 2005) and signals greater use of the affordances of social media to enable connectivity, communication, participation, and networked communities of learning.

For many decades, mechanical knowledge transmission models of teaching and learning have been at odds with participatory and interactive education. Currently, the affordances of Web 2.0 – sharing, collaboration, and communication, have given rise to a number of alternative paradigms of learning e.g. personal learning environments (Atwell, 2007) and heutagogy, both of which focus on students as self-motivated, independent learners (Conole & Oliver, 2007; Phelps, Hase, & Ellis, 2005). Theories such as connectivism (Siemens, 2005) help us understand learning as making connections with ideas, facts, people and global

communities. In many fields, the life of knowledge is now measured in months and years (Siemens, 2005, para. 2). Thus, pedagogical methods used for years and considered instructionally sound are becoming outdated as students and teachers adopt technological devices to teach and to learn. Although more formal forms of instruction and e-learning persist, many universities now integrate informal teaching strategies and flexible social media tools to accommodate students' desires for flexible study opportunities. In the context of this study, the rationale was to explore how best to support learners to social media into the learning process so that they could integrate Web 2.0 tools such as blogs, wikis and Facebook in specific tasks relating to egovernment, digital citizenship, location of specialized information, data management and conducting research online. The research problem was to how determine the success of teacher pedagogy in developing students' skills in application of social media to understand key concepts in social informatics. The teaching and learning process had to extend beyond use of the technological tools by students to include pedagogical design for effective learning. In this context, the research focusses on evaluating the success of a scaffolded pedagogy to teach informatics concepts using social media such as micro-blogging, multimedia sharing, social bookmarking and collaborative content creation. This issue is of special importance as it is under researched, and further studies are needed to explore how Pedagogy 2.0 can be successfully implemented (Ravenscroft, 2009)

2. SOCIAL INFORMATICS AND GOALS OF EDUCATION

Social Informatics (SI) is an innovative, growing discipline, although few universities offer the subject as a stand-alone course. Social informatics started in the early 1970s, when there was a burgeoning of information technologies in all areas, along with studies on computerization and its consequences for society. While definitions of the term 'social informatics' may vary in different countries and across different contexts, the term is used in this article to denote that social informatics is an interdisciplinary field of study, bringing together insights from various disciplines: sociology, library and information science, education, computer science, economics, information systems and communications (Kling, Rosenbaum, & Sawyer, 2005). To summarize the various definitions combined with educational applications, research trends and practice, several directions for social informatics as a subject for study revolve around central themes:

1. Technology and how it interacts with society and human/cultural forces
2. ICT applications in the social sciences, including impact on social communication and new forms of citizen journalism
3. ICT as a tool in social research and in eresearch
4. Socio-technical systems and how they are impacting on government and society
5. Reflecting on how technology as an artifact has consequences for the social interactions and social relationships of the people who use it

6. Developing an analytical perspective which theorises and questions the nature and roles that ICT plays in social, institutional and cultural contexts.

These themes also underpin the learning outcomes to be attained by graduates and clearly indicate a number of generic competencies that are aligned with the goals of learning for the 21st century, as they include graduate attributes, critical and analytical skills and digital literacies. For decades, the chief aim of education has been the development of citizens who are skilled and capable of joining the workforce. The 21st Century workplace and the capabilities people need for communication, citizenship, and self-actualization are primarily due to the emergence of very sophisticated information and communications technologies. Today's learners need to be equipped with skills to survive in future digital participatory global world (Council of Europe, 2010; UNESCO, 2010; Punie & Cabrera, (2006).

Desirable features of an informed and active graduate include:
- knowledge of how to interact with others and share views;
- the capacity to develop life-long learning skills and attitudes;
- openness to new ideas and alternative perspectives;
- ability to listen to others, share and incorporate their views within their own understandings;
- ability to thinking creatively, communicate and work collaboratively

To prepare students for digital age participation, it is essential for instructors to adopt learning designs that foster inquiry, meta-learning and learning-to-learn skills (Bellanca, & Brandt, 2010). Integration of information and communications technologies is essential in supporting networked, dialogic learning, and the addition of emerging digital tools (Twitter, blogs, wikis, Flickr) also enable rapid communication, collaboration and engagement with social trends, politics, commerce and society (Richards 2010; Tapscott et al 2007). Thus, media literacy skills and generic competencies were also intended learning outcomes for the student participants.

3. AIM AND CONTEXT OF THE STUDY

This article present a case study where Web 2.0 tools and pedagogies for learning are applied in a university learning environment to teach students core concepts and skills in social informatics and attain the status of digital content generators, who are able to produce, distribute and share information and media artifacts. The context for the study is 'social informatics' – a composite university level class comprising 25-30 postgraduate and 3rd year undergraduate students within the Faculty of Information Sciences and Engineering in an Australian university. The course focuses on study of social informatics by examining the impact of technology upon social behavior. In order for students to gain a more comprehensive understanding of the topic, it was deemed to be highly beneficial for them to develop the skills and knowledge to question and understand the value of social media tools in context, by actually using the tools in authentic learning tasks and investigations. The intellectual

content of the course included conceptual underpinning of social informatics and creative use of social media. The course utilised a Moodle Mashup (the integration of information from different sources into one Website) and amalgamate information from really simple syndication (RSS) feeds from participants and external blogs, wikis and Twitter. The integration of Web 2.0 technologies into the learning process is examined, highlighting the pedagogies that engaged students while enabling collaborative learning and digital literacy skills.

4. THEORETICAL BACKGROUND

Several major studies have contributed to our understanding of teach (Bransford et al., 2000). Views of learning develop in parallel with advances in technology (conceptual and technical tools) and together have major implications for learning. Deep learning does not come from experts transmitting de-contextualized knowledge; but learning is situated and we need frameworks that ground learning experience in activity, experience, culture and community (Lave & Wenger, 1991). The notion of distributed cognition suggests that when students with different expertise come together, they can draw upon each other's expertise and create new insights into learning. The Horizon Report (New Media Consortium, 2013) confirms that our ability to communicate and work with others, free from geographical boundaries, is facilitating learning that is collaborative, open, social and participatory. Social media tools support learner self-expression, distributing cognition across persons, tools, and resources. Digital technology can also help teachers to transform their teaching by providing a set of tools that facilitate learning and motivate students. Several emergent technologies (Wikis, blogs, etc.) have been successfully utilized in diverse educational settings as a means of fostering and facilitating student engagement, participation, and learning (Junco et al 2010). Twitter is, perhaps, the most recent addition to such endeavors, and this study reflects our exploration with this technology in a social informatics course.

Social media linked with constructivist pedagogy has been shown to connect learners in communities in order to engage them as active learners (Richards, 2010; Lara & Naval, 2009; Deng & Tavares, 2013; O'Brien, 2008) have devised instructional activities for enabling the engaged learning using Web 2.0 tools in learning environments. Through the framework of Pedagogy 2.0, the boundaries of current pedagogies are being stretched and challenged by the potential offered by social software applications for dynamic, user-generated content, while pervasive computing and wireless networking tools ensure constant connectivity and participation in communities of learning. With social software, there is a recognisable shift to include both formal and informal tasks and spaces for learning (Schroeder et al 2010). Social media tools afford greater learner autonomy and flexibility, while the learning experience becomes more personalised and responsive, not only to the learner's themselves, but also to their future needs in a knowledge based- society (Moll, & Krug,. 2009). This is the essence of Pedagogy 2.0, also referred to as the 3P model, depicted in Figure 1.

As a framework for personalised teaching and learner-centred practices, *Pedagogy 2.0* builds on the social media and affordances of Web 2.0, while promoting learner autonomy, idea sharing, collaboration, participation and creative production by learners. These overlapping elements are depicted in Figure 1. Each element of the 3P learning model is intended to develop participatory, distributed learning tasks that engage students personally and socially, leading to productive outcomes such as networked learning, lifelong learning skills and knowledge management. In this sense, the 3P learning model enables "crowd learning" where individuals learn from the experiences of others, shared through online social spaces and shared activities (Dron, 2007).
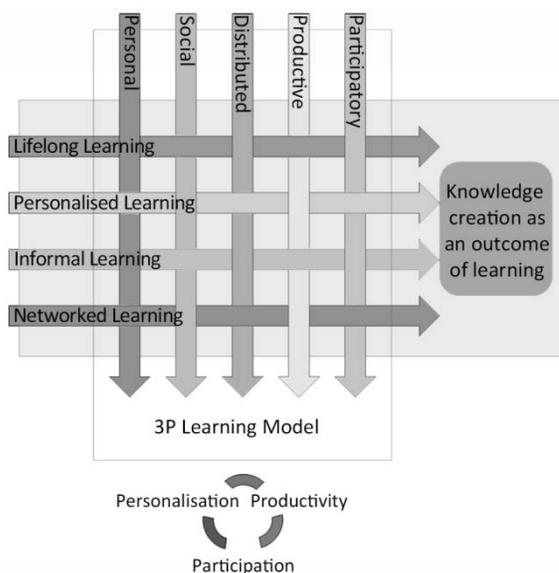

Figure 1: The 3P learning model and the implications for pedagogy

The 3 elements of *Pedagogy 2.0* are as follows:

Personalization: Defining personalised learning (PL) can be problematic, as there are many dimensions and perspectives on to its meaning. Downes (2005) describes a learning environment as an approach, not an application, one that protects and celebrates identity, supports multiple levels of socializing, and encourages the development of communities of inquiry. Others argue a case for Personal Learning Environments (PLEs), which affirm the role of the individual in organising, customising and shaping his/her own learning environment (McLoughlin & Lee, 2009).

The principle underpinning a PLE is that learners exercise greater ownership and control over their learning experiences, rather than be constrained by centralised, instructor-controlled learning based on the delivery of pre-packaged materials and activities. In the course, students were encouraged to post questions and content online and to develop a multimedia presentation on a topic of personal interest relating to social informatics

Participation: *Pedagogy 2.0* seeks to capitalise on the affordances of social media tools. It is a framework that

attempts to overcome the limitations of existing teaching and learning models, by emphasizing the connectivity enabled by social software tools. In a networked society, learners require access to ideas, resources and communities, driven by personal needs and choice (personalisation), and in order to learn effective they have to engage primarily in knowledge creation rather than consumption (Paavola & Hakkarainen, 2005). In the course, tasks were designed to ensure active participation by students and to enable them to follow personal research directions.

Knowledge Creation and Productivity: New forms of eresearch and productivity are enabled by social software tools. Learners can be creative by producing and manipulating digital images and video clips, tagging them with chosen keywords and making this content available to their friends and peers worldwide through Flickr, MySpace and YouTube. They were asked to contribute to blogs and create wiki spaces where peers could comment, share and revise these sources, thereby creating their own dynamic, self-published content. The creation of content between peers has been dubbed citizen journalism, and was part of the learning outcomes of the course .This trend towards peer creation of content is in sharp contrast to the dominant culture of education, where pre-packaged ideas and teacher-designed content often dominate, thereby limiting students choice and decisions in their own learning pathways (Selwyn, Scardamalia & Bereiter, 2003). Nevertheless, command and expertise of social media tools for learning cannot be assumed, as digital literacy skills are varied among university students. According to Selwyn & Facer, (2007) it is crucial to determine students levels of skill in using these tools before using Web 2.0 tools, and to make expectations clear about social media use in teaching-learning contexts. This advice was taken on board by the instructors in this study.

5. TEACHING AND LEARNING PROCESSES ADOPTED IN THE STUDY

The course on social informatics offered students a unique opportunity to investigate social, cultural, philosophical, ethical, legal, public policy and economic issues relating to information technologies (Kling & Star, 1998). By encouraging student of use social software tools in innovative ways to create and share ideas on issues relating to how technology impacts on society, the course was learner-centred. Through the study of social informatics learners examined the impact of technology upon social behavior. In order to gain a more comprehensive understanding of the topic, it proved highly beneficial for students to develop the skills to question and understand the value of these tools in a social context, by actually using them. The 3 pedagogical dimensions of Pedagogy 2.0 involved (personalisation, participation and productivity) meant that students were introduced to a suite of Web 2.0 tools, and engaged in project-based activities to investigate societal issues surrounding the ubiquity of social media As students were accustomed to social networking sites (SNS's for social and personal uses) they were new to social media for learning, so it was considered essential to scaffold them in digital literacy skills for academic purposes. initially,

students, some of whom were novice users of SNS's were asked about their prior learning experiences and level of skills, and about 50% of the group had limited exposure to Web 2.0 tools for learning. In order to foster greater ease and confidence in using blogs and wikis, teaching staff created appropriate scaffolding to ensure mastery of skills.

McLoughlin & Winnips (2001) developed a categorization of several types of scaffolds that could be use when teaching in eLearning environments. These are as follows:

Conceptual scaffolding: Cueing or hinting which helps students to reach a solution
Coaching comments: Direct teaching strategies or heuristics
Feedback: providing progressive feedback while the task is being undertaken
Reflection: The instructor provokes reflection on the tasks by asking the student to self-monitor their approach
Modelling: The instructor provides an example or demonstration of a similar tasks or gives.

Each of these types of scaffolds was used to provide assistance to students in developing digital literacy skills, and analytical thinking relating to the social issues arising from computerization. For example, when setting collaborative tasks, teacher support was provided.

Instructional event	Scaffolding used
Stimulate recall of prior learning	*Reflection, questioning by peers and self-questioning*
Present learning tasks	*Modelling by showing uses of Twitter for example*
Elicit performance	*Conceptual scaffolding by expanding and clarifying student contributions*
Enable peer-to-peer feedback	*Coaching by instructor in feedback strategies*
Assess performance	*Showing students how to self-assess their own work*
Enhance retention & transfer	*Reflection: ask students how they can apply the skills to a new situation*
Foster peer-to-peer learning	*Task scaffolding in the use of blogs and wikis*

Table 1: types of scaffolding used for instructional events

A subscription version of PB wiki was chosen because it allowed RSS feeds and group access control and each student had their own password. Students were given information about how the wiki worked and advice and scaffolding during the task in the following ways:

- The wiki contained notes and help files for students to access and use (software scaffolding)
- Notes on how to create a wiki entry and tips about basic functions and etiquette were provided on the Moodle site (procedural scaffolding)-teachers responded to inquiries for technical and task-related assistance (technical scaffolding).

Table 1 shows the activities and scaffolds used by the teachers during the course of study to support learning outcomes.

6. LINKING WEB 2.0 TOOLS AND LEARNING OUTCOMES

Many of the Web 2.0 tools were introduced to meet the learning outcome of this course of study – to develop a critical understanding of digital tools in everyday social transactions and for civic engagement. It was demonstrated that many digital tools could be used for civic activities such as contributing to a forum, voting on ideas, uploading a question on YouTube, tweet a question etc. Some of these tools were introduced in the unit coupled with e-citizenship scenarios. Other tools that were introduced as part of the suite of Web 2.0 tools are as follows:

Idea generation and voting – Many government and civic sites now use idea generation and voting tools to explore issues or policy based on the model of crowd-sourcing. Crowd-sourcing is a new paradigm for using the power of "crowds" of people to facilitate large scale tasks that are too complex or large for an individual. Surowiecki (2004) maintains that crowdsourcing "wisdom" (or expertise) requires independent answers with cognitive variety, features that are characteristic of a collection of solutions created and rated by individuals. Students were asked to post an idea to their peers via a blog in response to a question or problem. Each idea could then be expanded or refuted or modified through comments by students. The ultimate measure of the value of a solution was determined by a voting system. Students were also asked to comment and vote on their presentations of their peers and to offer constructive feedback. This was a useful exercise, but required careful scaffolding and guidance during tutorials.

Instructional tasks	Social media
Provide peer feedback and comments during class; share ideas;	*Twitter*
Create a personal blog on the Moodle site	*Blog"Use to archive Twitter feeds; provide peer review on learning tasks*
Find and collate sources of information on e-government an e-citizenship	*RSS feed*
Class content posted on wikis with students adding peer content and comments	*Wiki: collaborative and individual use by students*
Moodle mash used to amalgamate information from class and external blogs, wikis and twitter	*Moodle site*
Enhance retention & transfer	*Podcast creation by students to share knowledge of government 2.0*

Table 2: Summary of learning tasks involving social media

Vodcast presentation – Students were asked to prepare multimedia presentations in the format of a vodcast that included pictures, video clips and audio for peer comment. Students were introduced to many online tools for production such as Animoto, Screentoaster, windows movie maker and then sharing through tools such as Vimeo, YouTube, SlideShare etc. These are some of the tools currently being used widely to connect, share or talk to their constituents, government and social movements.

Bookmarking – Bookmarking is way of organizing online Web page links with tags that is accessible through browsers. Tags can be sorted, organized and shared. Deli.cious was introduced in the unit as a way of sharing relevant links with other students and by displaying these on course Moodle site, the bookmarks helped to foster multiple views on the learning tasks.

Table 3 provides a summary of web 2.0 tools used in the core instructional tasks of the unit

7. METHOD: DESCRIPTION OF THE MOODLE MASHUP LEARNING ENVIRONMENT

Based on the three dimensions of Pedagogy 2.0, in designing the learning environment for this unit, multiple digital social tools were incorporated in a Moodle site that allowed students to share ideas and participate in the use of Twitter, wikis and blogs to investigate the roles of social media in communication, egovernment and citizenship. A Moodle Mashup was used to amalgamate information from RSS feeds from the participants and external blogs, wikis and Twitter. In this way, diverse learning activities that students conduct in each technology can be summarized and highlighted on one Webpage, making it easier for students to assimilate information. More details about Mashups and Web 2.0 tools can be found in learning to teach an online (McIntyre, 2011).

In the 3P model, ideally students are active, creative learners constantly engaging in two-way communication with their peers and with information networks to generate new ideas and contribute micro-content to the course curriculum wiki. In reality, the idea is to use a suite of tools to achieve a learning goal, and provide learners with choices to engage in meaningful tasks using multiple media types in order to achieve relevance and understanding of the cultural, social and communicative impact of social media. Using technology innovatively can assist students to value peer-to-peer formal and informal learning environments (Dron, 2007; Boettcher, 2006), and in the Social informatics course this pedagogical approach was used, while also integrating scaffolds for instructional events (See table 1).

In this learning environment, teachers facilitated learning by providing relevant tasks with a suite of Web 2.0 tools integrated within an institutional learning management system (LMS) (e.g. Moodle) and by scaffolding, and coaching students as needed. Students worked in pairs or groups to produce micro-content, podcasts and vodcasts to share topics and ideas from the course schedule to peers. During the first 2 weeks of the course, students received explanations about social networking sites (SNS's) and shared their own experiences. It was explained that while SNS's were not designed for educational purposes, the learning tasks were intended to demonstrate that the tools could be used as powerful levers for political and commercial purposes, and also prove very useful in their students' professional careers. Task design and the learning

processes that entailed collaboration were also modeled by tutors.

Tasks assigned to these students included: sharing links and relevant sources; selecting pieces of news on egovernment for discussion, critical analysis of current issues in social networking globally, and the creation of a collaborative multimedia presentation that related to e-government and the application of social media tools. These tasks were part of the assignments, but students were free to use the SNS and Twitter for informal learning and also to share information. These forms of formal and informal interaction supported learning by:

- giving students an opportunity to demonstrate their understanding of the course topics through production of micro-content for their peers;
- enabling idea sharing in an emerging field such as government 2.0 and creating a knowledge repository for future students in this course using external information networks; and
- developing digital literacy skills required to engage in critical understanding of the impact of social media on civic activities and e-government (Frydenberg, 2006)
- These three elements and associated learning activities reflect the principles of pedagogy 2.0., i.e. personalization, productivity and participation.

8. DATA COLLECTION AND ANALYSIS

The methodology used was largely qualitative, though quantitative data was also collected on student perceptions, ease of use and value of the assignments in supporting the learning outcomes. At the end of the course, an online questionnaire was distributed among the students via the Model site. The questionnaire included the following categories:
1. digital literacy and perceived ease of use
2. Impact of the learning environment on (a) active learning (b) collaboration (d) content learning.

Both items were designed using a Lichaert scale, ranging from 1 (disagreement) to 5 (total agreement, and 3 was neutral. The instructors kept database that include the different grades obtained by students and also data obtained from the SNS sites. Students were also monitored in the blog and wikis tasks and the following data attested to their level of participation and involvement in the blog, and wiki and their Twitter use:
- number of comments in the blog and discussion forum showing the degree to which they responded to peer and teacher postings
- number of discussion posting in their own blog (showing their initiative in proposing new topics to the group for discussion
- number of references collected and shared using social bookmarking software

All students participated in the end of course evaluation *n* (35). The age of respondents ranged from 21 to 43, and almost 65% were male. More than 53% were active users of SNS's prior to the course, but only 12% rated their ability to use blogs, wikis and Twitter to support learning and

research. For this reason, a scaffolded pedagogy as chosen to teach the course.

9. RESULTS

9.1 Active and participatory role of students
In this course, students were expected to think independently but also to collaborate and share information, and the principles of the scaffolded pedagogy was explained to them along with the expectation for the forms of interaction that would support their learning, to go beyond simple use of social media and become active digital content generators, able to produce, use and share their digital content. In response to the end of course evaluation, students were asked to rate the extent to which the social media helped them learn actively and flexibly, and was perceived as valuable. Table 2 shows the active role of students in the course.

Use of Web 2.0 tools…	Mean	Agreement (%)	Disagreement
Make me feel more involved	4.17	88.35	.98
Allow me to use tools useful for my job& future	4.03	82.69	1.92
Help me learn on my own and do research	3.93	82.86	4.76
Give more flexibility	4.20	93.27	0.00
Facilitate staff-student consultation and assistance	4.65	99.03	0.97

Table 3: results showing student perceptions of the digital tools used in the course

These results indicate that students' views the Web 2.0 tools favorably, stating that use and application motivated them to be more actively involved in the course compared with traditional pedagogy. They valued the relevance of the tasks to their future professions, as many intended to work as IT consultants or in digital advertising or consultancy.

Use of Web 2.0 tools…	Mean	Agreement (%)	Disagreement
Allows students to learn from the contributions of their peers	4.3	**97.06**	**0.1**
Allows students to share problem solutions	4.21	92.16	2.91
Helps me consider other views	4.08	90.29	2.91
Allows	3.99	84.47	7.39

coordination of joint activities			
Provides helpful tools to facilitate teamwork	3.94	75.00	2.11

Table 4: Students' view of the collaborative aspects of the course

Flexibility was also appreciated by student as 93% agreed that use of the tools allowed them greater flexibility and autonomy. The scaffolded approach and multiple forms of assistance were also appreciated by students, with the majority showing that they valued the high levels of support offered i.e. technical, and assessment related. This created a more personal environment for them to and ensured that they remained on track to completion. In terms of collaboration and peer-to-peer learning, the scaffolded approaches of modeling, task support and coaching helped students to share ideas and points of view. The student reported that the benefits of collaboration, sharing and peer networking as major advantages of social media and this is reflected in the evaluation results, shown in table 4.

9.2 Limitations of the study

As no students were excluded from the study and there was no control group, the results should be interpreted with caution. Also, like all small scale studies, the study has limitations that must be acknowledged. One obvious limitation lies in the nature of the data collected, which is based on self-reports by students as indicators of active engagement and learning outcomes. It was beyond the scope of the study to analyze in detail all the blog post, wiki comments and tweets, which would have provided further in depth insights into learning processes that occurred as result of each particular scaffold employed by the instructors. The data presented does show a high level of student satisfaction with the pedagogies, and recognition that the approach was appreciated for its personalization, flexibility and immediacy. Some additional qualitative feedback was obtained from students regarding their use of each of the social media used, and is reported in the following sections.

10. TWITTER USE AND LEARNING OUTCOMES

Twitter is a micro-blog and offers users the capacity to send short messages (tweets). Twitter can be a valuable tool for exchanging ideas and for professional development, connecting with other professionals, and even hosting an online book club. This micro-blogging tool has grown into a powerful tool for business, communication, and education. While many institutions are just starting to be aware of the educational benefits possible with Twitter, there is evidence that microblogging has grown into a powerful tool for business, communication, and education (Ebner et al 2010; Kessler, 2010). The use of twitter in this social informatics course was based on the need for students to question, share ideas and provide feedback to each other on new and emerging topics as they arose during the unit, and to appreciate the role of Twitter in practices of civic engagement. It was used to support learning outcomes in multiple ways. Students were asked to follow, and post to the #socinfo hash tags (a dedicated hash tag for the course) so that everyone in the class could see and contribute to the conversation. One of the advantages of this was the ability to access a broad range of opinions from people outside of the university system. Students were also able Twitter on their mobile devices to keep in touch with each other between classes. Twitter was used:

- to facilitate debates, comment on discussions taking place in the face-to-face tutorials (by projecting tweets on a large screen using third party Twitter utilities like tweetchat.com or visibletweets.com), questioning of peer and the teacher, and giving feedback during presentations;
- to enable students to quickly and informally share information amongst themselves;
- to efficiently distribute outside links and internet resources to the class;
- as a quick way for students to communicate directly with the lecturer outside of class time; and
- to follow hash tags such as #socinfo, #gov2au and #election2010. This allowed students to apply what they learned in class by contributing to conversations about current issues in the larger social context.

Students made over 1000 tweets during the semester. 80% of the tweets were made by 77% of the Tweeters, demonstrating excellent participation by most students. Among the Web 2.0 tools introduced, Twitter was most popular. The following student comments highlight some of the reasons why they preferred Twitter, with comments reflecting the principles of *Pedagogy 2.0* (connectivity, participation, productivity and personal engagement:

"Twitter helped me to post what I wanted to show to the class [and] also helped me see other student's comments";

"Loved Twitter because of the ability to interact with others without having to bother about the time and distance. Further, it is such a great tool that I can find anything jobs, news....etc.";

"Twitter- buzz [because] until I started this unit I never used twitter but it's cool chatting about the topics that are interesting!!!"; and hearing from others

"Twitter's great, I like reading the posts for people I follow. I enjoyed the immediacy of it".

However caution needs to be used for Twitter use as echoed in following student comments:

"Twitter was easy to use once I got used to it - short and sharp. Though you had to keep on top of it to retain the context of tweets";

"The twitter stream was overwhelming at times - it would be good to have a pause button sometimes. I got frustrated that getting context of a tweet was difficult if you had missed previous tweets"; and

"A lot of people put out links to lots of articles via Twitter but these were only useful if a person had an immediate interest in the topic, difficult to find later."

Despite the benefits of twitter for networking and information sharing, some obstacles were noted. The risk of information overload was repeated by several students, signaling that their use was no sustainable and they needed

to have a specific purpose for using them. Students had to become aware of their digital footprint and also realize that are transient, eventually disappearing and becoming irretrievable. For some students this became a problem as tweets were used to make class announcements and share links and readings. Students rarely checked tweets every day, so there was a need to archive them so students could access a whole week's tweets. To archive *#so info* tweets (the hash tag the class used to make sure everyone could follow the Twitter conversation), a permanent record and blog was used as a vehicle for archiving Twitter feeds. Overall, the use of Twitter was positive as it created a culture of engagement and peer interaction, which reflected *Pedagogy 2.0* principles.

11. WIKI AND BLOG USE

Another important outcome of the course was to use digital media to prepare students to convey their public voices and to foster exploration and social interaction with direct experience of civic engagement (Rheingold, 2008). Learning to use blogs and podcasts (as media of self-expression), with an emphasis on 'public voice', was an essential element of the twenty-first-century approach to digital citizenship.

Participatory media enabled students to create, as well as consume, media and engage in democratic decision making. Confluence (http://www.atlassian.com/software/confluence) was chosen as the class wiki because it was already securely hosted on the university servers. This assisted with authentication and contributions with recognised with student identification. The wiki was used in the class as:

- a delivery mechanism for all class lectures, with students asked to add extra content and references to existing lectures, building upon the starting point offered by the teacher;
- support for face-to-face tutorials, with students able to build upon, edit and dispute the information provided, summarize readings and provide extra resources; and
- a resource for the class exam. Students were allowed to use the information in the wiki in their final exams. It was envisioned that it would create a high level of motivation for the class to work together ensuring that the information that was developed was analyzed correctly, accurate and succinct.

Feedback on wiki use was mixed. On the one hand, it was seen as useful *"The wiki was effective and the ability to add to it was a good idea"* but on the other hand, *"it was not used often. I was OK adding references from my own work _where indicated by the lecturer_ but I would not feel comfortable adding my own material"*. Further concerns regarding the use of wiki were related to time and workload issues

> *"The request to continually update the wiki was potentially time-consuming - it would have been good if links to these portions could be co-located so that if we found something relevant well after the lecture we could easily find where to add the information."*

These comments point to issues of student confidence in using the wiki, and also to usability issues with the organization of the wiki page. Future implementations by including both lectures and tutorials in a wiki with a clear structure would benefits students as it would provide a space where contributions are shared.

The instructional design of the unit was based on the pedagogical approach that encouraged students to learn collaboratively and engage in democratic decision making, expression of opinions and awareness of the power of media in enabling civic participation. Blogs were therefore employed as part of the learning experience in teaching social informatics in a number of ways:

- for tutorial exercises, peer review encouraging students to comment on each other's work;
- to blog about (or write interpretations and responses to) subject matter from multiple sources;
- to create public blogs dedicated to relevant topics which were also followed via their RSS feeds in Moodle

To encourage peer interaction, the class blog and wiki had comment features. Students found it useful to bring in RSS feeds for external blogs that were relevant for the unit. To ensure security and privacy for students, Wordpress.org (a version of wordpress.com that is designed to be installed locally) was installed on the university servers. This required an understanding of the installation process, so the support of information technology (IT) department was required. However due to technical difficulty during the installation process, the multi-user installation was not possible. Hence students resorted to use the wordpress.com site (externally hosted) for their own blogging. This became a time-consuming process as students were added to the social informatics blog space manually as blog-roll.

12. DISCUSSION OF RESULTS

This study augments the existing literature by presenting an in-depth study of how social informatics was taught by applying the principles of Pedagogy 2.0. In addition, the research provides a robust conceptual framework for integrating scaffolded pedagogies to enable idea generation, sharing and digital literacy skills. End-of-semester feedback from students showed that, for most, this was a novel and challenging learning experience and one that contributed to their learning.

For all students, this was their first unit that used a blended learning approach in which they has to use and create content and engage in peer learning using Web 2.0 tools . Our experience is that for instructors, use of Web 2.0 tools requires careful planning, a scaffolded approach to ensure students feel confident in using these new media and both technical and academic supports.. For some students, these problems largely relate to the initial learning processes surrounding the adoption of a new learning technology. As noted earlier in the use and outcome of each tool, significant resources for system testing and general technical support are required to manage the technical and usability issues that surface.Students require both orientation and training in using Web 2.0 tools even though they are familiar with some social networking tools such as Myspace and Facebook. Not

all students found it easy to use the tools right away. It is crucial to provide immediate and personal support for students in the form of a workshop or training session at the beginning of semester, and to also provide on-going access to help resources, and to ensure that questions are answered when they arise. Scaffolding students' use of the technology such that they begin by undertaking simple tasks, increasing in complexity (if required) as they build confidence. As one student commented *"I was confused at starting of this unit but I think everything is well now. It just take me some time to understand how this all will work"*.

It is wise to only introduce a limited number of Web 2.0 tools initially, evaluating their impact thoroughly before moving onto new technologies. As one student commented*: "I have been introduced to too many social media tools (wiki, blog, twitter, delicious) and expected to use them all as part of the assessment. I haven't managed this"*.

Students were generally excited about the social tools being introduced into the unit. However in some instances, students were confused about which tool to use for different tasks. Students may not immediately understand the benefits of using Web 2.0 tools. Care needs to be taken at the outset in explaining to students why each tool is used, how it works, why it is relevant to their learning, and how it can benefit them. As part of the class, strategies were taught on how to use the tools effectively, with explanations on learning outcomes to be achieved with them. One way this was managed was to design assessment tasks directly related to the use of these technologies. For example, some assignments required the use of Twitter, blogs, and others required participation in the wiki, thus ensuring learning (Bryant, 2006; Makinen, 2006).

Workload can increase for both teachers and students when Web 2.0 tools are used outside of class. As this technology provides the ability to communicate at any time, there is likely to be some increase in workload for teachers and students. However, the added benefits counterbalance this, if the tasks assigned to the technology are carefully considered such that they do not require the constant attention of the teacher. Teachers need to maximise the potential of collaborative learning by encouraging students to help each other, understand how to access help information online and develop self-regulated learning skills. Teachers should set boundaries and ground rules such as any question posted using Twitter would be answered within 24 hours. It is necessary to plan to make time available at regular intervals through the week to look at questions coming from the Twitter feed, comments in blogs etc. This ensure that the benefits of immediacy the technology afforded are not lost because students were waiting a long time for a response

It is important for students to understand the risks with using online social media networks. The first lecture of the class could be dedicated to explaining to students how to make themselves secure online in order to ensure privacy and develop awareness of their digital footprint.

13. FUTURE RESEARCH ON PEDAGOGY

This investigation demonstrates that teaching and learning innovations are best implemented when informed by constructivist learning theory (Chatti & Jarke, 2007). The learning design reported in this study followed established pedagogy 2.0 principles (McLoughlin & Lee, 2009; Downes, 2005). To summarize the forms of learning and engagement experienced by students, Figure 2 provides an overview of essential elements of the processes that enabled students to learn flexibly and actively. By ensuring that students had personal learning goals, the course and the learning activities always had direct personal contextual relevance to their objectives, and developed skills of lifelong learning and self-motivation. By creating a learning community, each individual student was encouraged to offer feedback and valuable contributions to others. Connectivity and seamless learning was created by enabling learning experiences across devices, time and contexts, and though conversation, both face-go-face and digitally mediated, students participated in creating knowledge objects in the form of short video clips, podcasts and Mashups. Twitter was used effectively to provide peer feedback and created a sense of presence and immediacy even when learners were working on individual projects. Learners often commenced an investigation online and shared findings both face-to-face and digitally, thereby providing them with a connected experience.

Citizen inquiry (i.e. mass participation by groups or the public in structured investigations) was a feature of the pedagogy used to create conversation, connectivity and community (Westheimer, & Kahne, 2004). By using an inquiry based approach with mass participation by students, there was active knowledge building and collaborative participation. For example, students investigated the question of how social media tools are used to create opportunities for active democratic participation, and how digital tools can enable citizen science. The pedagogical principle is that students become active researchers and engage in inquiry based projects (JISC, 2009). For each investigation they gather evidence of successful projects, create a plan of action, collect data and evidence and validate and share findings. This form of citizen enquiry engaged students in personally meaningful inquiry and offered them the scope to examine significant and dynamic problems in social informatics, such as mapping the effects of internet on cybercrime, and then collecting and sharing findings. For students, it was essential that they perceived an educational reason and purpose for the inclusion of Web 2.0 tools in their learning and assessment.

Overall, the pedagogies adopted in this blended social informatics course supported and scaffolded learner engagement, and enabled interactive, networked activities that used participatory media and tools shared across the face-to-face and virtual learner network (Frydenberg, 2006). The online environment offered an expanded notion of digital literacy and cyber behavior and thereby captured the interests of many students. In this way, inquiry skills were learned in conjunction with digital literacies that enable participation by students in global networks. Also, knowledge sharing, creative expression, content creation, organization of resources and research skills added value as learners developed lifelong learning skills and media literacy skills.

14. CONCLUSION

Social learning processes and the means by which people formulate their outlook and relationship with the world, have changed. Important learning outcomes for students include understanding the personal, social, and organizational consequences of ICT design and use. Students entering the IT profession require a nuanced and understanding of organizational consequences of ICT design and use technology appropriately for work, leisure, education and commerce. The skills and dispositions required for digital age success comprise a range of digital literacy skills, critical thinking and creativity, not simply knowledge acquisition.

Currently, social networks and digital media are increasingly oriented towards social and participatory activities (Lara & Naval, 2009; Bryant, 2006). Expertise with information technology enables new abilities and ways to participate and express ideas in a networked society – often called 'digital empowerment'. Such participation increases the competence of individuals and communities to act as influential participants in today digital world (Makinen, 2006). The course described here enables students to understand key concepts on social informatics as it harnessed the collective skills, knowledge and effort of all students and ensured that they were involved in a learning community where participation, openness to new ideas to peer review constituted the learning process.

In summary, it was emphasized at the outset of this paper that social informatics is an integrated field of study and the transdisciplinary nature of social informatics means that students need to develop a range of complex skills, thinking dispositions and concepts to enable them to think critically and creatively. In the case study presented here, the pedagogy adopted was a scaffolded approach based on the integrated elements of learning tasks that support lifelong learning, peer learning and networking. The pedagogy was also personalised as it allowed students to choose personally meaningful tasks for their assignments and to create a digital object or multimedia presentation to share with others. Social media and Twitter in particular, fostered individual and collective scholarly interconnections, moreover, social networking websites, such as Facebook, Myspace, and Twitter, have become an essential part of students' lives (Junco et al, 2010) but need to be use critically and reflectively.

The learning tasks, especially the use of blogs and Twitter, resulted in noticeable increase in communication and collaboration among students both in class and online with external information networks. Students developed more independent digital learning skills and confidence and became co-producers of knowledge and content which formed the emergent content repository of the course. The model depicted in Figure 2 shows the elements of a quality environment are integrated and aligned. Social media can be used to scaffold learning, if students are given authentic tasks to work on. This enables students to validate their learning in the context of the wider world.

Several key issues need to be considered for optimum implementation of Web 2.0 based learning environments. The complexities and interlinked nature of the challenges faced by institutions in embedding effective use of technologies require planning and leadership at all levels. Teachers need to not only plan for learning activities, but also factor in technical support and training for students when introducing social media and test all of the technology thoroughly before using it in a class. Faculty use of interactive, networked activities for teaching and learning enabled through participatory media such as Web 2.0 can enhance student participation, communication and collaboration if pedagogy is planned as a form of learner centred inquiry. The study depicted here illustrates the kinds of pedagogical scaffolds that can be offered to teach social informatics, and it is clear that digital media and networked learn offer great potential for reinvigorating authentic participation, peer-to-peer learning, and higher order thinking. The new insights gained from this study are that it cannot be assumed that all students have the digital skills to integrate web 2.0 tools in their learning, and that instructors need to scaffold learning processes.

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AUTHOR BIOGRAPHIES

Catherine E. McLoughlin is an Associate Professor in the Faculty of Education, Australian Catholic University, Canberra. Her research interests include innovative technology supported learning, e-assessment, digital literacies and emerging digital age pedagogies.

Sultana Lubna Alam is an Assistant Professor in the Faculty of Business, Government and Law at the University of Canberra. Her research interests include technology enabled education, digital citizenship, government 2.0 and crowdsourcing.

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