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Social Media and E-learning in Response to Seismic Events: Resilient Practices

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Abstract

The motivation to adopt innovative communication and e-learning practices in education settings can be stimulated by events such as natural disasters. Education institutions in the Pacific Rim cannot avoid the likelihood of natural disasters that could close one or more buildings on a campus and affect their ability to continue current educational practices. For the University of Canterbury in New Zealand, the impetus to innovate was a series of seismic events in 2010 and 2011. This paper presents findings from studies that identified resilient practices in this organisation, which was a 'late adopter' of e-learning. The findings indicate that the combined use of social media and e-learning to support teaching, learning, communication, and related organisational practices fosters resilience for students, staff, and organisations in times of crises. The recommendations presented are relevant for all educational organisations that could be affected by similar events.

Keywords: social media; e-learning; disaster response; resilience

Introduction

When disasters and crises (whether they be man-made or natural) occur, resilient education institutions adapt in order to continue teaching and research. Resilience has been defined as "an ability to recover from or adjust easily to misfortune or change" ("Resilience", n.d., para. 2). Chang-Richards, Vargo, and Seville (2013) define organisational resilience as "the ability of an organisation to survive a crisis and thrive in a world of uncertainty" (p. 117). Organisational resilience also refers to how organisations improve their ability to respond to, and quickly recover from, crisis events such as natural disasters. Such events can quickly interrupt the activity of an academic institution. Normal programmes and formal operations can break down in unexpected ways as a crisis unfolds and, if essential infrastructure is affected, may result in an institution having to close.. At such times, an organisation can be stimulated to innovate, making rapid changes to its structures and practices and adopting more information, communication, and teaching technologies. Even a university characterised as a "late adopter" (Rogers, 2003) of e-learning by Marshall (2009) can become innovative in these circumstances.

In 2008, the University of Canterbury (hereafter 'the University') situated in Christchurch, New Zealand, had little need to progress their university-wide adoption of e-learning practices. However, a series of seismic events in 2010 and 2011 stimulated the rapid adoption of e-learning across all the University's colleges. The first major earthquake occurred at the end of the mid-semester two break, at 4 a.m. on 4 September 2010. It caused the University to close for 2 weeks. The second major seismic event occurred at 1 p.m. on 22 February, on the second day of

semester one. The majority of the University's staff and students were on campus at that time, but thankfully there was no loss of life. This earthquake had a major impact on the University and the city, and the University was subsequently closed for 3 weeks. The third major earthquake, at 2 p.m. on 13 June 2011, was less destructive. It occurred during the examination period at the end of semester one and resulted in the University being closed for another 2 days. This third event had minimal effect on teaching because the semester had concluded; however, it did affect university assessment practices and resulted in some academics adopting online assessment methods.

Hundreds of aftershocks were experienced in the region between and after these three major seismic events. The provision of ongoing, timely, and comprehensive communication to students, staff, and the wider community was vital throughout this time. The University's Moodle learning management system (LMS) became increasingly important in enabling learning and teaching to continue; particularly after the second earthquake when teaching spaces on the University campus were severely limited. This paper highlights the University's adoption of social media and e-learning technologies to support communication, teaching, and learning in response to the three seismic events. The findings were informed by a series of related studies conducted between 2010 and 2016 by the authors, two of whom were staff members at the University.

Literature

Communication and social media

Digital technologies and virtual environments can provide alternatives for communication and continuity of practice when constraints in the physical environment are experienced after a crisis (Mark & Semaan, 2008). The use of digital technologies has been identified as an important factor in enabling people to adapt practices when their ability to implement existing practices is disrupted (Mackey, Gilmore, Dabner, Breeze, & Buckley, 2012). In the event of a disaster an organisation needs to communicate with its members and the wider community concerning the process of resolving the disaster or crisis. Communication can contribute to the empowerment of citizens in crisis situations by supporting preparedness, enhancing societal understanding of risks, and increasing cooperation (Vos, Lund, & Reich, 2011). Spicer (2008) established that, in an emergency, the ability to communicate, both internally and externally, becomes a key service for an organisation. The critical nature of communication was determined by Seaton, Seaton, Yarwood, and Ryan (2012), who are academics at another higher education institution that was affected by these earthquakes. They confirmed that the degree of disruption and uncertainty immediately after the second major earthquake significantly affected the ability of individuals, and their organisation as an entity, to communicate both within and outside the organisation. DiCarlo et al. (2007) reported that, in the aftermath of Hurricane Katrina in 2005, communication with dispersed faculty, staff, students, and residents at Louisiana State University School of Medicine was essential. The IT staff in that university were mobilised and immediately established an emergency website with daily messages from the chancellor and vice chancellors.

Social media and websites are increasingly becoming important channels for institutional communication to students and other stakeholders (SchWeber, 2008; Seville, Hawker, & Lyttle, 2012). Bird, Ling, and Haynes (2012), reported that social media were valuable to disseminate emergency information during the Queensland and Victorian floods in Australia, because they were effective and fast, and were used in everyday life in that region at that time. Sutton, Palen, and Shklovski (2008) concluded that social media supported backchannel communication, allowing for wide-scale interaction amongst members of the public, and had qualities of being collectively resourceful, self-policing, and generative of information that cannot otherwise be easily obtained. The use of social media during and after the Virginia Tech shooting in 2007 was

investigated by Palen (2008), who reported that "ICT enables people—disaster survivors, curious observers, and those who wished to help victims—to connect to one another and to participate in events, including through seeking and providing information peer-to-peer" (p. 76). Sutton et al. (2008) claimed that peer-to-peer communication through social media such as social networking sites, text and instant messaging applications, blogs, wikis, and other web forums, were growing as a way to support additional (often critical and accurate) dissemination of information in the public sphere. According to Qu, Huang, Zhang, and Zhang (2011), a popular micro-blogging system was used effectively to coordinate actions and provide situation updates immediately after the 2010 Yushu Earthquake in China.

E-learning adoption

E-learning is a global phenomenon fuelled by a variety of economic, technological, and social forces as well as student demand (Butterfield et al., 2002). At the institutional level, the need for organisations to engage the support and agreement of stakeholders through consultation has been highlighted (Guiney, 2013); and critical success factors have been identified in the area of leadership, and in issues of design, technology, and delivery (McPherson & Baptista Nunes, 2006). Strong and supportive leadership is required to successfully manage the cultural and organisational change involved in the adoption of e-learning. "The way forward seems to be for 'the University' to manage the change process by proposing and agreeing goals through consensual debate, supporting strategies appropriately and then realising these through common commitment" (McPherson & Baptista Nunes, 2006, p. 554).

Three levels of factors which influence the adoption of ICT in teaching: personal, school, and technology, were identified by Buabeng-Andoh (2012). At the technological level factors included improved practice; ease of use and consistency with values, experiences, and needs; and opportunities to experiment before adoption. Professional development, funding, and support were important at the school level, but the key influential factor was found to be personal; that is, "teachers' attitudes toward technology or intentions to use technology in their classrooms" (p. 147). Samarawickrema and Stacey (2007) found that academics' attitudes to new processes and change, and their motivation, influenced their technology adoption more than their technology preferences and skills. The perceived need for an innovation influences its adoption (Rogers, 2003), but e-learning is sometimes adopted in response to external influences such as management directives, economic imperatives, or student pressure (Samarawickrema & Stacey, 2007)—or in response to a crisis. In the midst of a crisis there may be little time to experiment before adoption, and the motivation to adopt e-learning can be increased by the urgent need to respond to the immediate situation (Mackey et al., 2012; Breeze, Buckley, & Gilmore, 2011).

The literature indicates that lack of time, heavy workloads, the need to modify teaching materials and practices, lack of funding, policy and intellectual property issues, inadequate academic staff knowledge, and existing university and/or departmental culture, are barriers that can influence the adoption of e-learning practices (Samarawickrema & Stacey, 2007; Walker et al., 2014). Haggerty (2015) identified academics' ability to manage workloads while increasing their own technological expertise as a further barrier to e-learning adoption. The steep learning curve required for the adoption of e-learning can be reduced by the institutional implementation of an LMS (Elgort, 2005), and the momentum from such an implementation can provide an opportunity to incorporate e-learning more broadly across an institution (Guiney, 2013). However, as Rosenberg (2007) stated: "empirical studies have provided evidence that professional development and associated staff capability or capacity issues such as time, incentives, and priorities are critical factors" (p. 8) in encouraging e-learning in New Zealand. While successful e-learning adoption requires professional development and support for staff (Guiney, 2013) across all relevant areas, the value of that professional development is increased by its applicability, appropriateness, and relevance, as well as its timeliness (Samarawickrema &

Stacey, 2007). Other factors contributing to successful e-learning adoption are learning communities (Brennan, McFadden, & Law, 2001), supportive environments, and interpersonal networks that extend beyond the local teaching context.

> If academic teachers have the innovativeness to exploit technology, the ability to seek help from others when necessary, a social network with colleagues, and the ability to respond to the environment and to internal changes, they are exhibiting the characteristics of being adaptive. (Samarawickrema & Stacey, 2007, p. 331)

Adaptability and collegial networks are particularly relevant to the adoption of e-learning in a crisis. By being adaptive in the use of e-learning and associated available technologies, there is potential for educators to provide students with continued access to educational programmes when physical attendance on a campus is highly problematic or impossible (Mackey et al., 2012; Breeze, Buckley, & Gilmore, 2011). Mackey et al. (2012) described how a combination of face-to-face and e-learning strategies, combined with just-in-time collegial professional development, enabled teacher education staff to contact and communicate with students, to address the sudden lack of physical teaching/learning spaces, and to accommodate the varied personal circumstances of both staff and students when normal ways of working and living were disrupted. Staff in the study worked as a collegial community and exhibited resourcefulness, adaptiveness, and flexibility in their ability to adopt new e-learning practices, and adapt existing ones, as an immediate response to challenging circumstances. The authors proposed that institutions and their academic leaders need to be "prepared for the unanticipated" to support staff and maintain student learning and engagement opportunities in crisis situations. They recommend contingency planning at an institutional level to prepare staff to use e-learning strategies and students to work in online environments, and to ensure resources are accessible to staff and students in alternative, digital formats.

Methodology

Five studies investigating the practices at the University during the seismic events of 2010–2011 were jointly analysed by the authors to identify common strategies that demonstrated institutional resilience. These case studies investigated the same phenomena through different lenses, and thus provided a second level of converging lines of inquiry (Yin, 2008). Yin (2008) defines the case study as "an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident" (p. 13). Case studies explore subjects and issues where relationships may be ambiguous or uncertain, and also try to attribute causal relationships rather than just describing a situation (Gray, 2009).

The first study (Ayebi-Arthur, 2016) spanned the years 2010–2015, during which the other four studies were also conducted (see Figure 1). It investigated the rapid adoption of social media and e-learning in the wake of seismic events through data gathered from interviews, documentation, and the University's websites. Non-probability purposive sampling (Cohen, Manion, & Morrison, 2007) was employed to select 29 participants for the study, and included academics who used e-learning, e-learning support staff, and executive leaders. These participants identified 66 relevant documents, which included University policy documents and reports by University units and working groups as well as staff, and including some of the authors of this paper. Descriptive content and thematic analyses were used to describe processes of increasing resilience with e-learning in the aftermath of the seismic events in 2010 and 2011.

The second study (Dabner, 2012) investigated the University's use of web environments (including the social networking site, Facebook) for information and support purposes following the initial earthquake in 2010, and explored how the University used these environments

effectively and the effect they had in the wider university community. Evidence for this study was gathered from multiple sources including interviews, websites, threaded discussion posts, and survey results.

The third study (Monti, Tull, & Hoskin, 2011) investigated the lecturers' reactions and strategies for using technology to compensate for the loss of physical spaces and subsequent opportunities for face-to-face interaction with students after the February 2011 earthquake. Data was gathered from interviews with 12 lecturers, and triangulated with LMS server logs and statistics of access to strengthen the validity of the findings.

The fourth study (Mackey et al., 2012) was inquiry-centred and employed quick-response research strategies (Quarantelli, 2002) to gather time-sensitive data following the February 2011 earthquake. The five academic staff participants were involved in a single programme. The descriptive account of engaging in blended learning in this emergency, which was developed from this reflective–narrative model, was supported by data from the LMS.

The fifth study (Tull, 2014) used a mixed-methods approach, combining data from interviews, video blogs, surveys, logs, and statistical data to focus on the influences on the participants' experiences when using Echo360 lecture capture technology (which was implemented after the June 2011 earthquake), and the e-learning support provided for its use. Quantitative data provided a backdrop for the research through information on the pan-university use of both Echo360 and the e-learning support provided.

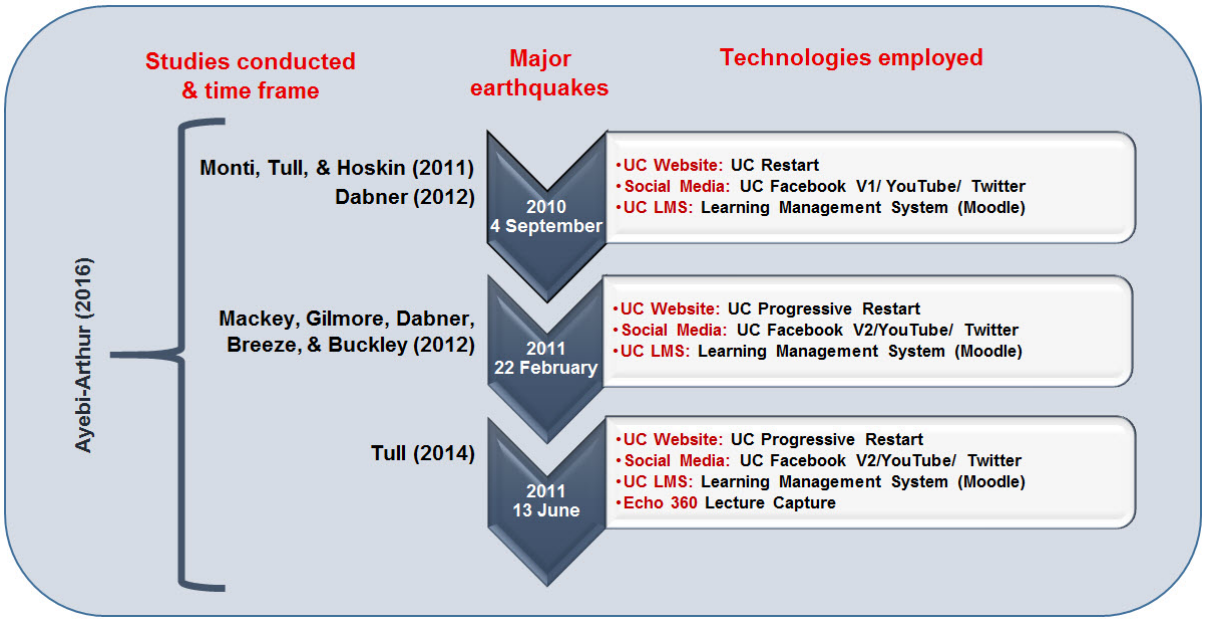

Figure 1 Overview of the focus studies, the major earthquakes they are associated with, and the communication and e-learning technologies employed at that time

The effect of crises on people, their communities, and their environments form part of the challenge of conducting research on unexpected events such as these earthquakes. The disruptive and sometimes sensitive nature of the context of a natural disaster can affect both the researcher and participants. These are important issues to consider when gaining ethical approval and informed participant consent for research. Ethical approval was gained from the University of Canterbury Ethics Committee before each of the studies was conducted.

Findings

Two key themes illustrating resilient practices emerged from the analysis of these five studies: communication about and throughout the crises, and the increased adoption of e-learning practices and technologies to support learning and teaching.

Communication

For the University, communication about the crises began with the first seismic event in September 2010. This involved reassuring students, staff, and stakeholders (including students' parents and guardians as well as national stakeholders such as the Ministry of Education and the Tertiary Education Commission) that the University was taking the necessary steps to ensure that teaching, learning, and research would continue in the aftermath of the crises. The University set up websites to serve as the main source of communication for all information relating to the University's response to the seismic events of 2010 and 2011. The first website was the UC *Restart*, which was set up in September 2010. This site kept staff, students, and other stakeholders up to date with all the latest announcements and information relating to the September 2010 earthquake and the University's re-opening. Then, in response to the February 2011 earthquake, the UC *Progressive Restart* website was set up to give information on how the University was reorganising to continue with the 2011 academic year. Communication focused on the restart of the academic year, the use of e-learning resources for teaching and learning, and other relevant earthquake-related information.

Communication was essential across the University community and, as reported by Seville et al. (2012), "very early in the response process, our leadership team made a conscious decision to invest a lot of effort in communications" (p. 32). The importance of consistent messages was one of the lessons learned from the September 2010 earthquake. In the midst of many sources of potentially misleading information available to staff and students, the University created a policy that its second website, UC *Progressive Restart*, would be the single source of "truth" (Healey, 2011). The Vice Chancellor was prominent in many communications and all official communications were sent from the Senior Management Team.

Although clear messages were being disseminated in an organised way in February–March 2011, disruption to the telecommunications infrastructure in some areas of the city resulted in these messages not being received by some stakeholders. All of the University's students were informed during enrolment that the main form of communication would be through their university email address, but this was not possible in the crisis that unfolded. The use of email was problematic, and Todorova and Bjorn-Andersen (2011), academics at the University, reported that "some email accounts exceeded their quotas under the pressure of increased email traffic and access to email accounts was blocked by pre-earthquake automated routines" (p. 598). There was no way of knowing how many students were missing vital communication. However, students' overall feedback referred to the overwhelming number of messages they received rather than a lack of communication. Communicating at the multiple levels of institution, programme, and course was a strong focus for staff and students. Comprehensive updates were published at least daily on the official University of Canterbury website; a dedicated University of Canterbury Facebook site provided a hub of interaction (Dabner, 2012); and programme coordinators and lecturers began posting news items which were emailed to students from the LMS.

The University's communication through Facebook began shortly after the first earthquake in 2010. According to Dabner (2012) "the University communications team worked on the site for 18 [hours] a day over the initial 2 weeks and at all hours of the day" (p. 75). This commitment of time reinforced Seville et al's (2012) findings that sustaining social media for communication had resource implications for institutions. The design of the Facebook site following this first event "lacked administration tools, making it difficult to track, categorise and sort discussion

threads into a more coherent format" (Seville et al., 2012, p. 34). The University made more effective use of Facebook when responding to the February 2011 earthquake, drawing on the lessons learned from the previous Facebook iteration. In 2011, the design of the Facebook site was improved to become systematic and well-managed and there appeared to be greater emphasis on providing students with a broader range of support from different organisations (Dabner, 2012).

Nesbit and Martin (2012), academics in the UC College of Business and Law, used Facebook to complement emails and postings sent from their LMS course site. They noted many students were without electricity for periods of time but were able to access a text-only version of Facebook on their mobile phones at no cost. They discovered that "as many of the students were already regular users of Facebook for social communication there was a degree of ease of use and familiarity that enhanced the level of engagement that students had with the respective courses" (p. 76). An academic in the College of Education confirmed that the Facebook community enabled "on-going dialogue and information sharing between staff at the Institution and the wider educational community" (Dabner, 2012, p. 69). Other University academics reported: "we found social media to be very effective, particularly in keeping staff and students engaged and interested, not only in what the University was doing, but also how it was going about reopening campus" (Seville et al., 2012, p. 34). Other social media used by the University communications centre over this time included UC YouTube and Twitter.

The University's LMS also played an important role in communication through the one-way channel of News forum posts. The number of these posts increased 88.4% in comparison with February–March of the previous year (Monti et al., 2011). Communication in two-way discussion forums also increased, as academics engaged students online to build community and support students with their learning. Each of these communication channels proved invaluable during these seismic events. They were also used to signal to students the broader adoption of e-learning strategies across the University in response to the crises.

Increased adoption of e-learning practices

In normal circumstances, the adoption of e-learning strategies would be carefully managed at an institutional level, and extra resources and support would be provided to staff and students to facilitate subsequent changes. This level of support and forward planning was simply not possible in circumstances increasingly described by staff as "the new normal". The imperative to increase the adoption of e-learning therefore proved challenging for many as they endeavoured to rapidly implement new approaches to teaching and learning, some involving the use of digital technologies, software, and online environments with which they were unfamiliar. However, in spite of these factors, staff at the University demonstrated resilience, flexibility, collegiality, and creative thinking as they endeavoured to cater for the needs of students in those challenging times.

Innovative solutions were required to enable the rapid adoption of e-learning technologies and e-learning methodologies in such challenging circumstances. These solutions were evident at both grassroots and institutional levels. For example, many academic staff established informal support networks to problem-solve and build capacity throughout this period; small groups often met in private houses to work together to refine content and share tips and ideas. Professional conversations and reflections about changing practices were clearly evident at these times, and the collegial support was valued by academics, some of whom were challenged by earthquake-related issues in their personal lives. For some academic staff, the initial focus was simply to ensure some course content was available for students to engage with online. Many staff were unable to access their offices for an extended period and so were unable to retrieve key resources for their course delivery. Resources that would traditionally have been accessed from textbooks,

hand-outs, or the library, were made available through the LMS. Staff were concerned about the ability of all students to access online content and their own ability to deal with the overwhelming number of resources they needed to access and upload.

For many academics this was a very intense period of work, with queries and forum posts that needed timely responses being received on all 7 days of the week. For those who already had much of their course content available in the LMS, the focus was to support and encourage students to engage with the course content. Several methods were described as successfully promoting engagement. Many academics considered that providing additional structure was one way to encourage students to engage (Monti et al., 2011). Ongoing communication, including timely responses to student queries, and clear, well-organised course sites in the LMS helped to provide this structure. Clear directions, overviews, outlines, and summaries within the sections of an LMS course site, as well as considerable scaffolding and modelling of tasks by staff, were also successful strategies in keeping students focused. In addition, many staff revised their course plans, assessment tasks, and due dates. They posted and emailed more regular course updates, and personally followed up with students who had not yet accessed the online course site. Some staff had to develop completely different assessment tasks for their courses to cater for students who could not complete all the planned coursework because they lacked resources, or could not attend what would have traditionally been a face-to-face exam.

This was also an intense period of work for members of the e-learning support team, which included the three flexible learning advisors. From the day after the February earthquake the team provided support from their homes, and this was one of the first teams to be reallocated space on campus when it became safe. Their accessibility via phone, email, and their central physical location supported many academics to restart their courses and communicate with their students through the LMS. Removing the support team from the main campus as teaching recommenced rendered them less accessible to lecturers, and the loss of one of the three flexible learning advisors in July 2011 further limited the availability of support. This limited support (two advisors) was available until July 2012 when the team was relocated to the main campus and the number of advisors returned to three.

A variety of e-learning tools was supported and used in the aftermath of the seismic events. Some e-learning tools, such the LMS and Adobe Connect web conferencing, were already available in the University. Other tools, such as Echo360 lecture-capture technology, were introduced later. The range of tools and their deployment, influenced by repeated crises, evolved over these years. Their use was facilitated by the availability of support from the e-learning support team, as well as more localised support and collaboration with colleagues. The provision of support in the use of e-learning technologies was at times problematic—innovative solutions were sought to encourage better pedagogical use of the e-learning technologies, which had been adopted under difficult circumstances. Traditional lecture content was initially provided in the LMS, using a combination of tools (such as PowerPoint slides with separate audio files) to minimise internet requirements (Monti et al., 2011). Video recordings were included when internet access became more freely available. Staff also developed additional multimodal resources, including podcasts and video recordings. Many of these were produced with readily available digital technologies such as mobile phones and Flip video recorders. These resources were then quickly uploaded onto websites (e.g., YouTube) or added to course sites in the LMS.

Resources from outside organisations also contributed to the University's ability to support teaching and learning in these challenging circumstances. National and international publishers and suppliers offered staff and students free access to tens of thousands of e-books, online journals, and global databases in the aftermath of the September 2010 earthquake. In 2011, Echo360 offered the University a licence for five lecture theatre venues and a site license for the desktop capture application of EchoSystem. The gift of these licenses meant that the University's

academics had another tool with which to create teaching materials, and supported the adoption of flexible delivery modes to meet the diverse needs of students at this time.

At an institutional level, professional development and support for the use of e-learning technologies were developed in ways that encouraged less reliance on face-to-face workshops and one-to-one technical support. For example, the University's Echo360 Community Grant research project found that academics' levels of confidence, resilience, and motivation for using Echo360 were important factors in the adoption of this technology (Tull & Holiss, 2013). A communities-of-practice approach to professional development was adopted in this project, and an online space was provided in the LMS to support a developing community. Forums were included to enable collegial discussion and support, as well as links to more formal documentation to provide just-in-time support. Academics could also share their Echo360 solutions, including examples and supporting explanations, with colleagues across the University. These contextual examples of good practice demonstrated potential solutions to real issues faced by lecturers at the University, provided reassurance for some that a potential use of Echo360 had been successfully implemented, and inspired others to engage in new uses of the e-learning technology (Tull, 2014). The research revealed that local communities of practice emerged where physically co-located users had become known to each other. Subsequent additions were made to the online space, supporting academics to make connections within their local context and to become part of a local community of practice, thus providing another avenue of support.

Discussion

Although crisis events can require immediate, and often challenging, adjustments to be made to educational and institutional practices, these studies indicate that institutional resilience can be a valuable outcome. Research suggests that enhanced e-learning practices in response to a crisis can also develop the resilience of both students and academic staff (Mackey et al., 2012). Other researchers (Hagar & Haythornthwaite, 2005; Mark & Semaan, 2008) have highlighted that disasters can prompt new ways of working and interacting to combat the constraints of unusual conditions as technologies enable alternative ways of networking and communicating, and as they blur the boundaries of formal and informal learning, and physical and virtual environments.

An organisation's ability to communicate effectively becomes critical in crisis situations (Spicer, 2008). The use of social media and dedicated websites to inform the University community of the organisation's response to the seismic events confirmed Bird, Ling, and Haynes' (2012) findings that identified the importance of disseminating effective and rapid emergency information in times of natural disasters. It also confirmed Vos et al's (2011) recommendation that "in order to ease emotional turmoil, [organisations] have a well-functioning communication structure with designated spokespersons" (p. 20). These studies reinforced that communication to members of an organisation and the general public—both about the crises, and the recovery from the crises—was essential. The importance of using multiple channels for communication was also emphasised in these studies. The University's journey provides evidence that social media does support organisations in responding to a crisis, and that the ways people and institutions respond has been affected by the increasing use of social media in everyday life. Using communication channels that students were familiar with, and were already using, clearly aided the dissemination of important information during these events. Organisations must consider tapping into the potential of these increasingly integral tools. During a crisis, social networking sites and Web 2.0 tools have the potential to benefit people at personal, interpersonal, and societal levels.

These studies found that e-learning became the cornerstone of teaching after a crisis in a university where the majority of teaching and learning had previously been facilitated face to

face. The increased use of e-learning freed up limited campus spaces and face-to-face interactions for other essential learning activities, and enabled students to continue with their studies during disrupted academic years. The availability of a range of e-learning tools was invaluable for facilitating different aspects of teaching and learning in online environments. There was more reliance on, and use of, the tools readily available in the LMS, and increased recognition of the value of online learning environments for course delivery. Uptake in e-learning was somewhat influenced by the availability of centrally located support from the e-learning support team, as well as more localised support and collaboration with colleagues.

In normal circumstances, the institutional adoption of e-learning practices can be enhanced by the development of an explicit e-learning strategy and a comprehensive, planned support programme. But in a crisis the rate of e-learning adoption increased rapidly as it became necessary for engaging students and enabling programme continuity. The duration of the crises also affected the adoption of e-learning. The provision of structured, planned professional development to support this rapid adoption was challenging during these seismic events, especially as they continued over several years and included three campus closures. Having a variety of support mechanisms available when adopting new e-learning technologies was essential for both academics and students at UC. The crisis situation compelled academic staff to review their course content and teaching strategies, to clearly focus on the key learning outcomes, and to engage students in the online environment (Monti et al., 2011). These pressures proved to be very challenging for many staff. Academics at the University, Nesbit and Martin (2012), confirmed "there were many challenges involved in enabling delivery to commence, many relating to the lack of experience of some of the staff in delivering courses online" (p. 198). Both formal and informal support networks helped to address the emergent and ongoing needs of staff.

Recommendations and conclusion

There is an increasing recognition of the need for organisational contingency planning to prepare for challenges, including natural disasters (Seville, Hawker, & Lyttle, 2012). In the university described in this paper, resilience was forged by necessity. The outcome was the development of communicative and e-learning practices that will enable the organisation to respond well to future challenges. The following recommendations are provided to inform the contingency planning process in other education institutions.

- Institutional communication about and throughout crisis events needs to be timely, consistent, coherent, and disseminated through a range of effective channels of communication, including social media. Organisations should exploit the potential of the tools and virtual environments people are increasingly using in their daily lives.
- All courses delivered predominately in a face-to-face environment should also have online course sites that can be enhanced should the mode of learning become more blended or off-campus as a result of reduced access to the campus or other educational space.
- When an organisation is under stress new tools should be introduced only when they are essential. When an e-learning tool is introduced there needs to be ongoing support that takes account of users' changing needs and their ability to support one another.
- The establishment of support systems and networks, both formal (i.e., institutionally facilitated) and informal (i.e., collegial support groups and/or professional communities of practice), will enhance the adoption of e-learning strategies and approaches in a crisis.

Educational institutions cannot avoid the possibility of a natural disaster and, if it does occur, that it could affect their ability to communicate and work with their students (Seville, Hawker, &

Lyttle, 2012). This paper provides some useful insights that will enable other institutions to prepare for the unexpected.

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