ascilite
ascilite 2012
FUTURE CHALLENGES | SUSTAINABLE FUTURES
25 - 28 November 2012 | Wellington | New Zealand

Sustainable futures for learning in a climate of change: Mobile apps, social media, and crisis informatics during emergencies and disasters

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Emergencies and disasters are different types of crisis events which can affect students and staff in their on-campus roles and off-campus activities. In such events, mobile technologies, mobile software applications (apps), and mobile social networks are becoming increasingly relied upon to communicate, to swiftly send and received information and images, to deliver learning moments, and to check the safety of colleagues and friends. This paper investigates the intersection of m-learning, mobile social media, mobile apps, and crisis informatics in times of emergencies and disasters, using the recent Gipplsand earthquake in south-eastern Australia as an exemplar. It also discusses proactive preparation for educational resilience during emergencies and disasters.

Keywords: m-learning; mobile social media; mobile applications (apps); crisis informatics; crises; disasters; emergencies; earthquakes; educational resilience; power supply

Introduction

It was the evening of Tuesday 19th June 2012 and writing was underway for an ASCILITE 2012 paper on the topic of m-learning, mobile social media, crisis informatics, and formal and informal learning in times of emergencies and disasters. At 8.53pm, Australian Eastern Standard Time (AEST), the Gippsland region of south-eastern Victoria, Australia, was rocked by what was reported to be the largest Victorian earthquake in over a century (Caldwell, 2012). At a shallow depth of 9.9 km, the earthquake registered 5.4 magnitude on the Richter scale (USGS, 2012). The epicenter of the earthquake was at -38.304 latitude and 146.200 longitude (Geoscience Australia, 2012), southeast of the township of Moe where Monash University's Department of Rural and Indigenous Health (MUDRIH) is situated. The earthquake was felt throughout the Gipplsand region. Monash University's regional Gippsland Campus is located a thirty minute drive down the road in the township of Churchill, and a number of centres belonging to Monash University's School of Rural Health are dotted throughout the region, including sites at the various district hospitals. As such, the earthquake affected students, and academic and general staff living in the area.

While no fatalities were recorded, the earthquake caused damage. Within some of the institution's departments, such as MUDRIH, plaster had fallen from ceilings, cracks were reported to have appeared in the staff accommodation centre's walls, and my office was a sea of shattered glass brought about by document frames falling from various heights, with books and other items being tossed from their positions on a bookshelf. Yet this was but a mild inconvenience compared to what our Christchurch colleagues had endured in their 2011 earthquake.

As the Gippsland earthquake struck at night, daily academic activities were not severely disrupted, even though some staff experienced disruption of workflows in the aftermath and cleanup. However, had staff or students been at their desks at the time that it struck or had the power failed during or after the event, there was the potential for the earthquake to cause greater challenges, including affecting the continuance of online courses. For example, the Gippsland region produces 80% of Victoria's power supplies. One of the region's electricity producers – the Yallourn Power Station – which was already operating at a reduced capacity at the time due to the flooding of the adjacent open cut coal mine from the Yallourn River, had one of its two remaining units 'tripped' as the result of the earthquake (Levy & Partenza, 2012). Had the earthquake struck during a peak use period, the state's power stability may have been seriously affected. Additionally, some forms of telecommunications experienced challenges during the event. Phone lines were jammed, key websites crashed due to the high volume of traffic at the time, and formal media channels lagged in providing key information to locals.

However, social media went into hyperdrive, providing a means of connectivity, crisis informatics and learning opportunities during and after the emergency event. Hagar (2010, p. 10) first coined the term crisis informatics to describe "the interconnectedness of people, organizations, information, and technology during crises". As

Palen, et al. (2010) note, citizens are naturally information-seeking and will principally rely on their social networks for information, interpretation, and guidance, during emergencies and disasters. The Channel 10 Late News reported on the day that tweets about the earthquake occurred within seconds of the earthquake commencing, and the event was the top trending topic on *Twitter* Australia-wide (Channel 10 Australia, 2012). *YouTube* also provided a means for affected individuals to upload their videos. On *Facebook*, conversations commenced with the anticipated "I felt the earth move under my feet". Factual information and safety warnings were provided through this conduit, including the embedding of hyperlinks to websites which contained up-to-date information. This was crucial in helping to quell community concern as key websites such as Geoscience Australia had crashed under the volume of traffic from concerned citizens wanting information (Levy & Partenza, 2012). Social networks were also used to provide light-hearted responses to the situation. One comical offering on *Facebook* was the posting of a photograph of collapsed shelving and extensively damaged merchandise in the supermarket 'Not Quite Right' (NQR) in the nearby township of Morwell, with the accompanying slogan: "There's something not quite right about Not Quite Right". In addition to this image going 'viral' as it was shared around the social network, the image was later picked up by the mainstream broadcast media as a visual icon of the damage from the Gippsland earthquake for its news broadcasts (ABC, 2012). Similar experiences of the key role that social media has played in times of crises have been noted by others (see Sutton, Palen & Shklovski, 2008; Willems, 2011).

How can the events of the recent Gippsland earthquake serve as a catalyst to safeguard learning and teaching for the future? This paper contributes to the theme of sustainable futures of learning and teaching in a climate of change. It explores m-learning, mobile social media and crisis informatics in times of emergencies and disasters in the backdrop of the Gippsland earthquake. It also discusses proactive preparation for educational resilience during emergencies and disasters.

Emergencies and disasters

Earthquakes are a phenomenon not usually associated with the Australian continent, yet they occur nonetheless. Historically, the strongest earthquake recorded onshore was the April 1941 Meeberrie earthquake in Western Australia which registered 7.3 magnitude on the Richter Scale. However, the December 1989 Newcastle earthquake in New South Wales, registering 5.6 magnitude, is considered to be Australia's most significant earthquake due to the associated loss of human life and the costs of damages (Seismicity in Australia, 2011).

Earthquakes are but one example of a crisis event. Crises can occur anywhere, anytime, and can affect academia in minor or major ways, from the safety of staff and students, through to disruptions of teaching and learning activities. In Australia, the term crisis is operationalised to incorporate events which result from human action or inaction, and/or due to as acts of nature such as fires, storms, floods, and cyclones (DBCDE, 2011). In addition to the type of event, the term crisis also encompasses the scale of the event. The scale of the event can be situated on a 'continuum of magnitude' (Oliver, 2010). Emergencies fall at the lower end of the spectrum as they are considered as having localised impact only. Emergencies fall in the middle of the continuum of magnitude as the resultant human, material, economic, and/or environmental losses exceed the ability of the affected community to cope in the situation (European Commission, 2008). Catastrophes have the highest magnitude of scale, with the organisational, community, and societal impact of catastrophes extending far beyond its geographical locality (UNISDR, 2009).

Future of learning in a climate of change

Hagar (2010, p. 12) notes that "the world will face far more crises and we need to be prepared for a variety of scenarios". This involves not only ensuring the physical safety of students and staff within academia, but also the continuance of academic activities. To safeguard the sustainable future of learning and teaching activities in a climate of change, crises need to be anticipated and strategically planned for in order to optimize seamless operations in a range of scenarios. For example, Kensington, Daellenbach & Davies (2012) shared their challenges in enabling the continuance of formal learning following the Christchurch earthquake in February 2011.

Online operations may be a possibility for both on-campus and off-campus students under such circumstances. However, Agnew & Hickson (2012) note that while there is a body of literature concerning delivery of formal learning in online environments during crises, they identify the paucity of literature in and around "moving to online assessment in a semester disrupted at short notice by a natural disaster" (p. 2). Thus both learning and assessment must be considerations in times of crisis. Further, as was potentially the case in the recent Gippsland

earthquake, power instability can threaten any online learning that is mains-power reliant. What might the solution be?

Mobile everything

The use of handheld mobile devices for learning during disasters and emergencies, especially when these occur in and around learning institutions, may be a solution. This is especially the case as mobile devices are portable and affordable telecommunications owned by most citizens. As Educause (2010, p. 3) has noted, "handheld technology can not only accompany the learner almost anywhere but also provide a platform that is rapidly evolving and always connected to data sources". Mobile phones are also not totally reliant on mains power supply. Although they have their own battery limitations, the addition of solar chargers or portable wind-up chargers (which connect to the phone via USB) are an essential part of any potential emergency kit when mobile technology is a consideration in times of crisis.

Apps

Learning for the future involves considerations on what educational technologies lie on the horizon. The annual Horizon Report (Johnson, Adams & Cummins, 2012) by the New Media Consortium comments on educational technologies in a 'time-to adoption' framework of less than or equal to one year, two to three years, and four to five years. While mobile learning has already been adopted (Johnson, Smith, Willis, Levine, & Haywood, 2011); mobile applications ('apps') are the new frontier for the immediate future. Apps are computing software for specific purposes such as mobile phones. Saylor (2012) refers to the Internet-connected smartphones as 'app-phones' and suggests that these mobile devices should be considered foremost as computing devices before they are considered as telephones.

According to the Horizon Report 2012 (Johnson et al., 2012, p. 6), apps for mobile devices "are the fastest growing dimension of the mobile space in higher education right now". Apps however, need not be designed specifically for learning purposes in order to be used in formal learning opportunities. Educause (2010, p. 1) notes that "The software that underlies m-learning includes not only mobile applications designed specifically for learning purposes, but also those designed for other uses – such as geolocation, data access, readers, and maps – but that can be adapted for educational purposes". Thus in relation proactive preparation for educational resilience during emergencies and disasters, mobile apps may be useful for providing seamless formal learning purposes including assessment, providing social media connectivity, and providing software to pertinent for personal safety.

In relation to the provision of seamless formal learning opportunities, purpose-built institutional apps enable access to key features of the institution's website and learning management system (LMS). For example, the Monash University smartphone app (Monash University, 2012) enables access to such key features as email and units. Moreover, the Monash app has the Monash University maps integrated with Google Maps so that the user can not only locate themselves onsite, but also track movements towards other destinations on (or off) campus. During emergencies and disasters, this particular feature could be used as a safety device in times of power-failures or overcome potential location disorientation due to smoke inundation.

In relation to apps to enable mobile social media, such as the *Facebook* app, one tap on the smartphone icon can allow direct access to a spatially-condensed version of the Internet website. Such social networks can provide immediate responses by others in the social network including the provision of crisis informatics and detailed localised information that may not be available on main channel information sources.

Specifically in relation to smartphone apps to assist personal safety of students and academic and general staff during crises, there are a number of free and/or cheap apps which may be beneficial:

- emergency location beacon app which utilises the global positioning system (GPS) of smartphones, such as the 'Rescue Me' app (Edith Cowan University, 2012);
- flashlight app which is handy when power fails as it often does in emergency and disaster events;
- seismometer apps which utilise the in-built vibration sensors of the use of the smartphone; and
- cardio-pulmonary resuscitation (CPR) apps which is useful for emergency first aid including cardiac compression rates through an audio beep for adults and children.

While this list is not conclusive, it serves to prompt proactive thought over what are the essential emergency needs during, and in the resolution period after, emergencies and disasters, not simply for teaching and learning, but also for the safekeeping of students and staff during crises.

Conclusion

Emergencies and disasters are increasingly frequent scenarios. These are events which affect students and staff alike, and may disrupt teaching, learning and assessment activities. The Gippsland earthquake struck without warning, as do many emergency and disaster events. How can staff and students be prepared for such events? How can teaching, learning and assessment be sustained in a climate of change? How can educational resilience be assured when infrastructure is disrupted or jeopardised?

This paper has discussed m-learning, apps, crisis informatics and mobile social media as means to help support educational resilience both during the crisis event and in the post-crisis timeframe. Through such hardware and software, potential strategies for seamless teaching, learning and assessment may be offered. This strategy will be the basis for further research.

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Please cite as: Willems, J. (2012). Sustainable futures for learning in a climate of change: Mobile apps, social media, and crisis informatics during emergencies and disasters. In M. Brown, M. Hartnett & T. Stewart (Eds.), Future challenges, sustainable futures. Proceedings ascilite Wellington 2012. (pp.1056-1060).