Evolving Resilience Through e-Learning: An Emerging Case Study of Change in Initial Teacher Education Programmes as a Result of Seismic Events

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Abstract: Change can be viewed as an evolutionary process in which the educators and their organisations are co-evolving with digital technologies (Davis, Eickelmann, & Zaka, 2013) and sometimes the co-evolution is stimulated by a shock that speeds changes in behaviour of the organisation as well as its staff and students. This paper presents the emerging findings in a case study of one College of Education that was impacted by seismic events in New Zealand. Documentary analysis and an interview of two staff indicate that evolution was prompted and has been sustained to enable the College to become more resilient. For example, with the adoption of a lecture capture system and also a move away from physical of assignments mailed to the college into online assessment managed through the LMS. This evolutionary process will be later evaluated though the generic model of organisational resilience by Resilient Organisations (2012).

Introduction

Since the start of the 21st century, there has been rapid growth in the range of technologies available to support learning in universities. There is also an increasing awareness that disasters and crises have and will continue to require higher education institutions to evolve rapidly and become more resilient in order to carry out their mandate of teaching and research. These stimuli have also influenced the decisions taken by individual academics and their institutions about introducing, developing and sustaining new approaches to learning with relevant technologies in universities and schools. Davis Eickelmann and Zaka (2013) view this as a process in which the educators and their organisations are co-evolving with digital technologies. Sometimes the co-evolution is stimulated by a shock that speeds changes in behaviour of the organisation as well as its staff and students. The paper focuses on the evolution of e-learning in initial teacher education and it's fit with the development of resilience for those programmes and related services. The seismic events, especially in February, 2011 had a great effect on University of Canterbury (UC) which included the closing of the university for two weeks at the start of the 2011 academic year. It would be of interest to find out how initial teacher education programmes (ITE) in the College of Education (CoE) of UC adapted with e-learning in the wake of the seismic activities. The research question guiding the study is: How did Initial Teacher Education programmes and related services change as a result of earthquakes? What helped to build resilience (or not)? This paper aims to describe that co-evolution in one college as it responded to seismic events. The paper reports early analysis from two interviews and a small collection of documents.

Background

The College of Education, one of five Colleges within the University, has an established reputation for distance education and was amongst the pioneers of online learning in New Zealand with its first fully online teacher education course offered in 2001 (Mackey, Breeze, Buckley, Dabner, & Gilmore, 2011). It offers one of the largest programmes of initial teacher education in New Zealand (University of Canterbury, 2007). These programmes are offered to all sectors of education including early childhood, primary, secondary and tertiary education. The College of Education has considerable expertise and practice in e-learning, including an award-winning nationwide primary teacher education programme with a flexible learning option (FLO) accessible to students nationwide and occasionally overseas (Mackey, Davis, & Dabner, 2012). Flexible Learning Option increases flexibility to make University study possible for students who do not have the ability to get to a local campus and allow students to

study, part-time or full-time in some programmes whilst they continue work, meet family responsibilities and pursue other interests (University of Canterbury, n.d.).

As part of FLO, the College had also developed a very effective learning management system (LMS) called StudentNet, which all students and staff had access to. The idea was that students would create an online community for sharing of ideas and information relevant to the course. StudentNet was discontinued when the university chose to focus on Moodle in 2008. UC College of Education runs ITE in Early Childhood Teacher Education, Primary Teacher Education, Secondary Teacher Education Physical Education. The Bachelor of Teaching and Learning (Early Childhood) and Bachelor of Teaching and Learning (Primary) programmes both include a FLO Option.

The E-Learning Maturity Model provides a means by which institutions can assess and compare their capability to sustainably develop, deploy and support e-learning (Marshall, 2009). Marshall (2009) used the E-Learning Maturity Model Version 2.3 Capability Assessment to conduct an analysis of the e-learning capability of The University of Canterbury in late 2008/early 2009. He noted, among other findings, that the processes surrounding the creation and maintenance of e-learning resources showed that the infrastructure in UC is robust, well designed, well maintained. While Marshall (2009) recognised that LMS were often used in courses, he criticized that the processes associated with institutional planning and management in UC were ad-hoc and depend on individual teachers, rather than being a systematic component of the core teaching design.

Organisational resilience can be defined as "the ability of an organisation to survive a crisis and thrive in a world of uncertainty" (Seville, Hawker, & Lyttle, 2012, p. 3). The concept of organisational resilience includes planning for crisis but also considers traits that lead to organisational adaptability and ability to thrive despite adverse circumstances (Seville et al., 2012, p. 4). It is important to recognise that all organisations may be seen to sit within a larger ecosystem and to have smaller organisations such as departments nested within them (Davis, 2008) and that resilience is required across multiple levels of the ecosystem. That is to say that the resilience of an organisation is directly related to the resilience of the other organisations on which it depends (e.g. the organisations of customers, suppliers, regulators, and even competitors). In addition, an organisation is dependent on the individual resilience of its staff and the communities in which they live. One way that resilience can be built is by influencing organisations to improve their ability to cope with and adapt to the consequences of crises and disasters. Resilience requires an ability to pre-plan for improved resilience at both normal times and when un-expected events occur. This develops the capability to constantly and continuously evolve to match or exceed the needs of its operating environment before those needs become critical. Appropriate leadership and culture that promotes adaptive ability and innovation within an organisation can embed resilience within decision making at all levels (Resilient Organisations, 2012).

Methodology

A qualitative case study research design was used for the study. Multiple sources of data were used for the study. These were university policy statements, documents and reports. Members of faculty and management were interviewed for the study.

Data collection

Cohen, Manion, and Morrison (2007) assert that a nonprobability sample can prove adequate and effective where researchers do not intend to generalize their findings beyond the sample in question. On the limitations of this sampling technique, Cohen et al. (2007) stress that, while it may satisfy the researcher's needs to take this type of sample, it does not pretend to represent the wider population it is deliberately and unashamedly selective and biased. Three members of the teaching faculty and a staff at the general office in the CoE and documentation were purposively sampled. Two different sources of data were identified, that is documents and interviews. Documents were selected for their relevance to the topic analysed using themes informed by the literature reviewed above. A semi-structured interview schedule was used for the systematic collection of interview data. To ensure content validity the interview schedule was also given to an expert in the field for checking. Documentary analysis was validated and enriched with the interview data. Interviewees were asked to supply any documents that they felt comfortable to share, including stored emails. Data collection was carried out by the first author, who has minimal experience of seismic events, supported by the second author, who was also his doctoral supervisor with extensive experience of the seismic events. Permission and approval were gained from the university's Educational Research Human Ethics Committee. Publications of the University of Canterbury on disaster resilience were sought from

interviewees, the web, the library, Canterbury Educational Printing Services and Canterbury University Press, interviewee emails that participants were happy to share, course material, policy and reports made available.

Creswell (2012) has recommended the use of at least two approaches in any qualitative research in order to ensure credibility. The credibility of the interview data was established by providing the participants with the focus questions prior to the interview and the interviewees were given transcripts of transcribed interviews to obtain feedback from the participants regarding the accuracy of the recorded information. The evidence from documents, interviews and survey were then triangulated to improve confidence in the findings, and illustrate the case study in layers of thick description, as recommended by Yin (2008).

Data analysis

The data analysis process was in two-fold. Firstly, there was documentary analysis to determine the e-learning measures that the university/CoE had put in place in response before, during and after the three seismic events in September 2010, February 2011 and June 2011. Content analysis approach was used to study UC documents using the 13 indicators of organisational resilience. The documents were also studied across a timeline from 2007 to 2013. This was to explore if the documents relating to e-learning exhibited waves of evolution/devolution to resilience as a result of the seismic activities. This involved searches for patterns, themes and topics on resilience indicators, and assigning coding categories. Some of the documents were at the university level, others were published research and the rest were college level. The responses from the interview were analysed narratively with themes that were deduced from the interview. Sarantakos (2013) noted that narrative analysis is concerned with studying the life stories of people and how they understand their world. It deals with interpreting conversation or story by paying attention to the speaker's embedded meanings and evaluations as well as their context (Wiles, Rosenberg, & Kearns, 2005).

Results

Documentary analysis results

The documents analysed for the study are listed in Table 1. The remainder of the preliminary results describes evidence of changes prompted by the seismic events, without an attempt to weave them into a story.

Document(s)	Date issued
UC Teaching and Learning Plan 2011-2013	Sep. 2010
UC College of Education Flexible Learning Guidelines	Oct. 2010
Emails from Niki Davis, chair of the FLO Working Group and professor of e-Learning (16 in total)	May – Oct. 2011
On-Line Marking Terms of Reference	Sep. 2011
FLO Quake Recovery Project	Nov. 2011

Table 1: List of documents used for the study

Twenty-one emails relating to the period of the study were received from Niki Davis. Sixteen of the emails had information relating to the use/disruption of e-learning during 2010-2012 and were therefore selected for the study. Some of the emails had documents attached such as minutes of meetings and reports. For example, an email to the FLO working group there was a proposal to the University Quake Recovery Project for temporary support for the centre that handled FLO students' materials (DMAC) in which Niki said: "As a result of the quake disruption and lack of access to facilities and resources Course leaders are likely to be behind in course production and it is essential that new courses will be ready in time" (email to: FLO WG from Niki Davis on 18 May 2011 Subject: Draft request for funding for DMAC/FLO).

The earthquakes of 2011 resulted in the relocation of video conferencing equipment in a room set up for video conferencing in CoE. A series of emails were sent among staff to find the video conferencing equipment for use by staff in CoE.

- "One screen and the Polycom of the video conferencing gear has been removed from 215? Do you know where its gone and when it will be back?" (email sent on 18/07/2011 subject: OT215 video conferencing gear missing)
- Pseudonym A came and got it last week. Not sure why or how long (email sent on 18 July 2011, Subject: Re: OT215 video conferencing gear missing)
- "Apologies that you didn't receive this news. Rest assured the video conferencing equipment has not been stolen but is being put to good use in KE06 on a regular basis due to the decisions that had to get made because of the earthquake." (email sent to Niki Davis on 18 July 2011 subject: RE: OT215 video conferencing gear - due back when?)

In September 2010 according to the UC Teaching and Learning Plan 2011-2013, the PVC (Learning Resources) was tasked with the responsibility to 'Support and promote the development of flexible learning and distance education options (University of Canterbury, 2010). The document also noted that dedicated support staff will be needed. Programmes were to be provided to staff and student support to enhance the use of the learning management system(s).

A document, UC College of Education Flexible Learning Guidelines 2010, published by CoE outlined the expectations for academic staff who were offering courses enhanced with e-learning, including the use of the University of Canterbury Learning Management System UC *Learn* (UC College of Education, 2010, p. 1). These guidelines were particularly relevant for courses and programmes with FLO and were produced by the College of Education Executive Sub Committee for FLO (UC College of Education, 2010). In the Guidelines it was recommended that in order to enhance course quality and reduce workload, each college course has one (and only one) current UC Learn course site (UC College of Education, 2010). The guidelines may have made the CoE resilient in its programmes during the seismic events of 2011. These was also a change in the Computer/Internet Access and Course Material Statement of CoE on the College website as a result of seismic events for prospective students to read on the web and in mail outs: "To study at the UC College of Education you must have continual access to a computer with broadband internet access, and access to a printer'. This will also ensure that we are covered when we move to the online submission of assignments (email to Niki Davis on 17 October 2011 Subject: Final statement for 'Computer Use').

Furthermore, a document with On-Line Marking Terms of Reference in 2011 sought to identify the steps where necessary that require change or modification to enable assignments to be marked on-line. It identified training requirements for academic and administrative staff arising from the implementation of online marking. The seismic event of 2011 resulted in the loss of the Distance Material & Assignments Centre (DMAC) of CoE as it was in a building that was inaccessible. In 2012 it was agreed that where possible FLO/distance assignments would be submitted via Learn drop-box (FLO Guidance on Online Assessment, 2012). "The Academic Services Team in the College Office can receive FLO assignments that are submitted by FLO students by post via the Assignments Room in Ōrakipaoa 116" (email From: College Office staff Sent: 14 February 2014 Subject: Exempt Assignments Procedure). It is useful to note that this has now become a norm for all students to submit assignments through Assignment Dropbox in the *Learn.*

Interview results

This section presents exemplars of influence of seismic events on e-learning in ITE in CoE derived from two lecturers identified as early adopters of e-learning in the CoE were interviewed. The interview was semi-structured in nature and the questions covered areas such as their training in the use of e-learning to teach, how their use of e-learning changed with the earthquakes, how they taught with e-learning, the role e-learning plays in their teaching, and the context(s) that influence how they use e-learning. The interview was conducted with two lecturers together because they jointly taught a course and this helped them to coordinate their responses; they also stimulated each other's memory of events. Their names have been replaced with pseudonyms to protect their identities. The findings are presented with the themes that were deduced from the interviews.

Role in relation to e-Learning

In this theme, the lecturers reported on their initial interactions of e-learning. Whitney reported, "I see part of my role as making sure that everyone in the team is able to participate with e-Learning with our students". She also

viewed e-Learning as part of the way that she could help best reach distance students in particular, but also using it for on campus students. Whitney's role has not changed much since 2010 although she is now coordinating more courses currently than before.

Whitney and Xantha indicated that they did not have any input into using e-Learning as part of that degree planning. Whitney remarked, "In fact I'm not even sure if it was particularly thought about to be honest. I think that e-Learning actually came after 2011". Whitney also remarked that "I think the e-Learning and how do we reach our students best using e-Learning tools happened after the February earthquake. It was a direct result for me in my teaching, of the February earthquake".

Xantha was of the opinion that "there was an assumption made in Early Childhood that we were set up really well for distance learning" as it was module based learning. Students come for face-to-face two days a month. She added that "when face to face was removed from our programme, as a result of the reconstitution of the programme we needed to start thinking about what does this now mean, how we can best reach our students". Whitney added that when the February earthquake hit, "we weren't connecting with the on-campus students either, because they weren't here". Whitney and Xantha discussed the issue of how to teach their on-campus students after the earthquakes. They remarked, "how are we going to manage, that we can't reach our on campus students, but we still pretty much just got the modules that we would have used with our distance students, and got them to work through that, but we had to really think about, you know what's happening for everyone, and how can we use some different technologies. Then in 2011, we actually had another colleague who started talking about Adobe Connect".

The colleague's enthusiasm in using Adobe Connect for teaching made Whitney and Xantha interested in using e-learning. They remarked "we started thinking, I wonder what that's about, it sounds really exciting, I wonder what we can do about that. So in 2012 we had this earthquake year of trying to reach our students, ... thinking about some ways". Whitney and Xantha have been using the LMS to communicate with students but they felt it was inadequate. Thus their comment, "The ways we kind of reached our distance students was just using *Learn* (LMS) really just to post information. That's what it felt like. Or we would put up a Power Point [files] and some questions for them to think about and the ways we kind of reached our distance students".

E-learning tools adoption

The e-Learning tools adopted by the interviewees now described. Whitney and Xantha used Personal Capture in Echo 360 to enhance their teaching in a course for their distance students. They made 20 minute Personal Captures and put the videos online in the LMS. The feedback Whitney and Xantha got from the majority of the students was that they wanted the whole lecture that the on-campus students were seeing, because they felt they were still missing out on the discussion that might occur in the actual lecture. Whitney remarked that the students felt like they were disconnected from the course. Whitney and Xantha took on board a lot feedback from their students and decided to do full recording of their lectures using Echo 360. Lectures were just automatically recorded each week. Lectures given to on-campus students were automatically recorded and put up in the LMS.

Whitney and Xantha also decided that they would also use Adobe Connect once a week with their distance students in that course as well. They had never done it before but "decided to give it a go". They found it hugely interesting and the students were grateful for it. On the use of other e-learning tools, Whitney and Xantha reflected, "Well, *Learn* was fine, all of our assessments are online for our courses. However, the ePortfolio was more challenging "MyPortfolio was a problem because we didn't understand it." Whitney and Xantha also remarked that "putting assessments up *Learn* worked for us particularly well …, even one with the resources which has lots of photos and stuff, was still fine for us. So actually online is not the problem for us". They added that they both actually enjoy marking online. Xantha remarked, "I can type faster than I can write" while Whitney added, "I also think you can mark anywhere, you don't have to carry scripts around with you.

"The students really connected with us in that course" recalled Whitney and Xantha. Whitney and Xantha reported on how "the students really could see the passion that the lecturers had for the course, maybe they felt that they couldn't quite see that if it was written stuff necessarily". Whitney and Xantha said that of their teacher feedbacks were really positive, and the evaluation of the courses were really positive from the distance students as well, "…they felt really connected, which was what we wanted to work on".

Support on using e-learning tools

When asked about support for e-learning, Whitney and Xantha stated that they did not have any training in the use of Adobe Connect. They remarked "we'd never had it before, and we decided we would just give it a go". During the interview Whitney and Xantha recalled, "So we just got them to set us up. We hadn't had any lessons on it. We're kind of keen just to give it a go, which has its ups and its downs but I think um, if we had known a bit more…we probably still need some more lessons on how to use AdobeConnect".

Xantha added: "in particular Adobe, because there's some really nifty little functions there that we haven't quite worked out yet". They added that a member of staff from the AV service came over and "did all the Adobe stuff, he was fantastic but it was only like one session; he came over once and it was actually quite a bit of time before we did anything right. " Whitney and Xantha recalled that they took a year before they used that training having adopted Echo 360 lecture capture first. In their recollections they also mentioned being displaced from their individual offices and relocated in an office space shared by up to 10 staff, "It was, it was probably about six or seven months before we sat down and did anything, but in fact we didn't do Adobe Connect for another year, it was rather Echo 360 we did and it was before we'd even, it was actually while we were in the hubs, right, at the beginning of 2011".

Their response to a question as to the person who had helped them with Echo 360, they replied, "we just… actually…we just did it. We had those little fact sheets that they had, just worked our way through those really, it was really good".

Effect of the earthquakes

This theme reports on the effect of the earthquakes on the interviewees. The earthquakes had influence on the use of e-learning by Whitney and Xantha. Whitney notes that "…definitely from the earthquakes, I think what really made us aware was that there were these other technologies out there that we could use to really connect with our students, like I think that's the whole thing for us, is that connection". She added, "Early childhood used the old StudentNet system [LMS], which was the student system, we always had things on StudentNet but for a very long time was information giving, like it wasn't actually interactive, it wasn't used interactively, and I think our, what modes of delivery, using technologies, wasn't interactive, it was information giving. So that the Personal Capture Echos were just information giving really, there was no reciprocity in that, because they just sat and watched it".

Whitney was of the opinion that "the earthquake gave us a bit of a shake, it kind of gave us the thought of, what if this does have to go on longer how are we actually ever going to know our students if we never see them". She was worried that, "how are we ever, well how are we going to know someone who's going to become a teacher, how do we find that out from distance students. How do we know they have the disposition to be a teacher if we never see them or hear their voice?"

Xantha believed that the earthquakes may have influenced the use of e-learning for teaching i.e. "I think the earthquake, yeah… I don't know if we would have moved so quickly, had we not had the earthquake… In fact, if we'd had some of that technology beforehand I think we would have done it better. If we knew about Adobe, if we knew about Echo a lot earlier, I think the experience for students would have been much better in that earthquake year".

Whitney concurred "I think earthquakes was the beginning and I think it was about the connection, but I also think the redeveloped degree was a connection because they stopped the students coming in, and so we suddenly started feeling like we weren't connecting so well with the students". She added, "we thought of campus and distance students as quite different. I think when the earthquake happened we suddenly had to treat the whole group of people that were all going to be distant, all going to be, and the on campus students of course had I think, um, gone on campus because they wanted that interaction, so we had to think, how are we going to do that? How can we, give them some experience where they are getting something that they feel like that's what they've actually asked for".

However, not all the events had an impact. Xantha indicated that the June 2011 earthquake did not affect her teaching thus "I don't think June slowed us down that much because we'd already moved on". Whitney added, "I

don't think it did slow us down because we had that, in actually exam time when we're out, then we had break time, and so…. so actually I think it didn't really slow us down too much".

The redeveloped degree in early childhood also affected the use of e-learning. This was because in the redeveloped degree Whitney and Xantha decided they would use more e-learning for their distance students. They recollected, "the students got these little Echo things and it wasn't so good for some of the students who wanted full lectures because other courses were putting up full lectures. Whitney and Xanta had thought about the distance students' circumstances when they decided to make the short video captures; rather than record full lectures, they added, "we thought we'd put up these little succinct things [video so] that we wouldn't have to be using broadband. We've just had this discussion about whether to put up full [lectures] or Echos [short recordings]. Our data showed really clearly that [the students] wanted full [lecture]. That might just have been the cohort of students."

Whitney also remarked that other people do not like the lectures being videoed "because they feel like it restricts their movement, as you know, the camera is kind of fixed. Xantha, who is a course leader with a number of staff teaching into it remarked "one of our lecturers is really adamant does not want it to be videoed, because it feels like it restricts their ability to move around the lecture theatre and we're [currently] having to do some negotiation about that". Whitney and Xantha concluded, "We're at the point where we think we might put both up and do a little, this is a snapshot of the lecture if you don't want to watch the whole thing, if you want the whole thing… you go for it, you choose which one you want. I think that's probably where we will head to, we will head to the full lecture the Echo and do it that way."

Whitney and Xantha also reflected on whether it was equitable for on-campus students to have access to the Echo recording, the lectures as the distance students and that there has been discussion about it. Xantha added that it was noticed a previous year that attendance in one of the courses was quite low because students assumed that as the lectures were being recorded they could just opt out and watch it at home. However, they did not realise the implications of their actions since students have to attend at least 80% or participate in 80% course materials and content else they cannot go out on teaching practice. This was stated in the course outline.

Future plans on use of e-learning

On future plans on using e-learning for teaching Whitney and Xantha resolve to "up-skill ourselves a little with the tools that are out there, and thinking of other ways of doing some things as well". Whitney added "I'll be doing the Adobes [web conferencing] with them so, [I will] show them how to link in [use Adobe software], and give them some experience of talking and stuff". Xantha remarked, "we had someone actually in this year's course evaluation, who said I finally found out how to connect to [Adobe within] the course". Whitney remarked that a colleague down the hall informed her that she wants to learn more about Adobe and how to work it, so "I'm thinking we probably really should just see if we can get PD [professional development] in for ECE [our programme] or one of our department meetings around using Adobe, you know, this is some of the features of Adobe".

Whitney and Xantha had planned that in the new academic year distance residential programme they would have two sessions where one will be dedicated to the LMS course site, and one to Adobe Connect. They also had plans of "pulling some other people of the team in to get them up-skilled as well and to do some of that Adobe". Whitney added, "I helped two Primary [staff] and so they feel a little more confident this year".

Also for their unit in the programme it has been planned that every lecturer will "do a lecture that will be videoed here, or videoed up there or wherever it is. So that was kind of a way we thought that could you know involve the voices of the staff, and the passions they have for the areas they have. They will actually use the Echo 360 software".

As part of the on-site intensives for distance students at the start of the current year in 2014, Whitney and Xantha "sort of scattered the students all around in pairs all over the campus, and then they just Adobe'd into a site, doing all the Adobeing, connecting and stuff". This was done so students could experience what they will be doing when they are home. Xantha explained that that the students will get to know "this is the link I need to link into and that never changes, so every week we get what's the link. Whitney and Xantha concluded, "the use of e-learning and particularly for TEPI is we have our distance campuses is that the Echo allows them to be part of, so this semester a couple of them are going to be doing Echos that our on campus students will have the opportunity to watch.

Otherwise they feel they don't really contribute because what happens is, all our lectures get videoed, and they feel like they don't have the opportunity to be part of that in some ways".

Next steps

Further interviews and documents have been gathered and more will be sought until a rich case study emerges with few contradictions. In addition, the generic model of organisational resilience by Resilient Organisations (2012) has been adapted to analyse the resilience of UC through e-learning. They identified 13 indicators of organisational resilience, (see Fig 1). The next analysis for this research will seek indicators of organisational resilience as recommended by Resilient Organisations (2012) in the case study findings for this CoE. It will be complemented with categories drawn from the E-Learning Maturity Model Version 2.3 Capability Assessment released by Stephen Marshall (2009).

Figure 1: Indicators of organisational resilience (Resilient Organisations, 2012)

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Acknowledgements