Development of an Evidence-based Professional Learning Program Informed by Online Teachers' Self-efficacy and Threshold Concepts

Kevin P. Gosselin
Texas A&M University

Maria Northcote, Daniel Reynaud, Peter Kilgour, Malcolm Anderson and Chris Boddey
Avondale College of Higher Education

Abstract

As online education continues to expand across varied educational sectors, so does the demand for professional development programs to guide academic teaching staff through the processes of developing their capacities to design and teach online courses. To meet these challenges at one higher education institution, a mixed methods research study was implemented to identify the professional learning needs of academic teaching staff for the purposes of developing a tailor-made professional development program. The principles of self-efficacy and threshold concepts were used to inform the design of the study. Data were systematically gathered from the participants to determine self-efficacy, concerns, and questions and experiences of academic teaching staff with online teaching. Findings revealed that academic staff held threshold concepts, skills and attitudes about online teaching. Three groups of staff were identified, all with varying forms of professional development requirements. This case study account demonstrates how an evidence-based project provided the basis for a research-informed institutional professional development program that is currently guiding academic staff through their development as online course designers and teachers.

Introduction

Online learning is now widely regarded as necessary rather than optional in tertiary education. New opportunities to maintain and grow student numbers accompany this development. The different nature of online learning requires resources to be invested in developing infrastructure and capacity in both students and academic staff. In particular, academics require ongoing professional development, especially as they engage with the underlying threshold concepts (Meyer & Land, 2003, 2005) of online teaching which, once acquired, grant access to a greater mastery of the field. This paper focuses on the third phase of a research study that has identified the growing awareness of threshold concepts about online teaching by academics in a particular institution. The first two stages of the study identified key threshold concepts and investigated how academics began the process of understanding and applying them to their online teaching. This case study explores the progress made by a range of academics, from those who began with the first study to those who have just begun their online delivery experiences. The data gathered have been used to inform the development of a professional learning program specifically for academic teaching staff as they progressed in knowledge and self-efficacy in delivering online education. By identifying the key concepts, and the means by which academics acquired and mastered them, and comparing them with the literature in the field, the research has sought to identify best practice in optimizing online learning and teaching. As a result, the institution has enabled academic programs to design and deploy academic technology to optimize online learning and teaching.

Avondale College of Higher Education, hereby referred to as Avondale, has been transitioning into online education over the decade, requiring it to rapidly build a base of expertise where little existed before. A handful of leaders at the institution have established a program of professional education and development to train the academic staff. To ensure the best possible outcomes and to produce evidence-based practice in online learning, the program has been informed by current literature and the findings of the ongoing research conducted by the implementers of the program. The first two stages of this research revealed the nature of the learning curve of academics moving into online education, and helped inform and refine the professional education process. As pockets of academics have increased their skill and confidence, the nature of the support that they require has changed. At the same time, academics from other disciplines not previously engaged in online learning at the institution have begun the process, meaning that the professional development has reached a point of diversity and complexity. This paper explores what happens at this stage at Avondale, as the community of scholars broadens and deepens in knowledge and skill. This case study of professional development at Avondale provides an example of how one institution is working towards best practice in online learning and teaching in the context of meeting the challenge of changing teaching practices.

Literature Review

Effective professional development in higher education provides participants with opportunities for active learning, continuous participation and the application of knowledge (Bennett & Lockyer, 2004; Garet, Porter, Desimone, Birman, & Yoon, 2001; Harris, 2006). Adult learners are more motivated when they are able to self-select, access and integrate their learning through multiple pathways for specific purposes (Harris, 2006; Siemens, 2005). A key goal of professional development in higher education is the provision of authentic and relevant training to facilitate the improvement of learning and the integration of skills into the teaching environment (Chism, 2004; Guskey & Yoon, 2009; Harris, 2006; Levitch & Milheim, 2003; Siragusa, Dixon, & Dixon, 2007).

The delivery of well-designed professional development in higher education has resulted in academic staff participating as learners in the rapidly growing economic and social sector of online learning (McGreal & Elliott, 2004). Learning flexibility and the improved efficiencies of anytime, anywhere, multi-modal access to information and experts is helping build the capacity for those

participating in online professional learning (Northcote & Huon, 2009). With online access to evolving and appropriate online professional development, engaged educators are increasingly utilizing these responsive and effectively integrated instructional technologies for their own skill development and incorporating similar practices in their own learning design for students (Chism, 2004; Siragusa et al., 2007). Ongoing, innovative and customized professional development is continuing to empower educators as they manage their changing roles and develop the necessary competencies for online course delivery (Baran, Correia, & Thompson, 2011). This stage of the project supports collaborative capacity building, facilitated by networked communication for the purpose of building and distributing expertise and collective wisdom (Gunawardena et al., 2006; Guskey & Yoon, 2009).

The authors considered multiple perspectives and theoretical underpinnings in the examination of online education and professional development programs. Social cognitive theory (Bandura, 1986) and self-efficacy, or the beliefs that one holds regarding their capabilities to organize and execute actions that lead to success (Bandura, 1997), have generated a paucity of research activity and interest due, in part, to their intuitive appeal and ability to integrate behavioural, individual, and social views about human agency. The underlying efforts of research in self-efficacy has centered around two main questions: (a) are self-efficacy beliefs predictive of performance outcomes within domain-specific tasks, and (b) how do the hypothesized set of causal interactive determinants (personal, behavioural, and environmental) shape our self-held beliefs about performance? These frameworks provided the authors a comprehensive view for considering how self-efficacy beliefs about online teaching are shaped and influenced by one's personal characteristics, beliefs and behaviours within the broader context of higher education.

Self-efficacy, defined as the "beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments" (Bandura, 1997, p. 3), is influenced by four principle sources of information: enactive mastery, vicarious experiences, verbal persuasion, and physiological and affective states (Bandura, 1997). In Phase 1 and Phase 2 of the investigation, enactive mastery was incorporated by allowing faculty to successfully implement courses and gather feedback from peers and students. Vicarious experiences were facilitated within training workshops that followed a demonstration-application format and through ongoing sessions where faculty shared best practices related to successes in online course development and instruction. Verbal persuasion was used within professional development workshops as faculties were encouraged to engage in activities related to developing and facilitating online courses. Although the physiological and psychological anxiety of the participants was not a central focus of the study, data gathered early in the study did reveal that some participants experienced trepidation related to teaching online courses.

Outcome expectations refer to the belief that behaviour will lead to a desired outcome (Bandura, 1997). It is possible to have low outcome expectations in spite of having high self-efficacy. For example, although faculty may perceive themselves as efficacious online educators, they may not expect student learning to be promoted to the same extent in an online course as in face-to-face delivery. This consideration was important to the study, and using both qualitative and quantitative data collection periods throughout the series of investigations allowed spontaneous faculty input that added richness and depth to the information about outcome expectations of online educators.

Threshold concepts (Meyer & Land, 2003, 2005) have been used in varied disciplines and educational contexts, along with the concept of troublesome knowledge (Perkins, 2006), to explore and describe the central and sometimes difficult discipline knowledge that students must master in order to achieve higher levels of learning. The process of understanding threshold concepts often is described as transformative, as achieving such knowledge enables the learner to transform and deepen their view of a discipline or body of knowledge.

Anderson, M., Boddey, C., Gosselin, K., Kilgour, P., Northcote, M., & Reynaud, D., (2016). Development of an Evidence-based Professional Learning Program Informed by Online Teachers' Self-efficacy and Threshold Concepts. *Online Learning* 20 (3) 178 - 194.

Much of the research on threshold concepts has focused on student learning in undergraduate and postgraduate contexts (Jooganah, 2010; Kiley & Wisker, 2010; Meyer & Land, 2006; Quinlan et al., 2012). The study of threshold concepts in learning has proven particularly helpful in analyzing and unravelling the mysteries of where and how students become "stuck" in their learning (Kiley, 2009; Meyer & Land, 2005; Perkins, 2006), sometimes referred to as a state of "stuckness" (Savin-Baden, Sinclair, Sanders, & Wind, 2007, p. 1) or as being in a "stuck place" (Ellsworth, 1997, p. 9). By engaging students in learning practices that enable them to master key threshold concepts, educators can facilitate the movement of students from stuck places through to a state of learning attainment.

Some researchers recently began exploring how the principles and educational theories associated with threshold concepts can be utilized in adult learning, professional development and research contexts (Carmichael, 2012; Cousin, 2006; Mills & Wilson, 2012; Ó Donnchadha, 2012). However, very few studies have specifically focused on threshold concepts developed by online educators, apart from earlier studies conducted by the current authors (Northcote, Gosselin, Reynaud, Kilgour, & Anderson, 2015; Northcote, Reynaud, Beamish, Martin, & Gosselin, 2011). These studies identified a number of threshold concepts developed by online teachers in a higher education context which highlighted their understanding of the role of resources in learning, personalization of the online environment, and the purposeful use of online technology.

Numerous attempts have been made to define the scale of knowledge and skills required of an effective online educator (Northcote, Seddon, & Brown, 2011; Van Duzer, 2002). A multitude of resources exists to guide online teachers and course designers (Alsofyani & Aris, 2011; Salmon, 2013; Siragusa, 2006). While much has been published about the success or otherwise of online teaching and learning (Dole & Bloom, 2009; Shepherd, Alpert, & Koeller, 2007), little research has been conducted to date, apart from the investigations by the current researchers, about the threshold concepts university educators need or use as they develop abilities to teach online and to design engaging online courses. Investigation into the relatively new field of threshold concepts offers an approach to explore and identify the knowledge of online teachers in tertiary contexts, alongside the guiding theoretical principles associated with self-efficacy and professional development.

Today, tertiary education programs increasingly have online learning for distance and campus-based learners, hence, the growing demand for professional development programs for academic staff to develop their abilities to teach and design engaging online courses. To meet this challenge, the research project proposes that engaging online academic teachers in identifying threshold concepts and self-efficacy beliefs about online teaching will inform and enhance professional development strategies. Phases 1 and 2 of this investigation showed that staff attitudes and perceptions of self-efficacy improved with the introduction of professional development initiatives, resulting in a more positive outlook to online learning and heightened online teaching skills. Nevertheless, more research is needed to further refine the use of threshold concepts and self-efficacy levels in academic staff within the context of online teaching and learning. The overall aim of this study was to identify the professional learning needs of academic teaching staff, starting with their threshold concepts about online learning and teaching, in order to develop a tailor-made professional development program.

Methods

This study adopted a mixed-methods case study approach, with a group of academic teaching staff within Avondale being the unit of analysis. Case study methodology can be defined as the in-depth exploration of a program, an event, an activity, a process, or even one or more individuals (Creswell, 2009, p. 13) in which the case or cases are "bounded by time and activity and researchers collect detailed information using a variety of data collection procedures over a sustained period of time" (Creswell,

2009, p. 13). In this study, data collection procedures included a reflective journal and a self–report questionnaire designed to explore occurrences associated with online teaching as well as self-efficacy levels of academic teaching staff as they developed online teaching skills. Intrinsically, the study exemplified a mixed-methods approach, defined by Tashakkori and Creswell (2007, p. 4, emphasis added) as "research in which the investigator collects and analyzes data, *integrates* the findings, and *draws inferences* using both qualitative and quantitative approaches or methods in a single study or program of inquiry." This joint or triangulated approach to qualitative and quantitative data collection and analysis enabled the researchers to provide a more complete account of the threshold concepts and attitudes of teaching staff encountered and developed as they learned about online learning and teaching throughout a typical academic semester.

The study aimed to address the following research questions:

- o What are the threshold concepts that teaching staff encounter when they learn about online learning and teaching?

- o Is there a difference between the threshold concepts encountered by staff who are experienced or inexperienced in online learning and teaching?

- o How can the identification of the threshold concepts be used to inform future academic staff development programs and processes?

This research involved 38 participants whose responsibilities ranged from lecturers to deans and heads of school. They represented the Schools of Education, Arts, Theology, Science, Nursing and Business across the institution.

Data were collected in the form of a questionnaire, reflective journals and interviews. These data were analyzed with the dual purposes of identifying the threshold concepts encountered by academic staff as they develop as online teachers and methodically implementing the outcomes of data analysis processes to inform the ongoing development of an evidence-based professional development program.

The data collected consisted of three raw text files of reflective journal data corresponding to three reflection points participants were asked to consider. These data were checked for inconsistencies, repetition and inaccuracies at which point the authors read over the data to become familiar with the content, to clean it and make notes on possible emerging themes. This memo-ing was used to guide the initial qualitative analysis and is a process endorsed by Groenewald (2008).

The next step was the coding process, adapted from Robson (2011), Patton (2015) and Creswell (2005). Open coding was worked on first; each sentence or part of a sentence was labelled with a meaningful code to develop a "manageable classification" (Patton, 2015, p. 554). Codes were then grouped together to form categories by looking for "recurring regularities in the data" which can "reveal patterns that can be sorted into categories" (Patton, 2015, p. 556). These categories were developed into themes and subthemes that were labelled inductively by comparing the data with the research aims and questions. Some codes were renamed or collapsed into other codes based on their similarity.

Axial coding was the next step (Creswell, 2005). Based on the categories, sub-themes and themes that emerged from the open-coding process, the core theme is identified (in this case, the worst lesson experience).The other themes related to this core theme (in this case, the other categories) were: College issues, conceptions of online learning and teaching, course and pedagogical issues, student issues, teacher-student issues, technical issues about skills and materials, and time issues for staff).

The thematic map diagram (Figure 1) was created to explain how the thematic map that emerged from the coding process reflects the axial coding process. Links between codes were identified as being "interconnected" and ordered or "layered" according to Creswell (2005). Themes were summarized and diagrams were created to represent the key themes and subthemes. In this last stage of the coding, a theory was developed by examining the relationships between the categories that emerged from the axial coding process which provided "an abstract explanation for the process being studied in the research" (Creswell, 2005, p. 444).

Using the word count statistics, the memoed observations and the thematic coding, the main findings from the data analyses were identified. This process was conducted by all researchers on the project.
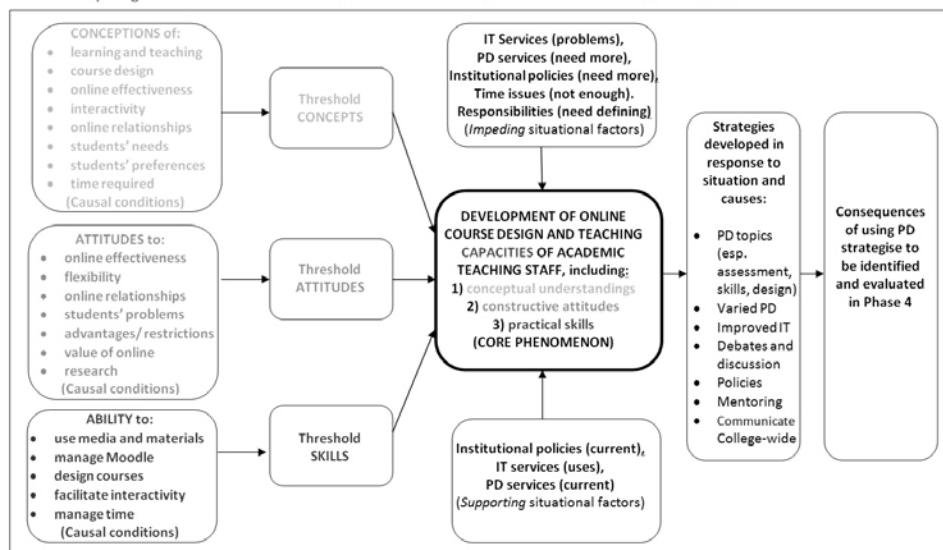
Data collected from the Online Teaching Self Efficacy Inventory (OTSEI) across each stage provided an additional data set to contrast with the qualitative findings. The OTSEI is a five-scale inventory consisting of 46 items for assessing online teaching self-efficacy (Gosselin, 2009). Online faculty participants were asked to indicate how confident they are in accomplishing the activities by selecting a number for each item on a scale ranging from 0 to 10. *No confidence* is represented by a 0 and *complete confidence* is indicated by a 10. The inventory scales include: (1) *Web-Based Course Structure*; (2) *Online Curricular Alignment*; (3) *Course Content Migration*; (4) *Virtual Interaction*; and (5) *Selection of Technological Resources*. Alpha reliabilities of the scales range from .84 to .95 reflecting excellent internal consistency. The average variance accounted for across the five single-factor scales ranges from 45.93% to 64.38% with an average of 53.16% of explained variance which provides evidence for good factor validity (Stevens, 1996).

Collection of OTSEI data explored what expertise and confidence had developed across data collection stages, and also served to identify new issues that arose as lecturers advanced their skill in online learning delivery. In the initial stage, data were gathered from two faculties, including the Faculty of Education and the Faculty of Arts and Humanities ($N = 21$). Data gathering was extended across three faculties for the second stage of the research to encompass the Faculty of Nursing and Health, as well as the two faculties involved in the first research stage ($N = 54$). After a reorganization of Colleges and Schools, the third stage again extended the sampling pool to include faculty from Schools of Education, Arts, Theology, Science, Nursing and Business across the institution ($N = 38$). These data provided a standardized metric for comparison within and across research phases and allowed for comparisons with the qualitative data analysis results.

Results

Analysis of the qualitative data indicated that the way in which academic teaching staff develop their capacity to design and teach online is influenced by a number of causal factors. These factors, in turn, influence how they develop threshold concepts, threshold attitudes and threshold skills. A number of situational conditions that were impeding and/or supporting (see Figure 1) were also identified. From this analysis, a number of professional development strategies were developed and the consequences of implementing these strategies will be identified and evaluated in Phase 4 of the research.

Anderson, M., Boddey, C., Gosselin, K., Kilgour, P., Northcote, M., & Reynaud, D., (2016). Development of an Evidence-based Professional Learning Program Informed by Online Teachers' Self-efficacy and Threshold Concepts. *Online Learning* 20 (3) 178 - 194.

Figure 1. Thematic diagram developed from analyzing qualitative data

Threshold concepts about online teaching were identified in Phase 1 of the study, and threshold concepts *and attitudes* were identified in Phase 2. Results of the first two phases have been reported elsewhere (Gosselin & Northcote, 2013; Northcote et al., 2015; Northcote, Reynaud, et al., 2011). By Phase 3 of the project, reported in this paper, a number of constructive *threshold concepts*, *threshold attitudes and threshold skills* were evident (Table 1).

Table 1. *Threshold concepts, attitudes and skills identified in Phase 3 of the study*

Threshold concepts about online teaching
• Online courses can be designed to facilitate interactivity (between students, teachers, resources, and other experts) by including interactive resources, activities and assessment tasks. • Learning can be facilitated in online courses by a skilled online teacher. • An understanding of the institutional and technological support that is available. • The capacity to conceive of how a student may navigate through an online course.
Threshold attitudes about online teaching
• Good teaching can occur online. • Students can engage meaningfully in online learning contexts. • Confidence in designing online courses. • Confidence in teaching online. • Increasingly positive about the introduction of online learning at this institution.
Threshold skills in online teaching
• Can login to and access own courses. • Can create e-resources and e-activities. • Can manage the assessment process online (setting up tasks, instructing students how to submit, accessing assessment tasks, marking assessment tasks, distributing feedback about assessment tasks). • Can set up and modify an online course (e.g., adding headings, resources, activities, assessment tasks, graphics, • Can identify a purpose for a forum, and then set up and manage an online forum. • Can track student activity in an online course.

Anderson, M., Boddey, C., Gosselin, K., Kilgour, P., Northcote, M., & Reynaud, D., (2016). Development of an Evidence-based Professional Learning Program Informed by Online Teachers' Self-efficacy and Threshold Concepts. *Online Learning* 20 (3) 178 - 194.

Compared to the earlier phases, the staff presented a more comprehensive understanding of online learning and the institutional issues involved. However, they still were very focused on pedagogical issues, with technological concerns appearing to be of secondary importance. Engaging students in high quality learning remained a focus.

"I often ask others if they are doing similar things and discuss what works or not, but it's not usually technical, more pedagogical."
"The rate of questions being asked is significantly down on previous experience; seems to indicate increasing confidence in using and managing the system."

There was more evidence that course navigation was an area of concern, along with an acceptance that the institution is "on the online train" and that course development responsibilities lie with the lecturer rather than an external agency. Less polarized views and emotions about the benefits and limitations of online learning were observed, but many staff expressed a lack of patience with institutional and technical support. Interestingly, there were few references to social media in online and blended learning contexts.

Three categories of staff were identified from an analysis of the Phase 3 data. Each category has been described below in terms of their threshold concepts, their threshold attitudes and their threshold skills:

(1) **The enthusiastic embracers.** Teachers who have embraced the online approach and are working in the online learning environment quite well. The data suggests they are inspired, driven, determined, and skillful.
(2) **The fearful sceptics.** Teachers who have been exposed to online learning but remain resistant to change and continue to fall behind. Some hold misconceptions about online and blended learning. They sometimes present as being skeptical, fearful and anxious.
(3) **The fresh entrants.** Teachers who have very little knowledge and skill at this stage of their careers. Their attitudes to online learning contexts are often quite open.

It appears that confidence and self-efficacy are the keys to developing as an online teacher, and these are developed by a blend of understandings, skills, pedagogical knowledge, mentoring and developing a personal history of success. These findings were supplemented by an analysis of responses to the OTSEI scale.

Given that self-efficacy is highly indicative of practice, the OTSEI scale that measures self-efficacy was used to gather descriptive statistics across the three phases of the study by each dimension of online teaching (Table 1) and also by faculty (Table 2).

Table 2. *Means and standard deviation for the OTSEI Scales across Research Phases*

	Phase 1: 2010[a]	Phase 2: 2012[b]	Phase 3: 2014[c]
Scale	M (SD)	M (SD)	M (SD)
Selection of Technological Resources	4.13 (2.74)	4.00 (2.13)	4.84 (2.49)
Virtual Interaction	5.30 (2.44)	5.44 (2.16)	5.71 (2.27)
Unit Content Migration	5.29 (2.51)	5.28 (1.95)	6.29 (2.34)
Online Course Alignment	6.03 (2.53)	5.92 (2.26)	6.73 (2.05)
Web Based Unit Structure	5.56 (2.77)	5.33 (2.09)	6.05 (2.23)
Total	5.36 (2.65)	5.26 (2.69)	5.93 (2.09)

[a]$N = 21$; [b]$N = 54$; [c]$N = 38$

Anderson, M., Boddey, C., Gosselin, K., Kilgour, P., Northcote, M., & Reynaud, D., (2016). Development of an Evidence-based Professional Learning Program Informed by Online Teachers' Self-efficacy and Threshold Concepts. *Online Learning* 20 (3) 178 - 194.

Table 2 uses means and standard deviations to illustrate the differing outcomes between different phases of the research project (this being the third phase). It can be seen that most scales took a small dip from Phase 1 to Phase 2, but there has been an overall increase moving into Phase 3. Accompanying the increase in mean scores is a general decrease in standard deviation from Phase 1 and moving through to Phase 3. Given the sample size in the study, these results need to be seen as indicative rather than significant, but it would seem that academic staff are becoming more confident in all areas of online instruction as assessed by the five individual OTSEI scales. The decreased standard deviation shows their responses are more clustered, meaning that there is less diversity in their online teaching self-efficacy.

It can be seen that the *Selection of Technological Resources* had the lowest value across all three phases but the greatest standard deviation in Phase 3 (2.49). The *Virtual Interaction* scale was also disappointingly low (5.71) and could well feature in future professional development while the most positive result was the *Online Curricular Alignment* (6.73).

Table 3. *Means and standard deviations on the OTSEI of Faculties by Data Collection Phase*

Phase and Faculties	N	STR M(SD)	VI M(SD)	UCM M(SD)	OCA M(SD)	WBCS M(SD)	OTSEI M(SD)
2010 (N = 21)							
Education	1 2	3.72 (1.85)	4.66 (1.66)	5.63 (1.95)	5.79 (2.01)	5.66 (1.75)	5.14 (1.58)
Arts & Theology	9	5.37 (4.43)	6.47 (1.72)	5.03 (1.74)	6.18 (2.22)	5.48 (1.74)	5.41 (1.69)
2012 (N = 54)							
Education	2 3	3.65 (1.87)	5.33 (1.77)	5.55 (1.73)	6.39 (1.82)	5.89 (1.71)	5.45 (1.50)
Science	1 6	3.30 (2.89)	5.63 (2.57)	4.92 (2.52)	5.51 (2.46)	4.16 (2.55)	4.67 (2.32)
Nursing and Health	8	3.86 (1.13)	3.67 (2.01)	4.45 (2.46)	4.54 (2.96)	4.03 (2.38)	4.11 (1.97)
Arts & Theology	7	4.87 (2.38)	6.40 (2.16)	5.48 (1.77)	6.27 (2.22)	5.69 (1.92)	5.80 (1.94)
2014 (N = 38)							
Education	1 2	4.99 (1.52)	6.22 (2.04)	6.81 (2.02)	6.90 (1.69)	6.30 (1.38)	6.27 (1.48)
Arts & Theology	9	6.71 (2.47)	6.69 (2.18)	7.11 (1.75)	7.40 (1.81)	7.28 (1.92)	7.07 (1.93)
Nursing and Health	8	3.11 (2.38)	5.32 (2.07)	6.00 (1.96)	6.93 (1.86)	5.66 (2.05)	5.50 (1.79)
Science	5	5.00 (2.69)	4.60 (2.19)	5.49 (1.75)	6.33 (1.72)	5.60 (2.65)	5.44 (2.31)
Business	4	5.06 (2.53)	6.12 (1.82)	6.86 (3.11)	7.02 (2.19)	5.91 (3.31)	6.21 (2.51)

When individual faculties are taken into account, the sample size for each faculty necessarily becomes even smaller. Therefore, no statistical comparisons were made across faculties. There are some interesting observations however. The lowest OTSEI score is from the Science Faculty (5.44) and the highest from the Arts and Theology Faculty (7.07).

Anderson, M., Boddey, C., Gosselin, K., Kilgour, P., Northcote, M., & Reynaud, D., (2016). Development of an Evidence-based Professional Learning Program Informed by Online Teachers' Self-efficacy and Threshold Concepts. *Online Learning* 20 (3) 178 - 194.

Along with Arts and Theology, the Faculty of Education has been a part of all three phases of the research, and like Arts and Theology, has shown a steady increase (5.14 to 6.27) in OTSEI scores. This shows that lecturers have become more confident in each scale. It should be noted, however, that the scores for the *Selection of Technological Resources* scale has not improved to the same levels as the other scales.

Overall, the findings revealed that academic staff held threshold concepts, skills and attitudes about online teaching. Compared to Phase 1 and 2 of the study, staff presented a greater knowledge and appreciation of online teaching and institutional issues. The qualitative results showed staff can incorporate learning strategies that result in meaningful interactions between teachers and learners. Perceptions of teaching online were largely positive with staff believing a sense of community can be established in online learning contexts. Moreover, teachers were positive about the introduction of online teaching and learning. These teachers were identified as "enthusiastic embracers" who were inspired, driven and skilful. In contrast, there were the "fresh entrants" at the beginning of their learning experience with online teaching. Further, there were "fearful sceptics" who were resistant to change. The quantitative findings complemented the qualitative themes, which showed teachers' confidence or self-efficacy seemed to increase over time in most aspects of online instruction. Lower scores were reported, namely, *Selection of Technological Resources* and *Virtual Interaction*, which have implications for future academic staff professional programs and processes.

Discussion

While research into threshold concepts has been conducted to investigate areas of troublesome knowledge in many fields of study (Jooganah, 2010; Kiley, 2009; Savin-Baden et al., 2007; Wisker, Kiley, & Aiston, 2006), especially the threshold concepts developed by students, research into the threshold concepts, skills and attitudes developed by online educators remains under-investigated. Some work on threshold concepts within professional development contexts has also appeared in recent years (Carmichael, 2012; Mills & Wilson, 2012; Ó Donnchadha, 2012). Specifically, little research has been located that identifies and uses the threshold concepts associated with online teaching and online course design within professional learning contexts. Macdonald and Poniatowska's work (2011) into designing professional development contexts for online educators has acknowledged the influence of threshold concepts on student learning but does not represent a study that has specifically explored the threshold concepts of online teachers. The findings of this study, therefore, have contributed to this growing area of research, and have supplemented our earlier work on the threshold concepts developed by online educators (Northcote et al., 2015; Northcote, Reynaud, et al., 2011).

The findings of this research have revealed that online educators experience transformations in their knowledge, skills and, to an extent, attitudes about teaching online. This aligns with the characteristics of threshold concepts, identified by Land and Meyer (Meyer & Land, 2003, 2005, 2006). However, the less practical, skills-focused aspects of online teachers' development (that is, confidence and self-efficacy) appear to be precursors to the advancement of an online educator's knowledge and skills-based competencies. This area of research into threshold attitudes represents a new area of research that has yet to be extensively reported.

Emotions about online teaching did not run as strong for the teachers in this phase of the study but they were still evident. Emotions expressed were less diverse and less polarized with more comments about confidence and attitudes that reflected a "getting on with it" approach. This indicated the teachers were becoming more at ease with the interplay between online technology, pedagogy and the cognitive content of their disciplines. This is important given that teacher emotions and instructional behaviour are

significant predictors of student emotions (Becker, Goetz, Morger, & Ranellucci, 2014). On the other hand, those teachers lacking in confidence, or even fearful, of online teaching and related technology will require support and professional development for a considerable period of time. This will permit the teachers to reflect on their practice and allow them to effectively implement their approaches to online teaching and learning (Lawless & Pellegrino, 2007). Ertmer (2005) argued that for a long-term effective integration of technology in education, it is necessary for the beliefs that teachers hold towards student-centered learning and technology to be transformed.

Three groups of staff emerged in the earlier phase of the study and were categorized based on their levels of experience (Northcote et al., 2015). In comparing the groupings of this current phase of the study with literature on changing work environments, there are evident similarities and some overlap within the groupings. The "first-generation" staff in Phase 2 are similar to the "fresh entrants" of Phase 3. They lack confidence and pedagogical awareness, and they express reservations about online learning. Their characteristics are not dissimilar to the "laggards" profiled by Rogers (2003) and "hopeless prisoners" or "disgruntled wingers" identified by Irwin (1996). While the second-generation staff in Phase 2 demonstrated improved confidence, tackled technological challenges and delivered pedagogically sound outcomes, the "fearful sceptics" of Phase 3 have more in common with the previous "first-generational" category. The "early" and "late majority" groupings of Rogers (2003) are likely to fall between the "first" and "second-generation" staff and either side of the phase three "fearful sceptics". The current "enthusiastic embracers" are similar to the "third-generation" staff of Phase 2. With even more experience, they were willing to take risks as they participated in creative experimentation and evaluation of their teaching. They are similar to the "early adopters" and "innovators" of Rogers (2003) or the "contented volunteers" of Irwin (1996). By examining trends in the data across study phases, it is evident that most staff are currently positioned closer to the positive end of the continuum. However, identifying the characteristics of various groups is valuable in that it provides an opportunity to prioritize where relationships can be developed to build cooperation and facilitate change, innovation and improvement in quality (Irwin, 1996). It also identifies where staff perceptions of risk in changing environments can be understood and managed (Howard, 2013).

Several issues normally identified in online research do not appear in the results from this study. It would be reasonable to expect comments on the use of social media in blended learning contexts (Mbati, 2013), but there is no mention of this.

It also is noted that there were fewer 'cries for help' in the form of requests for online course 'saviours'. This means there was less demand for someone to come in and create online units for lecturers to deliver and more ownership taken by staff for the development of their own teaching areas. It seems that staff are developing a greater disposition towards taking control of their own learning about online teaching and course design. These findings were paralleled by the online teaching self-efficacy data. In the current phase, self-confidence had improved and may be indicative of increased self-confidence and autonomy for carrying out online instruction.

Perhaps the most notable omission in the responses for this phase were the emotive responses from previous phases that echoed feelings such as frustration and even suspicion with online learning. The responses reported in this phase were less diverse and had an underlying confidence about them that was missing in the first two phases. This may be partly because staff recognize that online learning is part of their role and it is in their best interests to adopt it in a positive way. The observed changes in attitudes were aligned with Bandura's (1997) posited sources of self-efficacy beliefs. Engaging in online education, participating in professional training workshops, and collaborating with colleagues may have fostered self-confidence, thereby tempering initial trepidations about online instruction.

The recommendations for practice that emerged from this investigation have implications reaching beyond the immediate research context to the broader community of online educators. The results of the analyses conducted throughout the study were consistent with the findings of Chism (2004), Siragusa et al (2007) and Guskey and Yoon (2009) in the provision of authentic and relevant training. The findings were used to modify professional development activities, such as additions to the institution's *Moodle's Little Helper* site, and the modification of workshop topics. Moreover, advanced workshops were tailored to the specific teaching needs and expertise of particular staff. Phase 3 of this study highlighted in particular the special attention that needs to be given to disciplines with a high practical component where where there often are perceptions that online learning is unable to give satisfactory results. Lecturers in these disciplines can feel a sense of 'stuckness' (Ellsworth, 1997) quite easily, and need extra empowerment and training before feeling confident in delivering online education.

Another recommendation is that online trail blazers need to be empowered to expand their experimental work, through appropriate resourcing and administrative and technical support.Their enthusiasm needs to be publicized to encourage staff whose attitudes could be changed by a better understanding of the threshold concepts. The best way to enhance staff enthusiasm and skill is through a combination of interactive, applied group, individual, on-campus and online activities and resources, thereby allowing them to integrate their learning through multiple pathways tailored to their own needs (Harris, 2006; Siemens, 2005). The quantitative results highlighted the two areas where staff most needed professional development, firstly, in *Selection of Technological Resources*, and secondly in *Virtual Interaction*, as these areas exhibited lower self-efficacy. In all cases, active learning, continuous participation and the application of knowledge (Bennett & Lockyer, 2004; Garet et al., 2001; Harris, 2006) results in the most effective improvement of lecturer confidence and skill.

Although data were gathered from the perspectives of both professional development staff and faculty teaching staff during this study, more varied forms of data could be gathered from academic staff in future iterations of this research project. For example, faculty representing varied skill levels could be interviewed or shadowed in their day-to-day work to determine more contextualized information about how their threshold concepts were developed as they design and teach online courses. To establish a more streamlined method of gathering the reflective journal data from professional development staff, an automated, electronic or online system could be implemented.

This research study has been underway at Avondale in various stages since 2010. More recently, this research approach has being implemented in three additional institutions (two universities in Australia and one in the United States). Findings from these investigations may provide insight into the differences in the way in which threshold concepts, skills and attitudes are developed across varied institutions. Such findings could help demonstrate whether or not threshold concepts, skills and attitudes about online teaching, developed by faculty teaching staff, remain constant or similar across institutions. Further exploration may be conducted, with larger sample sizes, to compare the types of threshold concepts, skills and attitudes developed by staff from a range of disciplinary backgrounds.

Conclusion

This study has expanded on the two previous studies of threshold concepts in online learning among academic staff at Avondale, both by engaging more academic staff from across all disciplines and campuses of the College, and by exploring what key threshold concepts and related issues are at play as staff develop greater experience in online education. It demonstrates the varying progress made by academic staff in terms of the mastery of threshold concepts and the development of self-efficacy in relation to the delivery of online learning. In particular, it notes the close association of threshold

attitudes, values and emotions with the concept of threshold concepts as matters that must be addressed in staff development.

The study also highlights the need for continuing research into the threshold attitudes, values, emotions and concepts that underpin the progress of academic staff in online learning, in order to ensure that professional development maintains currency with where teaching staff are at in their own journey. These outcomes have implications for other institutions experiencing the same or similar shifts towards online learning. They suggest key issues that engage staff and ways in which professional development and support might be directed. The need for a more holistic approach to staff professional development emerges as a key finding, addressing not just threshold concepts but also threshold attitudes, values and emotions. The methodological approach and findings presented in this paper serve as evidence-based suggestions for consideration and application by others with similar professional learning requirements beyond the scenario of this case.

In the future, results from this study need to be tested with larger sample sizes. This may produce a more significant statistical change than is evident here, as the relatively small sample size utilized in this study represents a potential limitation. For instance, it may have limited the diversity found in comparisons between Phase 1 and Phase 2 of the study as well as the results of the faculty development training workshop. Accordingly, future research in online faculty development programs should be carried out across additional sites and with larger sample sizes.

As one researcher from outside the institution noted:

There is no question in my mind that online education is the way to go. Advancements in technology will continually pressure us to make this transition. At the same, this change challenges the established culture referred to as the on campus 'Avondale Experience'. I do not think this layer of comfort zone is clearly defined, but I gather that it refers to the overall on-campus experience. Further, it includes the personal care and engagement with students not only on the academic level but also in taking a more caring interest in their journeys.

Acknowledgements

References

Alsofyani, M. M., & Aris, B. B. (2011). *Design and development of TPACK template: Planning effective blended courses.* Paper presented at the International Conference on Information Society, i-Society 2011.

Bandura, A. (1986). *Social foundations of thought and action*. Englewood Cliffs, New Jersey: Prentice-Hall.

Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: Freeman.

Baran, E., Correia, A. P., & Thompson, A. (2011). Transforming online teaching practice: Critical analysis of the literature on the roles and competencies of online teachers. *Distance Education, 32*(3), 421-439.

Becker, E. S., Goetz, T., Morger, V., & Ranellucci, J. (2014). The importance of teachers' emotions and instructional behavior for their students' emotions: An experience sampling analysis. *Teaching and Teacher Education, 43*, 15-26.

Bennett, S., & Lockyer, L. (2004). Becoming an online teacher: Adapting to a changed environment for teaching and learning in higher education. *Educational Media International, 41*(3), 231-248.

Carmichael, P. (2012). Tribes, territories and threshold concepts: Educational materialisms at work in higher education. *Educational Philosophy and Theory: Special Issue: The Future of Educational Materialism, 44*(Supplement s1), 31–42.

Chism, N. V. N. (2004). Using a framework to engage faculty in instructional technologies. *EDUCAUSE Quarterly (EQ), 27*(2), 39-45.

Cousin, G. (2006). An introduction to threshold concepts. *Planet, 17*(December), 4-5. http://www.et.kent.edu/fpdc-db/files/DD%2002-threshold.pdf

Creswell, J. W. (2005). *Education research: Planning, conducting and evaluating quantitative and qualitative research*. New Jersey: Pearson Education.

Creswell, J. W. (2009). *Research design: Qualitative, quantitative, and mixed method approaches* (2nd ed.). Thousand Oaks, CA: SAGE.

Dole, S., & Bloom, L. (2009). Online course design: A case study. *International Journal for the Scholarship of Teaching and Learning, 3*(1), 1-11.

Ellsworth, E. A. (1997). *Teaching positions: Difference pedagogy and the power of address*. New York: Teachers College Press.

Ertmer, P. A. (2005). Teacher pedagogical beliefs: The final frontier in our quest for technology integration? *Educational Technology Research and Development, 53*(4), 25-39.

Garet, M. S., Porter, A. C., Desimone, L., Birman, B. F., & Yoon, K. S. (2001). What makes professional development effective? Results from a national sample of teachers. *American Educational Research Journal, 38*(4), 915-945.

Gosselin, K. P. (2009). *Development and psychometric exploration of the online teaching self-efficacy inventory.* (PhD), Texas Tech University. Retrieved from https://repositories.tdl.org/ttu-ir/bitstream/handle/2346/8971/Gosselin_Kevin_Diss.pdf?sequence=1

Gosselin, K. P., & Northcote, M. (2013). Cross-continental research collaborations about online teaching. In D. G. Sampson, J. M. Spector, D. Ifenthaler, & P. Isaias (Eds.), *Proceedings of the IADIS International Conference on Cognition and Exploratory Learning in the Digital Age (CELDA)* (pp. 282-289). Fort Worth, Texas.

Groenewald, T. (2008). Memos and memoing. *The Sage encyclopedia of qualitative research methods.* Retrieved from http://srmo.sagepub.com/view/sage-encyc-qualitative-research-methods/n260.xml

Gunawardena, C. N., Ortegano-Layne, L., Carabajal, K., Frechette, C., Lindemann, K., & Jennings, B. (2006). New model, new strategies: Instructional design for building online wisdom communities. *Distance Education, 27*(2), 217-232.

Guskey, T. R., & Yoon, K. S. (2009). What works in professional development. *Phi Delta Kappan International, 90*(7), 495-500.

Harris, S. (2006). Common factors influencing success in the online environment. Sydney: Sydney Centre for Innovation in Learning.

Howard, S. K. (2013). Risk-aversion: Understanding teachers' resistance to technology integration. *Technology, Pedagogy and Education, 22*(3), 357-372.

Irwin, B. (1996). *Leaders in Australia: The Australian cultural imprint for leadership*. Warrandyte, Vic.: Cultural Imprint Pty Ltd.

Jooganah, K. (2010). *Student transition to advanced mathematical thinking: A focus on 'proof 'as a threshold concept*. Paper presented at the 3rd Biennial Threshold Concepts Symposium: Exploring transformative dimensions of threshold concepts, University of NSW and University of Sydney. http://www.thresholdconcepts2010.unsw.edu.au/Abstracts/JooganahK.pdf

Kiley, M. (2009). Identifying threshold concepts and proposing strategies to support doctoral candidates. *Innovations in Education and Teaching International, 46*(3), 293-304.

Kiley, M., & Wisker, G. (2010). Learning to be a researcher: The concepts and crossings. In J. H. F. Meyer, R. Land, & C. Baillie (Eds.), *Threshold concepts: Theory to practice*. Amsterdam: Sense.

Lawless, K. A., & Pellegrino, J. W. (2007). Professional development in integrating technology into teaching and learning: Knowns unknowns and ways to pursue better questions and answers. *Review of Educational Research, 77*(4), 575-614.

Levitch, S., & Milheim, W. D. (2003). Transitioning instructor skills to the virtual classroom. *Educational Technology & Society, 43*(2), 42-46.

Macdonald, J., & Poniatowska, B. (2011). Designing the professional development of staff for teaching online: An OU (UK) case study. *Distance Education, 32*(1), 119-134.

Mbati, L. (2013). Online social media applications for constructivism and observational learning. *International Review of Research in Open and Distance Learning, 14*(5). http://www.irrodl.org/index.php/irrodl/article/view/1579/2709

McGreal, R., & Elliott, M. (2004). Technologies of online learning (e-learning). In T. Anderson & F. Elloumi (Eds.), *Theory and Practice of Online Learning* (pp. 115-135). Athabasca, Canada: Athabasca University Press.

Meyer, J. H. F., & Land, R. (2003). Threshold concepts and troublesome knowledge: Linkages to ways of thinking and practising within the disciplines *Enhancing Teaching-Learning Environments in Undergraduate Courses Project, Occasional Paper 4* (pp. 1-12). Edinburgh: University of Edinburgh.

Meyer, J. H. F., & Land, R. (2005). Threshold concepts and troublesome knowledge (2): Epistemological considerations and a conceptual framework for teaching and learning. *Higher Education, 49*(3), 373–388.

Meyer, J. H. F., & Land, R. (2006). Overcoming barriers to student understanding: Threshold concepts and troublesome knowledge. New York: Routledge.

Mills, R., & Wilson, A. (2012). *There's a right answer but only some students can get it: Threshold concepts in the professional development of physics demonstrators*. Paper presented at the Fourth Bienniel Conference on Threshold Concepts: From personal practice to communities of practice, Trinity College, Dublin. http://www.nairtl.ie/documents/EPub_2012Proceedings.pdf#page=158

Northcote, M., Gosselin, K. P., Reynaud, D., Kilgour, P., & Anderson, M. (2015). Navigating learning journeys of online teachers: Threshold concepts and self-efficacy. *Issues in Educational Research, 25*(3), 319-344.

Northcote, M., & Huon, G. (2009, 3-6 May). *Giving fishing lines is better than giving fish: A capacity-building approach to educational resource development.* Paper presented at the EDUCAUSE Australasia: Innovate, Collaborate, Sustain, Perth Convention Centre, Perth, Western Australia.

Northcote, M., Reynaud, D., Beamish, P., Martin, T., & Gosselin, K. P. (2011). Bumpy moments and joyful breakthroughs: The place of threshold concepts in academic staff development programs about online learning and teaching. *ACCESS: Critical Perspectives on Communication, Cultural & Policy Studies, 30*(2), 75-90.

Northcote, M., Seddon, J., & Brown, P. (2011). Benchmark yourself: Self-reflecting about online teaching. In G. Williams, Peta Statham, N. Brown, & B. Cleland (Eds.), *Changing demands, changing directions. Proceedings ASCILITE Hobart 2011* (pp. 904-908). Hobart, Tasmania: ASCILITE (Australasian Society for Computers in Learning in Tertiary Education).

Ó Donnchadha, B. (2012). *Moving from personal practice to communities of reflective practice: a model for professional development*. Paper presented at the Fourth Bienniel Conference on Threshold Concepts: From personal practice to communities of practice, Trinity College, Dublin. http://www.nairtl.ie/documents/BookofAbstracts_ONLINE.pdf

Patton, M. Q. (2015). *Qualitative research and evaluation methods* (4th ed.). Thousand Oaks, California: SAGE Publications, Inc.

Perkins, D. (2006). Constructivism and troublesome knowledge. In J. Meyer & R. Land (Eds.), *Overcoming barriers to student understanding: Threshold concepts and troublesome knowledge* (pp. 33-47). New York: Routledge.

Quinlan, K. M., Male, S., Fill, J., Jaffer, Z., Stamboulis, A., & Baillie, C. (2012). *Understanding thresholds in first year engineering: digging beneath Mohr's Circle*. Paper presented at the 4th International Symposium for Engineering Education, The University of Sheffield, UK. http://isee2012.group.shef.ac.uk/docs/papers/paper_29.pdf

Robson, C. (2011). *Real world research*. West Sussex, UK: John Wiley & Sons.

Rogers, E. M. (2003). *Diffusion of innovations* (5th ed.). New York, NY: Free Press.

Salmon, G. (2013). *E-tivities: The key to active online learning* (2nd ed.). London and New York: Routledge.

Savin-Baden, M., Sinclair, C., Sanders, C., & Wind, S. (2007, 21-23 March). *Lurking on the threshold: Being learners in silent spaces* Paper presented at the Ideas in Cyberspace Education Ross Priory, Loch Lomond.

Shepherd, C., Alpert, M., & Koeller, M. (2007). Increasing the efficacy of educators teaching online. *World Academy of Science, Engineering and Technology, 1*(2007), 426-432.

Siemens, G. (2005). Connectivism: A learning theory for a digital age. *International Journal of Instructional Technology and Distance Learning, 2*(1), 3-10.

Siragusa, L. (2006). *Quality eLearning: An instructional design model for online learning in higher education.* Paper presented at the Annual Conference of Australian Association for Research in Education, Adelaide.

Siragusa, L., Dixon, K. C., & Dixon, R. (2007). Designing quality e-learning environments in higher education *ICT: Providing choices for learners and learning. Proceedings ascilite Singapore 2007* (pp. 923-935).

Stevens, J. (1996). *Applied multivariate statistics for the social sciences*. New Jersey, USA: Lawrence Erlbaum Associates.

Tashakkori, A., & Creswell, J. W. (2007). The new era of mixed methods. *Journal of Mixed Methods Research, 1*(1), 3-7.

Van Duzer, J. (2002). Instruction design tips for online learning.   Retrieved from http://www.csuchico.edu/tlp/resources/rubric/instructionalDesignTips.pdf

Wisker, G., Kiley, M., & Aiston, S. (2006). Making the learning leap: Research students crossing conceptual thresholds In M. Kiley & G. Mullines (Eds.), *Quality in postgraduate research: Knowledge creation in testing times*. Canberra: CEDAM, The Australian National University.