LEADING TECHNOLOGY INNOVATION:

WHEN BELIEVING IS SEEING

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ABSTRACT

The literature on the professional development of primary and secondary teachers suggests that isolated initiatives are not effective in bringing about changes in teachers' practices and beliefs. Research argues that changes in belief result from changes to practice that are perceived to improve student learning.

This study examines the influence of an extended, work-integrated professional development initiative on primary and secondary teacher leadership practice. As an example, a leadership course, which is part of the Postgraduate Certificate in Applied Practice (Digital and Collaborative Learning) for primary and secondary in-service teachers, will be examined. The research question guiding the investigation is: How does successful completion of leadership-focused professional development influence teachers' practices and beliefs in leading innovations in their work environments? As a framework for analysis, we (the authors) have adopted the seven-pillared definition of school-based digital leadership proposed by Sheninger (2014): communication, public relations, branding, student engagement and learning, professional growth and development, re-envisioning learning spaces and environments, and opportunity. We have adapted Sheninger's concept into a set of themes, sub-themes and key questions for investigation.

The methodology is based on a series of interviews conducted with randomly-selected primary and secondary teachers who have completed the leadership course during the preceding twelve months. The findings identify common changes in leadership practices and beliefs, and evaluate these against Sheninger's seven pillars of digital leadership. This exploratory study informs a greater large-scale evaluation that may provide valuable insight into the design of teacher leadership courses.

INTRODUCTION

The Postgraduate Certificate in Applied Practice (Digital and Collaborative Learning) is a 32-week, NZQA Level 8, part-time programme. The programme is delivered at the Mind Lab by Unitec and offers primary and secondary teachers the opportunity to enhance their knowledge and skills related to twenty-first century learning. This programme is offered irrespective of the specific levels or learning areas that the teachers facilitate, and consists of four 15-credit, compulsory courses: Digital and Collaborative Learning in Context, Leadership in Digital and Collaborative Learning, Research and Community Informed Practice and Applied Practice in Context. The aim of the Leadership in Digital and Collaborative Learning course is to enable educators to lead innovation in digital and collaborative learning, whilst drawing upon concepts associated with leadership theory, educational theory and research. The leadership approach that informs the aim of the course and associated learning outcomes corresponds with the concept of leadership outlined by Robinson, Hohepa and Lloyd (2009, p. 66):

- It includes both positional and distributed leadership.
- It views leadership as highly fluid.
- It sees leadership as embedded in specific tasks and situations.

The course encourages students to consider leadership theories, styles and attributes as malleable and integrated tools that can be shaped to address the specific requirements of a particular context.

The aim of this investigation is to establish whether the completion of leadership-focused professional development influences teachers to change leadership practices in their work environments and, if so, whether such changes lead on to associated shifts in beliefs and attitudes. This exploratory study attempts to ascertain whether changes in teacher leadership practices are largely idiosyncratic, based on interpretations of leadership – or whether engagement in an

extended, work-integrated professional development initiative shapes leadership practices and beliefs. Such changes in practices and beliefs are then evaluated using the seven pillars of digital leadership identified by Sheninger (2014).

The findings of this research may contribute to: a) our understanding of how teachers define leadership in their daily practice, and b) the design of teacher leadership professional development.

LITERATURE REVIEW

The literature reviewed in this section focuses on three questions related to the key concerns of this paper: Do one-off professional development initiatives, such as conference attendance or focused workshops, influence teacher practices and beliefs? If professional development, irrespective of design, does influence teacher practices and beliefs, what evidence is there to suggest that such altered practices and beliefs influence student outcomes? Answers to these questions will provide some insight into the effectiveness of professional development for primary and secondary teachers. The third question specifically addresses the role played by teachers in leading technology integration in schools.

Professional development and practice

The literature on teacher professional development suggests that one-off professional development events, such as a conference or a half-day workshop, are not effective in bringing about changes in teacher practice, beliefs and attitudes (Guskey, 2002; Davis, Preston, & Sahin, 2009). Research has found that changes in beliefs and attitudes take place as a result of changes to practice that are perceived to improve student learning (Guskey, 2002). The leadership course of the Postgraduate Certificate in Applied Practice (Digital and Collaborative Learning) encourages participants to apply what they learn during weekly sessions to their daily practice on an ongoing basis.

The question raised is whether the 'sustained engagement' learning, which takes place during professional development initiatives such as The Postgraduate Diploma in Applied Practice, leads to changes in teacher practices, beliefs and attitudes. Whitworth and Chiu specify such development as changes in teacher beliefs, understandings and/or practices (2015), while Guskey believes professional development programmes are designed to bring about changes in teacher attitudes and beliefs, and changes in student outcomes (2002). Yet Guskey argues that most professional development programmes are ineffective because they ignore two critical issues, namely "what motivates teachers to engage in professional development", and "the process by which change in teachers typically occurs" (2002, p. 381). Rather than professional development leading to changes in teachers' beliefs and attitudes (and thus informing changes in classroom practice), Guskey suggests that shifts in beliefs and attitudes take place after evidence of improved student outcomes becomes available following on from changes in classroom practice (2002, p. 383). From the perspective of educational change, therefore, changes in teacher beliefs and attitudes follow changes in classroom practices and subsequent gains in student outcomes, rather than the other way around. Professional development, viewed as a mechanism for bringing about change to teachers' beliefs, attitudes and practices (and student outcomes), needs to be reconsidered as, according to Guskey, "sustaining change … is one of the most neglected aspects of professional development" (2002, p. 388). Rather than the quality of initial professional development playing a significant part in shaping responses, it is more likely that improved student outcomes, continued support and feedback are likely to lead to longer-term success.

Furthermore, the view of teacher and educational change addressed above does not account for the multitude of situational and contextual influences that shape change initiatives in practice (Guskey, 2002; King, 2014; Fullan & Quinn, 2016). These influences range from the quality of ongoing feedback (Guskey, 2002), to the depth of teacher knowledge and understanding regarding practices (King, 2014), and the extent to which there is shared understanding in an institution about the nature of the work of its teachers (Fullan & Quinn, 2016).

Teacher practice and student outcomes

Whitworth and Chiu argue that establishing the nature of the relationship between professional development and student outcomes is beset by a scarcity of research on the topic (2015, p. 125), although Hattie (2009) suggests otherwise. In a meta-analysis of 800 studies, Hattie defines an effect size as "[Mean end of treatment – Mean beginning of treatment]/ standard deviation" (2009, p. 8). He then argues that an effect size of 0.40 "sets a level where the effects of innovation enhance achievement in such a way that we can notice real-world differences, and this should be a benchmark of such real-world change" (2009, p. 17). Against this background, he finds that the effect size of teacher professional development on student achievement is 0.62 – well above the 0.40 threshold. This finding is also supported by Yoon, Duncan, Lee, Scarloss and Shapley (2007) who found that an average of 49 hours of teacher professional development could boost student achievement by about 21 percentile points. Although further explication of the situations and contexts in which these effect sizes were obtained might be required (but are beyond the scope of this paper), the findings do provide some evidence of the influence of professional development on student achievement. There is, therefore, support in the literature for the efficacy of professional development that is sustained, inseparably integrated into practice and suitably scaffolded by teacher supports in context.

The remaining question is whether sustained, work-integrated professional development of primary and secondary teachers influences their leadership of technology integration in their schools.

Teacher leadership of technology integration

A number of studies consider the leadership of technology integration in schools from the perspective of the principal as de facto leader of technology integration (Dawson & Rakes, 2003; Flanagan & Jacobsen, 2003; Yuen, Law & Wong, 2003). There are many studies approaching technology integration in schools from the perspective of distributed leadership. In the ensuing discussion, 'technology integration' and 'integration of educational technology' are deemed to be equivalent concepts.

Davies claims that the relationship between the leadership of technology integration and school change is in need of further research, focusing more on descriptive analysis than pure prescription (2010, p. 59). However, some studies shed light on the nature of this relationship. Yuen et al. argue that variations in educational technology practices across different schools are strongly influenced by the leader's vision and understanding of technology integration into the curriculum (2003). In addition, such variations in practice across schools is also influenced by school culture and general vision and mission (Yuen et al., 2003). These findings are also supported by Mingaine (2012) and Chang (2012). In addition to these strategic concerns, Davis, Preston and Sahil emphasise the importance of the school leader's understanding of both the affordances of individual educational technologies, as well as ways in which use of these technologies can be incorporated into teaching and learning at the school (2009). Another aspect of the relationship is the fact that school leaders have, in the past, been viewed as leaders of educational technology integration, purely because they have controlled budgets and influenced school resource allocation (Davies, 2010).

Ultimately, leadership vision and the extent to which resources can be brought to bear upon the integration of technology in the curriculum are not influential enough on their own to bring about meaningful change. Such integration of technology has to be crafted carefully to become part of the school's overall approach to making learning more vigorous and more meaningful.

Fullan and Quinn define 'coherence' as "the shared depth of understanding about the purpose and nature of the work" and do not view technology as a driver for meaningful change in schools (2016, p. 1). Leaders who focus on technology-as-driver risk overwhelming staff as successive technologies are implemented[1] with scant regard for how these technologies meaningfully support and enhance the school's approach to striving for improved student

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1   This is a problem referred to by Fullan & Quinn as 'initiativitis'.

learning (2016, p. 5). Instead, leaders should focus on a small number of tested drivers for change by, as Fullan and Quinn put it, "focusing direction; cultivating collaborative cultures; deepening learning; and securing accountability" (2016, p. 14). They also state that "coherence making … has to be achieved at the receiving end, not the delivery end" (p. 6). Positional leaders may attempt to design leadership practices with coherence in mind, but such practices can only lead to change in environments where staff across the school actively engage in coherence-making. Resultantly, it can be argued that coherence-makers engage in a form of distributed leadership that partly conforms to Fullan's (2005) definition of leaders as systems thinkers in action. The current investigation is motivated to identify leadership practices in technology integration of teachers who are aware of differing approaches to educational leadership.

METHODOLOGY

Background

To provide a framework for analysis, we have used Scheninger's (2014) definition which outlines seven pillars of digital leadership; communication, public relations, branding, student engagement and learning, professional growth and development, re-envisioning learning spaces and environments, and opportunity.

These aspects of leadership fall into three areas of concern. Firstly, there are the external links and channels, then the internal practices for students and staff, then the potential structural changes. Depending on the role that an educator may have, digital leadership may focus on one or more of these areas, and in different ways. For example, a classroom teacher manages communication channels between their class and parents, while a principal manages communications at a school-wide level. In order to utilise the concepts of digital leadership as a framework for analysis, we have adapted Scheninger's 'seven pillars' into a set of themes, sub themes and key questions.

Participants and procedure

This investigation uses a qualitative case-study research design informed by Sheninger's (2014) theory. Semi-structured interviews (please see the appendix) were conducted with four participants from venues across New Zealand where the leadership course was presented from July 2016 to October 2016. Since the cohort consists of equal numbers of primary and secondary teachers, two primary and two secondary teachers were interviewed.

The interview questions were formulated by the research team, to probe the extent to which participants engaged in leadership practices aligned to Sheninger's (2014) pillars of digital leadership. After approval had been obtained from the Unitec Research Ethics Committee and participant consent had been gained, the interview schedule was piloted with four participants, and question four was adapted to include two parts. Originally, question four was designed to elicit both responses on school visions as well as responses related to strategies employed to gain school community buy-in. Pilot interviewees commented on their school visions but did not address strategies employed to gain school community buy-in. In order to elicit this information, it was decided to split the original question four into two separate questions. The interviews were conducted either in person or via electronic means such as Skype or Google Hangout. Interviews, with the approval of the interviewees, were audio-recorded for transcription purposes.

Data analysis

Following transcription, key themes were identified across the four responses provided to each question, hand-coded separately by two members of the research team and then grouped together. The identification and coding of the key themes was presented to the remainder of the research team for comment and adaptation as required.

Findings

Findings are presented in the form of a series of short tables. Each table relates to a specific question posed during the interviews and contains key data relating to the agreed-upon codes for the question concerned. Discussion of these findings and relevance for this study are taken up in the next section of the paper.

Question 1: What role(s) did you play in the leadership/followership of digital and collaborative learning initiatives in your school/work environment before enrolling in the course?

Role	Interviewee 1	Interviewee 2	Interviewee 3	Interviewee 4
Formal leadership position	No	Yes	Yes	No
Leadership of formal, school-endorsed project	Yes	No	No	No
Leadership of digital initiative?	No	Yes	Yes	No
Leadership of collaborative initiative?	Yes	Yes	No	No

Question 2: Having completed the Leadership in Digital and Collaborative Learning Course, how do you now use digital tools as a leader to communicate to stakeholders?

Target groups	Interviewee 1	Interviewee 2	Interviewee 3	Interviewee 4
Communicate with students?	No	Yes	Yes	Yes
Communicate with teachers?	Yes	Yes	No	No
Communicate with parents?	No	No	No	Yes
Communicate with the community?	No	No	No	No
Applications or tools used?	Google Docs	Google Classroom, Google+	Yammer	Electronic newsletter

Question 3: As a leader, how do you use digital tools to take control of public relations to spread positive news?

Target and aim	Interviewee 1	Interviewee 2	Interviewee 3	Interviewee 4
Target audience, aim and application or tool	Parents/ Share student success to encourage dialogue/ Seesaw (e-portfolio)	Colleagues and educationalists/ Contribute to and learn from professional learning network/ Twitter and blog	Parents and school stakeholders/ Showcase school successes/ Electronic newsletter	Parents and school stakeholders/ Showcase school successes/ Electronic newsletter
Target audience, aim and application or tool	Parents and community/ Profile school and marketing/ Facebook			Parents/ Showcase individual student successes/ Videos of student performances - iPad

Question 4: (a) What characterises your and/or your school's vision of digital and collaborative learning, and (b) how do you get your school (or organisational) community to embrace this vision?

Vision	Interviewee 1	Interviewee 2	Interviewee 3	Interviewee 4
Coherent school vision?	Not clear	No	Yes	No – management-dictated vision; not embraced by all teachers
Vision endorsed by interviewee?	Yes	Not applicable	Yes, but vision needs to emphasise educational affordances of devices	No
Key characteristic of vision?	Educationally meaningful use of devices	Not applicable	'Bring Your Own Device' implemented across the school	Teacher-driven learning
How is school community buy-in gained?	Not clear	Not applicable	Was gained by project team before the interviewee became involved	Not sought or gained

Question 5: How do you use both digital and face-to-face learning networks to shape your professional development?

Networks	Interviewee 1	Interviewee 2	Interviewee 3	Interviewee 4
Networks used during course?	Used Twitter and blog to network with course-based learning community	Used Twitter and Google+ to network with course-based learning community	Used Twitter and Google+ to network with course-based learning community	No
Did use persist after course?	No	Yes	Yes	No
New networks established after course?	No	Use Twitter to contribute to and learn from international educator community of practice	Catholic Schools Digital and Collaborative Community of Learning (online tools and face-to-face meetings)	No

Question 6: How do you ensure that technology supports effective and authentic learning in a particular context?

Technology	Interviewee 1	Interviewee 2	Interviewee 3	Interviewee 4
Application or tool	iPads and Seesaw	Google Classroom	Online competitions and virtual reality applications	iPads
Effective?	iPads used mostly for games but Seesaw used to reach learning outcomes	Yes	Partially effective – did not reach all learning goals	Not yet. The focus has been on suitable purchasable applications
Authentic?	Sometimes	Yes – students enabled to shape their own curricula	Not really, since resource links were supplied to students	To some extent: teacher and students have sourced information together
Context	Reading and Mathematics	Blended learning across learning areas	Media design	Reading and writing

Question 7: What are the most important things you consider in setting up physical environments and technical infrastructure for learning?

Considerations	Interviewee 1	Interviewee 2	Interviewee 3	Interviewee 4
Physical	Open, bright, colourful, age appropriate, close to toilet, place for bags & books	Not mentioned	New curtains, window treatments, lighting, colour, blinds, break-out space	Spaces where student can learn in small groups
Technical	Not mentioned	Top-level computers, projector, mini tripods, film-making equipment, Chromebooks	Computer charging points, equipment installed at appropriate height for student use	Availability of iPads and desktops
Emotional	Welcoming and safe	Not mentioned	Teacher and students are on a learning journey together	Not mentioned
Pedagogical	Meets the needs of learners	Not mentioned	Allow students to explore the space and provide opportunities for variety of learning uses	Spaces for pair learning activities

Question 8: How do you identify and implement digital and collaborative learning opportunities for working with partners from beyond the school community?

Partnerships	Interviewee 1	Interviewee 2	Interviewee 3	Interviewee 4
Partners	Other schools	Local technology company	Catholic Schools Community of Learning	Potentially rural and low-decile schools
How implemented?	Skype sessions allow both teachers and students to conduct learning sessions across schools	Nothing – much discussion but nothing implemented	Collaboration (online and face-to-face) to raise the literacy standard for Year 7-10 boys	Envisage collaboration on communal challenges

Question 9: What was the most important thing you learned from the Leadership course?

Learnings	Interviewee 1	Interviewee 2	Interviewee 3	Interviewee 4
About yourself	Thought that I hadn't really done anything as a leader and then realising actually I have totally done that / this is the kind of leader that I am, and this is the kind of leader that I want to be	Since the course I've made connections with people who are facilitating agile and design thinking	Basically, that I can do it	I am a leader and I'm a follower
About leadership	There are different types of leadership	The leadership part was fascinating	The course helped me to recognise, first of all, my own leadership style and, then, why I might be clashing so much with my syndicate who have very different leadership styles / Develop empathy, respect with colleagues	If you don't agree with somebody's leadership style you should be able to stand up and say, and tell them so.
About your beliefs	Gave me a lot more confidence	I am curious about adult cognitive development and change – I want to know more		Made me think more about how other people approach things and how I approach things and where we meet / It has given me confidence that I actually know more than I thought I did/ I feel empowered

Question 10: Is there anything that I have missed that you want to add or you think I should know about?

Interviewee 1	Interviewee 2	Interviewee 3	Interviewee 4
Digital skills are transferrable but when contact time with students in schools is short, digital is difficult	No comment	Even after completing the programme, I still feel I can contact the Mind Lab, so I don't feel cast adrift	The programme needs more differentiation and options
Older kids do flipped learning		There is a slower process of change in my school because not all teachers did the programme	I want help with IT things such as how to use a data projector / I want to know how to do the physical aspects
Short- term use of digital tools for short-length classes		We need to account for a community that is not all digitised	The programme has a lot of looking at the big picture but not always enough of what teachers really need
Not all courses in the programme were relevant		I have minimised the furniture in my room to make the space more flexible	Others in the cohort were frustrated at our tech ability
Students learn through play so the digital component is tricky			Make the use of a blog compulsory throughout the programme from the beginning – if it is not, people will opt out
I was challenged by the idea that this was not about apps but about transforming teaching			
A lot of time is spent thinking of ways to apply course content in my setting I was stagnant in teaching, now I want to keep up to date			
I have embraced the Idea that teachers are learners too			
Reflective teaching was challenging			

DISCUSSION

Findings relating to questions one to nine may be discussed in terms of four broader themes. Firstly, questions one and nine relate broadly to interviewee leadership roles and beliefs. Secondly, questions two and three focus on interviewee use of digital tools as means of communication and public relations. Thirdly, questions four and five elicit responses relating to the immediate and broader professional environment in which teachers work. Finally, questions six, seven and eight focus on aspects of learning with technology. The following discussion considers the findings presented above in terms of these four themes, the data set having been made up of four transcribed interviews with teachers who completed the Leadership course.

Leadership roles and beliefs

This paper sets out to assess the influence of leadership-focused professional development on teacher practices and beliefs relating to digital and collaborative learning. Question one probes the extent to which such practices might have been shaped by leadership experiences of interviewees prior to engagement with the Leadership course. Two participants indicated that they had occupied official leadership positions before enrolment in the course, while a third had been a member of the leadership team of a formal school project. The fourth participant had not played a formal or informal leadership role in her school prior to enrolment in the course. Two considerations need to be mentioned in this regard. Firstly, the broad definition of leadership adopted in the Leadership course encompasses formal, informal and class-based leadership practice. Participants appear not to have contemplated class-based leadership in their responses to this question. The question might have elicited such responses had the word 'roles' been replaced by the word 'practices'. Secondly, participant leadership roles are not equivalent to participant leadership practices. Roles do, however, indicate specific forms of leadership. As such, this needs to be borne in mind when assessing the influence of professional development on leadership practices.

The influence of engagement in the Leadership course on interviewee beliefs is more pronounced and somewhat clearer. Three participants indicated that the course had made them aware of the fact that they were already leaders, and this had given them greater self-confidence in their own leadership abilities. Two of these participants also indicated that an awareness of their own leadership styles had made them more empathetic towards colleagues who exhibited preferred leadership styles that differed from their own. The fourth participant became fascinated with the relationships between leadership, change and adult cognitive development. This interest springs from her involvement in the school-wide professional development of teachers, focusing on the integration of technology into the curriculum. The literature suggests (Guskey, 2002) that changes to teacher beliefs take place as a result of changes in practice and related improvements in student outcomes. Responses to question nine suggest, on the contrary, that changes to teacher beliefs about their own leadership might well precede changes in leadership practices. Further research is required in this regard.

Use of digital tools

The second broad theme, addressed by way of question two and question three, relates to the use of digital tools to communicate with stakeholders and positively influence public relations. In response to question two, interviewees interpreted 'stakeholders' as students, teachers and parents. No mention was made of any other stakeholders in the school environment, such as the wider community, a board of governors or the Ministry of Education, for example – even though these stakeholders are considered during the Leadership course. One possible reason for this omission might be the fact that communication with these specific stakeholders might be viewed by teachers as the responsibility of the senior management team. Furthermore, three of the interviewees used digital tools they had become familiar with during the course (Google Docs, Google Classroom and Google+) to communicate with the identified stakeholders. Only one interviewee used a tool (Yammer) that had not been mentioned on the course. Exposure to a wide array of digital tools during the course seems to have encouraged teachers to use these digital tools in their practice, rather than identify additional tools that might have been even better aligned to their specific

purposes.

Responses to question three appear to confirm and extend observations made above. Two interviewees indicate that their target audience consists of 'parents and other stakeholders', and that they communicate positive news via contributions to electronic newsletters. Here, two interviewees seem to assume that the responsibility of communicating positive news to broader stakeholder groups is not necessarily theirs. Where interviewees do use digital tools to communicate positive news to parents, this takes place in the context of the teachers' classrooms, rather than the context of the school. Only one interviewee uses a blog and Twitter to communicate with a wider audience of educationalists, but her purpose is professional development rather than communicating positive news – though this might be an unintended consequence.

The professional environment

The third broad theme addressed via questions four and five examines the extent to which teacher leadership of technology integration takes place in a supportive and professional environment. Question four focuses on the extent to which the teacher's school has a clearly formulated and agreed-upon vision for technology integration. Only one interviewee could clearly formulate a coherent school vision for digital and collaborative learning. This participant personally endorses the vision – with the proviso that the school-wide implementation of Bring Your Own Device (BYOD) is more cognisant of its unique educational affordances, rather than focusing only on the supply of hardware, software and connectivity. She also indicated that the buy-in of the school community had already been achieved by the time she became involved in the initiative. A second participant could not clearly define her school's vision for digital and collaborative learning, but she did personally endorse the school's focus on the educationally meaningful use of digital devices. A third participant indicated that her school's vision for digital and collaborative learning had been defined by senior management, but that this vision was not supported by all teachers in the school and is not endorsed by herself. The fourth participant was adamant that her school did not have any vision for digital and collaborative learning, and said that when she presented such a vision (based on what she had learned on the programme) her proposal had been rejected. Overall, these responses seem to suggest that teachers lead technology integration in schools that do not necessarily provide supportive, coherent visions endorsed by stakeholders across the school community.

Question five focuses on the extent to which teachers garner support for their leadership of technology integration from professional learning networks, either face-to-face or online. During the Leadership course, teachers are strongly encouraged to set up and participate in learning networks, both within and beyond the course. In this regard, three interviewees indicated that they had participated in professional learning networks during the course but only two interviewees had continued participating in these networks after the course had ended. One of these two interviewees indicated that she had expanded her participation in professional learning networks after the course to include an international network of educators.

In summary, interviewee responses suggest that teacher leadership of technology integration does not necessarily take place in schools that provide a supportive, school-wide vision. In addition, responses indicate that participation in wider professional learning networks does not necessarily persist after completion of the course. These observations suggest that teachers lead technology integration in environments that might not necessarily provide them with the professional support that they need.

Learning with technology

The final broad theme relates to specific aspects of learning with technology. Question six considers the use of technology to support effective and authentic learning in specific contexts. Participants had implemented technology to support learning in reading, writing, mathematics and blended learning across the school. Only one participant claimed, unequivocally, that the implementation (use of Google Classroom) had been effective. A second claimed that the use of Seesaw had aided student learning, but that iPad use had mostly involved playing games rather than

on meaningful learning. A third participant claimed that the use of technology had only been partially helpful in supporting student learning, while the fourth indicated that the implementation of technology had not yet been fully effective in advancing student learning.

Overall, only one participant believed that digitally-enhanced learning had been fully authentic, whereas the other three participants believed that authenticity had been only partially achieved.

The second aspect of learning with technology, addressed in question seven, asks interviewees to identify the most important things they would consider in setting up physical learning environments and the associated technical infrastructure. With regards to physical environments, two participants stressed the importance of sufficient light, while another included vibrant colours, and a third mentioned acoustic qualities. One participant (a primary school teacher) also believed that age-appropriateness of learning space design, proximity to toilets and space for school bags are important. From a technical perspective, two participants emphasised the importance of up-to-date desktop computers; one of them referred specifically to the value of iPads for use, while the other favoured Chromebooks, tripods and video-capture hardware. A third participant (recently involved in the refurbishment of learning spaces at her school) argued the importance of having enough power outlets for students to charge devices, and ensuring that smartboards and whiteboards are positioned at the right height for student use. Only two of the four referred to the importance of evoking positive emotional responses from students in learning spaces. One of these participants suggested that learning environments needed to be safe and welcoming, while the second believed the environment should encourage innovative, experimental behaviour and acknowledge failure as part of the learning process. In short, interviewee responses to this question seem to be shaped to a much greater degree by their individual experiences than their responses to any of the other questions.

The third aspect of learning with technology, addressed in question eight, relates to the identification and implementation of partnerships beyond the confines of teachers' schools. Two of the four participants indicated that they do not engage in digital and collaborative learning opportunities beyond their school walls. A third participant indicated that her students engage in educational Skype chats with children from other schools in the region. A fourth participant indicated that she had been instrumental in setting up a Catholic schools' learning network in her region.

Responses to question ten focus largely on design aspects of the programme as a whole and not specifically on the Leadership course. Such responses are not directly relevant to the matters discussed here. There are, however, some responses that emphasise the difficulty of implementing change initiatives in contexts where neither fellow teachers nor community members might share an interviewee's enthusiasm or vision for the use of digital tools in education.

CONCLUSION AND OPPORTUNITIES FOR FURTHER RESEARCH

In conclusion, two aspects of this study deserve comment, namely, the suitability of Sheninger's (2014) framework for assessing the quality of digital leadership in schools, and the extent to which the findings of this study confirm or diverge from findings in relevant literature.

The first matter to consider is whether Sheninger's definition (both overt and implied) of leadership is comparable to the definition of leadership proposed during the Leadership course. This course proposes that teacher leadership of a class of students is as much a matter of leadership as a principal's leadership of a school. Although Sheninger (2014) suggests that school leadership does not necessarily rest with the principal, his entire argument is specifically crafted from his own point of view as principal of a school. This discrepancy has significant implications for the measures adopted in assessing digital leadership. The question is really whether the specific measures adopted by Sheninger are necessary and sufficient measures of digital leadership. For example, does digital leadership necessarily include the use of digital tools to communicate with stakeholders and to spread positive news – or does digital leadership necessarily include the establishments of partnerships beyond the confines of the school community? Conversely, Sheninger's framework does not include a range of skill-sets that might directly influence the success

of digital leadership, for example: project management skills; a rudimentary understanding of ways in which the establishment of school technology infrastructure impacts resources, budgeting cycles and strategic planning; and an understanding of regional, national and international support structures and resources – not simply digital tools. In summary, further research is required to identify a theoretical framework that better suits teacher leadership of technology integration in schools.

The second aspect of this study that demands further research is the relationship between the findings of the investigation and relevant literature presented above. One of the insights presented in Guskey's (2002) research is that teacher beliefs and attitudes are not changed as a direct result of professional development initiatives. Rather, professional development encourages teachers to change their practices. Teacher beliefs only alter if changes in practice lead to improvements in student outcomes. The findings of this study suggest that this might not necessarily be the case in leadership-focused professional development. In this study, the most pronounced response to any question was that the professional development undergone by teachers had made them aware of the fact they were leaders, and that this awareness had given them a good deal of confidence in their own ability to engage in leadership practices. In this instance, changes in belief preceded conscious changes in practice. Given the exploratory nature of this study, more research is required to ascertain whether these findings do indeed suggest a divergence from the insights suggested by Guskey (2002) or whether the findings of this research are idiosyncratic. If further research does confirm the findings of this study, then leadership-focused professional development might well differ from other forms of professional development – and changes in belief might well have to precede changes in practice.

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APPENDIX

Interview schedule

Opening

A.   (Who I am)

Hi, I'm (insert name). Thank you for agreeing to meet with me. Just to confirm my background – I currently work for The Mind Lab by Unitec as a postgraduate facilitator.

B.   (Purpose)

The Mind Lab by Unitec would like to collect data from students who have completed the course on Leadership in Digital and Collaborative Learning and this is why we have asked you for an interview.

The research question guiding the investigation is: How does successful completion of a Leadership in Digital and Collaborative Learning (Leadership) course influence teacher practice in leading digital and collaborative innovations in their work environments? And how do such changes influence teacher beliefs and attitudes towards leadership of digital and collaborative learning?

We are interested in learning about whether completing the Leadership in Digital and Collaborative Learning course has had any influence on your leadership practice. We would like to know about the changes in your practices, beliefs and attitudes towards leadership.

C.   (Motivation)

We hope to be able to use the findings of this research to contribute, firstly, to our understanding of the ways in which teachers define leadership in their daily practice and, secondly, to the design of teacher leadership professional development in so far as it is able to influence both teacher practices and teacher beliefs and attitudes. We are able to provide a copy of this research to you upon completion and hope that this will be of use to you.

D.   (Timeline)

The interview should take about half an hour.

E.   (Information for interviewee)

Neither yourself, nor your organisation, will be identified in this research. This interview will be recorded digitally and you may find my eyes looking occasionally at the recording device to check it is working. I will be writing notes throughout the interview as well. I will provide a transcript (or summary of findings if appropriate) for you to check before data analysis is undertaken.

If you agree to participate, you will be asked to sign a consent form. This does not stop you from changing your mind if you wish to withdraw from the project. However, because of our schedule, any withdrawals must be done within two weeks after we have interviewed you.

Do you have any questions for me at this point?

If you have any queries about the project, you may contact our National Postgraduate Director Dr David Parsons. He may be contacted by email or phone. Phone: 0800 Mind Lab (6463522) or (09) 964 4444. Email: david@themindlab.com

F.   (Consent form)

If you agree to continue with this interview, could you please sign this consent form stating that you have understood my explanation of the research and you give your permission to be interviewed and recorded.

G.   (Transition)

Let me begin by asking you the following question:

1.   What role(s) did you play in the leadership/followership of digital and collaborative learning initiatives in your school/work environment before enrolling in the course?

Body (interview questions)

We'd like to understand how coursework has been applied to your learning and what positive things have happened because of this. In order to do this, we have selected seven lenses (adapted from Sheninger, 2014) through which we might view your own digital leadership. So, to begin …

Communication

2.   Having completed the Leadership in Digital and Collaborative Learning course, how do you now use digital tools as a leader to communicate to stakeholders?

Public Relations

3.   As a leader, how do you use digital tools to take control of public relations to spread positive news?

Branding

4.   a) What characterises your and/or your school's vision of digital and collaborative learning and,

        b) how do you get your school's (or organisational) community to embrace this vision?

Professional growth and development

5.   How do you use both digital and face-to-face learning networks to shape your own professional development?

Increasing engagement and enhancing learning

6.   How do you ensure that technology supports effective and authentic learning in a particular context?

Re-envisioning learning spaces and environments

7.   What are the most important things you consider in setting up physical environments and technical infrastructure for learning?

Opportunity

8.   How do you identify and implement digital and collaborative learning opportunities for working with

partners from beyond the school community?

Closing

9.   What was the most important thing you learned from the leadership course?

Notes

The seven pillars of digital leadership proposed by Sheninger (2014) have been associated with particular themes, sub-themes and key questions, as indicated in the table below. After careful consideration of the contents of the table, the questions posed during the body of the interview were formulated to elicit responses regarding each of the seven pillars of digital leadership. Where further probing is required in order to elicit more specific information on any one of the seven pillars, researchers are encouraged to use one or more of the questions posed in the 'key questions' column.

Table key: DCL = digital and collaborative learning

7 Pillars	Themes	Sub-themes	Key questions
Communication	Communicating progress, setbacks and successes in DCL transparently, honestly, accessibly and flexibly.	Communicating a DCL vision and strategy to stakeholders. Communicating progress, setbacks and successes honestly. Differentiated communication for different stakeholder groups and different accessibility characteristics.	How do you communicate the vision and plan for your DCL innovation to all stakeholders? How do you ensure that stakeholders are provided with honest, up-to-date information regarding progress, setbacks and successes relating to your DCL innovation? How do you design your communication to accommodate different stakeholder groups and access to different channels of communication?
Public relations	Using social media, as a complement to marketing communication, in order to tell your own positive DCL story.	To stakeholders To the wider school community Nationally Internationally To people outside of education e.g. political and business leaders	How do you use digital tools to communicate with stakeholders and the wider school community regarding your DCL innovation? How do you use digital tools to communicate with national and international audiences regarding your DCL innovation? How do you use digital tools to communicate with audiences in other industries (for example, politicians and business people), regarding your DCL innovation?
Branding	Community 'embracement' of BrandYOU and BrandINSTITUTION in DCL terms.	Definition of BrandYOU in DCL terms: Your own unique selling point in terms of DCL. Definition of BrandINSTITUTION in DCL terms: Your institution's unique selling point in terms of DCL Community 'embracement' of BrandYOU and BrandINSTITUTION in terms of DCL.	What special quality makes your own approach to your DCL innovation unique? What special quality makes your institution's approach to DCL unique? What do you do to ensure that the school community embraces your vision for your DCL innovation? What does your institution do to ensure that the school community embraces its vision for DCL?

Professional growth and development	Using personal learning networks and planned professional growth opportunities (both online and face-to-face) for DCL professional development. (Definition: A personal learning network is a group of people with whom you communicate regularly, either online or face-to-face, in order to gain knowledge, advice, etc. regarding DCL).	Using personal learning networks for professional development relating to DCL. Using regular, scheduled professional growth periods for professional development related to DCL.	What role do personal learning networks play in your professional development regarding DCL? Are you able to schedule regular periods of time for personal professional growth and, if so, how do you use this time?
Increasing engagement and enhancing learning	Increasing engagement and enhancing learning through DCL.	Authentic learning experiences. Technology that engages learners at all levels. Finding the most effective technology for a specific teaching technique.	How do you ensure that your DCL innovation incorporates authentic learning experiences? How do you ensure that the technology you use to support a specific teaching technique is both engaging and effective? How do you ensure that every student has access to digital devices that enable personalised, prolonged use?
Re-envisioning learning spaces and environments	Re-envisioning learning spaces and environments that support authentic digital and collaborative learning.	Establishing a better vision. Strengthening and opening up the wireless network. A choice to teach and learn a different way. A new building construct. Creating a real-world space. Strategic partnerships.	How does your vision for learning, drive the design of DCL spaces and environments in which you work? How do you ensure that the quality of wireless connectivity supports specific learning activities you envision taking place in these spaces and environments? How closely do these learning spaces and environments resemble the spaces that students are likely to encounter after they leave school? How do you go about involving partners (both from inside the school and beyond the school walls) in the learning that takes place in these spaces and environments?
Opportunity	Forming DCL partnership networks beyond the school community	Community partners energised by the mission.	How do you identify and implement DCL opportunities for working with partners from beyond the school community?

Table 1: Deriving interview questions from Scheninger's 'Seven Pillars of Digital Leadership'.

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