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LEADING LEARNING IN A DIGITAL AGE

In the twenty-first century, school leaders are faced with the challenges of changing local, national and global contexts. While responding to the unique needs of their local school community, an increasing emphasis on national requirements in areas such as curriculum and teaching standards further compel leaders to ensure that teacher professional learning keeps pace with changes. This mixed methods case study sought to understand how school leaders can manage professional learning in twenty-first century contexts.

School leaders have always played an important role in teachers' learning, responding to the challenges and needs of their school communities while working within the larger contexts of curricular, technological and pedagogical change. Whereas these contexts were relatively stable throughout the twentieth century – with typical emphases on print-based information, face-to-face learning, and the relatively „private" classroom walls – the twenty-first century challenges leaders to perform in very different ways. They must continue to identify and model best practice, transform school cultures and establish and maintain appropriate structures to support sustained learning for both teachers and students. However, in many schools where face-to-face learning often still dominates, many leaders are now engaged in professional learning as members of diverse online communities. Networked learning is, accordingly, becoming an increasingly important element in contemporary teacher professional learning.

Brooks and Gibson (2012) point out that traditional models of professional *development* „reinforce an externally-designed, stand-and-deliver non-participatory type of learning environment [that] do little to assist teachers in enacting constructivist, inquiry-based learning practices, commiserate with 21st century learning, in their classrooms," while professional *learning* with a wider range of learner-centred technology tools can be more personal, practice-focused and community-oriented. Highlighting a similar distinction, Huber (2010) notes that until relatively recently, professional development has been centred around the twentieth century industrial schooling realities of information scarcity, the dominance of print media and the privatised classroom, noting that these realities have been tied to largely unquestioned assumptions about how teachers can, or should, learn. Her discussion of the use of Web 2.0 tools for professional learning illustrates the pressing need to challenge ongoing traditional beliefs such as „passing information on is enough," „insight must come from outside formal training" and „planning means learning" (p. 42).

Contemporary times present new opportunities for school leadership, not least with the increasing connected affordances of free and cheap technology tools now commonplace throughout most developed (and many developing) countries. For example, leaders can use tools for content aggregation and social media to access a wide

range of information sources from industry, education and other experts, and to form people-to-people connections outside of traditional school- and system-based networks. Increasingly recognised as the „Personal Learning Network," or PLN (Couros, 2010; Warlick, 2009), educators are now able to use technology tools to construct and manage very personalised online networks of people and information that are relevant to their professional learning needs. As Warlick (2009) explains, the PLN provides educators with ways:

to tap into connected and cultivated communities of interest to find information sources, suggestions for lesson plans, potential collaborators, current events and trends, new opportunities, resources, and a wide variety of other answers and solutions. PLNs open up doors to sources of information that were not even available a few years ago, and continually evolving technologies are making it easier to capture and tame the resulting information overload (p. 13).

Tools like *Feedly* and *TweetDeck* provide ways to aggregate multiple RSS feeds, follower lists and hashtags, while teleconferencing tools such *Skype* and *Adobe Connect* facilitate audio/video links between geographically divided schools. Social media tools like *Twitter* enable both content aggregation and people-to-people connections, allowing educators to follow and communicate with professionals in areas that include key organisations, popular thinkers in education, academics and teacher bloggers, while having all of these connections appear in the form of tailored news feeds. These available tools provide individualised opportunities for users to customise and share their pedagogical practices with others.

When faced with the challenges and opportunities of the twenty-first century, each leader's capacity to learn arguably represents a significant factor shaping their school's development. While the relationship between leading, learning and managing change are not new, the complexities of the contemporary school environment are transforming the nature of leadership, with renewed calls for „networked" school leaders who are able to more seamlessly connect learning opportunities across different contexts (Finger & Lee, 2014). The push towards recognising the importance of networked learning has also prompted the development of new learning theories such as Downes' (2006) epistemological learning model incorporating the emerging theory of „connectivism." Elaborating further, Siemens (2008) suggests that this new learning theory „posits that knowledge is distributed across networks and the act of learning is largely one of forming a diverse network of connections and recognizing attendant patterns" (p. 10).

However, while the potential of the PLN to transform learning is becoming more and more apparent, the realities of the school environment present barriers to realising its potential for learning both within and beyond the classroom and staffroom walls. Fullan (2013) highlights the gap between potential and reality as a „push-pull" factor existing in schools throughout the developed world:

The push factor is that school is increasingly boring for students and alienating for teachers. The pull factor is that the exploding and alluring digital world is irresistible, but not necessarily productive in its raw form. The push-pull dynamic makes it inevitable that disruptive changes will occur… with more radical change in the next five years than has occurred in the past fifty years (p. 23).

Now well into the second decade of the twenty-first century, technology has played an important role in eroding false assumptions about the nature of professional learning

and in challenging the privatised worlds of the classroom and teacher practice. However, with learning that has the capacity to be both highly connected and personal, leaders arguably need to play key roles in further challenging recurrent assumptions and modelling meaningful twenty-first century learning.

Teacher and Leader Sample

This study explored relationship between the technology use for teacher professional learning and the school context, with a sample of 102 teachers and school leaders across seventeen government schools. Schools were self-selected on the basis of expressions of interest submitted by teams of school leaders. As part of their participation, each school received AU$10,500 of system funding to develop a project that involved redeveloping the school's use of technology and pedagogy to meet the requirements of the new Australian Curriculum. This new curriculum accordingly represents ICTs both as specialised subject skills and content knowledge, and as broader, cross-curricula skills. Future curriculum development will also focus on the relatively new areas of design and computational thinking as skillsets to be developed further (ACARA, 2012). Accordingly, educators are now challenged to respond to these new curriculum contexts that position technology and pedagogy quite differently when compared to previous curricula. In the design of the present study, these challenges were framed as professional learning challenges. This study sought to explore how teachers work – both within their immediate school context and as members of online communities – to effect change within their schools.

In addition to submitting expressions of interest, the program required school leaders from each participating school to provide interim and final reports, as well as posting weekly in a shared public blog. The shared blog posts prompted schools to report on their progress, and was often used to identify common problems and solutions, promote inter-school dialogue, share school project highlights, facilitate teacher reflection and include links to related digital resources. Participants also discussed how they were using current technology tools to support professional learning in their school. Apart from the program's reporting and blogging requirements and the need for each project to include a focus on technology, pedagogy and curriculum, school leaders were free to determine the scope and parameters of their individual projects and, to a large degree, the nature of teacher professional learning undertaken. The overall sample of participants included principals and non-teaching executives, teachers with leadership roles (for example, ICT mentor and subject coordinators) as well as regular classroom teachers who had adopted a leadership role for the purposes of the project.

Table 1 – Profile Summary of Participants

Educator Role:	Principals (n=5, 7.9%	School Executive (non-teaching) (n=4, 6.3%)	Teachers with leadership roles (n=35, 55.6%)	Classroom Teachers (n=19, 30.2%)
Mean Age:	44.5	42.7	37.3	38.2
Mean YT:	21.4	22	13.59	13.11

Some schools focused on technologies that were currently in place, others used their project as an opportunity to acquire and explore new technologies. Some schools attempted a school-wide project with every teacher involved, whereas others included only a small number of teachers. While each school employed their resources differently, the majority schools spent more funds in the areas of teacher release (the provision of time away from classroom duties to plan, work with colleagues or attend training) and the purchase of new hardware devices (most notably, tablets). Other areas like formal training and infrastructure development (such as the implementation of new wireless network access points) were less consistent, being applied in a relatively small portion of schools. Perhaps most notably, the majority of hardware acquisition funds were spent on the purchase of iPads ($25,961, or 20.5% of total funds).

Methodology

This study incorporated a mixed methods design with two staged components. The first (qualitative) component explored the school context, including the decisions, actions and leadership styles of each school leader and how these affected the development and implementation of their project. Researchers requested school visits and semi-structured interviews with school leaders from all seventeen schools; six schools agreed to participate in this component and, of these, three were selected as critical cases reflecting important themes across the three required areas of technology, pedagogy and curriculum. By closely examining the school context as a starting point, the study was able to draw findings about the impact of these areas on the school community and establish frames of reference to be explored in subsequent research.

The second (quantitative) component developed the emerging themes as operational constructs in a questionnaire (The Teacher Professional Learning Questionnaire, or TPLQ) that was delivered online to all participants from each of the seventeen schools at the end of the program. The questionnaire design was further informed by Clinton, Purushot, Robison and Weigel (2006) with their emphasis on participatory cultures of learning. In the TPLQ, participants were asked to identify and rate common technology tools used for teacher professional learning and a range of broader support structures (such as the provision of time, presence of infrastructure, the freedom to try new ideas and actions of other leaders) that commonly exist in schools. In relation to these tools and support structures, Principal Components Analysis (PCA) was used to explore the connections between different technology tools, leadership styles, key influences and strategies for facilitating professional learning in the school. By exploring current technology tools and school support structures, the questionnaire was able to compare and contrast the use of technology in both formal and informal settings, and to identify the kinds of technology tools that are used to support professional learning in each setting.

Qualitative findings

Through one-on-one and focus group interviews, a range of themes emerged that describe how professional learning and leadership intersect across participating schools.

School A: Whole-of-School, „Top Down" Approach

Two key themes in relation to technology emerged. First, the principal emphasised the importance of flexibility when responding to change: „so, it hasn't just been me that's driving it [the project]. It's been the technology team. What they've learned along the way is that every six months, that technology plan goes out the window… and that's fantastic." This positive perception of technology as rapidly changing was also reinforced by a Year 4 teacher in the focus group, who described the shift in mindset, where „technology used to be seen as the extra thing, whereas now we see the technology is so vital to what is going on in the classroom." Second, the role of students in teacher professional learning was evident. In particular, many of the participants reinforced the importance of students having substantial input into learning with technology. In summary, the discussion reflected the importance of teachers being adaptable to change – especially when thrown in „the deep end" – and the need for teachers and learners to engage with one another in a way that reflects, to some extent, Fullan's (2013) „new pedagogy" of the „teacher-learner partnership."

School B: Small Team, „Offering" Approach

Being a small school, researchers were interested in the extent to which new pedagogical approaches such as IBL could be accurately and effectively implemented in each classroom. When asked about the adoption of this model in particular, one of the leaders remarked that most teachers „had been doing it for the last few years" but that some „were on a higher level than others."

Exploring the different levels of innovation and experience with Inquiry-Based Learning further, the principal pointed out that she encouraged her small team of innovators to develop new approaches and „offer" them to other staff members. When developing the new units of work, she stated that when other teachers heard about the new ideas, they would, she believed, „come on board." One teacher suggested that this process of co-opting new teachers to the project goals involved time, patience and not forcing staff members to follow the new initiative. The principal also addressed the school's innovation in relation to her own style of leadership:

One of my biggest philosophies is that you go with who's ready to go first... and hopefully that ripple effect will take place... once they [innovating teachers] have the opportunity to share it [their ideas] with the rest of their stage, it [the reaction by other teachers] will be, „We want some of what you've having... we want some of that too." It's not „you will do this" [to the staff]... it's „if you would like to... here it is for the offering."

All interviewees strongly agreed that forcing members of staff to try new ideas was not at all part of their school's culture.

School C: Mid-Size Team, „Innovate First – Plan Later" Approach

In School C, the participating teachers initially articulated two goals for their school's project: first, the use of iPad-based literacy apps to support a whole-school reading program; and, second, the development of a „learning alliance" of schools in the local area with a shared website for pooling curriculum-related resources and communication. Separate members of the school's executive managed each of these

goals; in both cases, however, this management involved setting strategic direction but leaving the operational logistics up to individual teachers to decide. In particular, the members of the school executive claimed to have limited understanding of how the technologies worked and therefore relied on other members of staff (especially younger members) to „show us the way."

The Assistant Principal of School C talked about what he described the „snowball effect," where most teachers in the school were observing the positive changes developed by the school's participants and then trying these new approaches in their own classrooms. At the same time, he conceded that the initial project goal of the shared online community was „stalling a little," because the impetus provided by other members of the project team were taking the school in new directions. Referring to both of these younger teachers, another member of the executive commented, „I'm nowhere near as au fait as these girls here," stating that the school was „at the stage where these girls are still playing and learning with the technology," and suggesting that „we'll come to the point where they share, and then people like me can pick it up and run with it."

Quantitative Findings

The initial qualitative component illustrated how school leaders in three typical-case Australian schools responded to the challenges of the changing curricular, technological and pedagogical contexts. In all three schools, leaders responded in ways that they believed would best serve the unique needs of teachers and students in their school community. The decisions made often reflected the leaders' styles and philosophies, with communities of like-minded leaders often helping to create a school culture where these styles, philosophies and decisions were seen as normal and appropriate.

The quantitative component explored these changed contexts at the personal level of the individual school leader. Given the differences (both within and between schools) in the ways that each leader approached the challenges, the Teacher Professional Learning Questionnaire (TPLQ) employed items that more closely examined how each leader used technology, what common support structures they felt were most important for professional learning in their school and how they perceived their knowledge of technology, pedagogy and the Australian Curriculum at the conclusion of their school's project. The TPLQ sought to measure these areas in with a view to obtaining findings that might further explain how school leaders respond to changed contexts, the impact of their professional learning and actions on the school culture and possible leadership attributes that leverage professional learning most effectively in a digital age. Themes from the qualitative component were explored further, including the differences between the importance of time, formal and informal professional learning, the impact of research on practice and the role of current technology tools.

Leaders' perceptions and use of time for professional learning

Given the level of expenditure for release time, the Teacher Professional Learning Questionnaire (TPLQ) sought to measure how school leaders perceived and employed their time in the context of common time-related support structures that exist in many schools. These organisational structures include less formal uses of time, such as lesson preparation periods, programming days and time to plan with colleagues, as well as more

formal uses of time such as staff meetings, training days and structured release from face-to-face (RFF) to mentor other teachers. Further, the TPLQ also examined how much time school leaders spent time outside of typical work hours on their professional learning with findings that revealed, on average, an additional 12.1 hours each week. Table 3 shows the distribution of this time in relation to professional learning activities:

Table 2 – Use of Additional Time for Professional Learning: Top Activities

Professional Learning Activity	Time (minutes)
Searching for and reading information:	386
Watching or listening to audio and/or video content:	106
Sharing information with people:	89
Creating your own content:	55
Co-creating/editing content:	54

Overall, the level of expenditure and number of schools allocating funds in this area suggested that time represents possibly the largest factor in the success of each school's project and even the professional learning outcomes of participating teachers.

The Teacher Professional Learning Questionnaire (TPLQ) explored time as a multi-layered support structure, with ten items rated in importance by respondents through a 7-point scale on the use of professional learning time in different contexts. To understand relationships between the items, principal components analysis (PCA) was conducted, employing oblique rotation (direct oblimin). An initial analysis was run to obtain eigenvalues for each component in the data. Three components had eigenvalues greater than one and in combination explained 69.11% of the variance. The researchers retained three components because the third component, though limited to one item, accounted for 10.23% of the variance. Table 3 shows the component loadings after rotation. The items that cluster suggest that Component 1 is time spent on preparation and planning within the immediate school environment, Component 2 is time spent networking and planning beyond the immediate school environment and Component 3 is traditional structured professional development (PD) days beyond the immediate school environment:

Table 3 – Results of Components Analysis – Time-Related Support Structures

	Component		
	1	2	3
Unstructured professional development days in my own school (e.g. a planning day with colleagues)	.874		
Release time from class	.789		
Structured professional development days in my own school (e.g. staff training day)	.737		
Unstructured meeting time with leaders to discuss concerns face-to-face in my school	.722		
Unstructured meeting time to share ideas face-to-face with colleagues in my school	.703		
Lesson preparation time (e.g. designated free period in timetable)	.488		
Unstructured meeting time to share ideas with colleagues face-to-face outside of my school		.893	

	Component		
	1	2	3
Listening to a guest visitor during a professional development day or staff meeting		.705	
Unstructured professional development days outside of my own school (e.g. a planning day with colleagues from other schools)		.642	
Structured professional development days outside of my own school (e.g. one-day course)			.827
Rotation Method: Oblimin with Kaiser Normalization.			

The pattern matrix suggests that leaders perceived time spent on professional learning time in three different contexts; each context reflected the locus of professional activity and interaction related to teachers' learning. The themes that had emerged in the qualitative component were thus confirmed by the PCA. As shown, unstructured time was generally perceived to be more important to professional learning, particularly in terms of interactions with colleagues both within and beyond the school environment.

Discussion

As the case summaries show, each of the schools adopted considerably different approaches in their emphasis on, and treatment of, technology, pedagogy and curriculum. All three schools used their funding to explore new technologies in the classroom; while School A appeared to explore a wide range of devices and applications, Schools B and C chose to focus mainly on the use of iPads. The leaders in School A employed what could best be described as a „top down" approach to technology adoption, where leaders from the school co-opted all members of staff – including resistant teachers – into using the tools, citing equity as a guiding principle. In terms of curriculum, School A's use of sample units enabled them to learn about the requirements of the Australian Curriculum without needing to create new teaching resources. In contrast, School B's focus on the curriculum provided an opportunity to try a form of collaborative planning that was consistent with their „offering" approach. While some members of staff were keen to get started immediately, others took time „to come on board," and this was an accepted part of School B's culture. School C used literacy and their reading program as a curriculum connection in their project plan; however, the fact that these programs had „stalled" meant that the current direction for their school's project was unclear.

Interestingly, for both Schools A and B, questions on pedagogy prompted a discussion of popular thinkers in education, while School C seemed unable to articulate current pedagogical approaches that were being employed by their teaching staff. Both Schools A and B adopted the instructional model of Inquiry-Based Learning and deferred to this when explaining aspects of their pedagogy in practice. However, in the case of School B, the adoption of this model was inconsistent due to teachers not being explicitly *required* to work towards the school's project goals (the „offering" approach). Both School B and C seemed to deliberately avoid a „top-down" approach to leadership; while School B's model of „offering" stemmed from the principal's own philosophies of learning, School C actively encouraged what might be described as a „bottom up"

approach through the two younger teachers whose innovations were valued but not arguably consistent with the school's articulated project goals.

PCA conducted on time-related support structures suggests that there are clear distinctions between learning within, and outside of, the local school environment. Further, the higher component loadings for unstructured uses of time were apparent in all cases, suggesting that school leaders recognise the importance of including unstructured time when meeting the challenges of the changing local, national and global contexts. This was consistent with the large allocation of funds on teacher release, most of which was not associated with formal training.

Conclusion

The changing local, national and global contexts of the twenty-first century are challenging school leaders. These challenges will continue with a growing number of educational pressures such as implementing new curricula, meeting professional accountability demands, and skilling teachers in evidence-based pedagogies. At the same time, meaningful use of rapidly changing and evolving technology tools needs to be included in classroom practice.

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