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Transforming Teacher Education with Digital and Collaborative Learning and Leadership

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ABSTRACT

This paper investigates some participant outcomes from a part-time postgraduate course for in-service teachers, focusing on digital and collaborative learning and leadership, delivered in several locations across New Zealand. In order to monitor the success of the course, regular anonymous feedback is gathered. One question in particular is essential to this feedback; to what extent does attending the course lead to transformation of classroom practice by the participants? The authors analysed free text responses to on-line surveys which posed this question to two different course cohorts. Their findings were that almost all of those who had completed the relevant course modules reported making changes their practice. Some were still making tentative steps towards new forms of pedagogy, but the majority were transforming the way they managed the learning processes within their classrooms, and many were beginning to apply their newly developed awareness of leadership skills to extend their ambitions to aim to transform their schools.

Keywords: Digital and Collaborative Learning, Leadership, Qualitative Analysis, Survey, Transformation

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INTRODUCTION: THE DRIVERS FOR PEDAGOGICAL CHANGE

Drivers for the transformation of pedagogy apply pressure to the current education system from a number of perspectives. One is the idea that the existing system is in some way lacking. For example Perkins (1992) refers to ‘fragile knowledge’ as being a chronic problem in the outcomes of schooling, comprising a number of factors and having long term social and economic consequences. Another perspective is that, even if the current system is not flawed, new generations of learners who have grown up with technology have different requirements and expectations. Rosen (2010), for example, refers to the ‘iGeneration’ and their technology-centric learning styles. A further view is that changes in technology in wider society provide new opportunities for education that need to be embraced, for example ‘pedagogy 2.0’, leveraging social media in learning (McLoughlin & Lee, 2008.) However, the introduction of such technology into the classroom is not without its problems, since it does not automatically bring changes in pedagogy, while its pervasiveness may lead to idiosyncratic knowledge construction (Sutherland et al., 2004). Thus changes in technology demand deliberate changes in pedagogy. A further, perhaps more problematic, view is that education operates within cycles of external short term political agendas (Waters, 2013) and in developed societies where technological change may even reduce the need for education (Chang, 2010.) Whatever the realities of these various arguments, one thing is evident; Education is unable to remain unchanged when all around it is in a constant state of flux and evolution.

The Move towards Digital and Collaborative Learning

While the forces of social and economic change have continued to evolve and impact on expectations of education, approaches to teaching and learning have not remained static. Over the last century, conceptions of learning have shifted from a largely instructivist approach to one that has as its core the concept of active student engagement in the learning process (Laurillard, 2008). During the same period, stable print and inscription-based technologies have been augmented by a rapidly increasing number of digital technologies that challenge traditional notions of time, space and place. New theories such as connectivism (Siemens, 2004) have emerged to address the relationship between technology and learning. In many countries, over the last two decades or so, digital and collaborative practices have been embraced in mainstream education as a means of embodying and addressing modern learning theories that emphasize active student engagement. However, education can only change where teachers are given the necessary support to self-reflect and innovate in an informed way.

Addressing Teacher Education

The OECD (2015, p.4) emphasise that ‘to deliver on the promises that technology holds, countries will need a convincing strategy to build teachers’ capacity’. Otherwise introducing digital tools into the classroom without appropriate teacher education will not lead to successful outcomes. However, Laurillard (2008), supported almost a decade later by Johnson, Adams Becker, Estrada and Freeman (2015,) argues that the professional development of teachers has not delivered the reflective practitioners, action researchers and collaborative innovators that would constitute a learning profession in a learning system. In fact, The Horizon Report 2015 K-12 Edition specifically lists the integration of technology into teacher education as one of the most significant challenges impeding technology adoption in schools (Johnson, Adams Becker, Estrada & Freeman, 2015).

Teachers need to be able to embrace innovation to improve their pedagogy, but innovation alone is not synonymous with change and change agency. Change can be a psychological threat as it provokes a state of uncertainty of a new situation. Teachers need to be able to embrace new classroom dynamics while maintaining the standards required for the development of knowledge by their students, and more social activity does not automatically mean more cognitive activity (Greener, 2014.) Changes in practice can only happen as a result of fundamental changes in belief. The New Zealand Ministry of Education has commissioned a synthesis of research on teacher professional development and changes in students' learning outcomes. The report indicates that having an effective professional community is necessary for a teacher professional development programme. One of the characteristics is that teachers need to be introduced to new perspectives, challenged with problematic beliefs and assisted to process new understandings and their implications for teaching (Timperley, Wilson, Barrar, & Fung, 2007.) Teachers cannot be expected to forge the necessary links between technology, pedagogy and subject matter independently, regardless of their own personal uses of technology (Kumar & Vigil, 2011.) Thus teacher education programmes need to help teachers to develop these links and apply them in their classrooms.

The Certificate in Applied Practice (Digital and Collaborative Learning)

In the context of the challenges outlined in the previous sections, the postgraduate certificate programme investigated in this article, offered on a part time basis to in-service teachers through a collaboration between a New Zealand polytechnic and a specialist education lab, is designed to enhance digital literacy and contemporary practice in the teaching profession. The programme blends hands-on learning experiences using software, electronics, robotics and other digital tools, with contemporary pedagogy around collaboration and leadership to support classroom-based applied practice and online learning.

The 32 week programme (16 weeks face to face, 16 weeks online) combines coverage of digital and collaborative learning, educational leadership, applied research and reflective practice. Assessment methods are flexible and based on the course philosophy. Assignment tasks are able to be completed in collaborative groups, and presented using a choice of media, for example video, photography, blogs or visual diaries of applied practice. Teachers on the course mostly teach in primary and secondary schools, with a few from early years and tertiary institutions.

The programme recognises the importance of active learning, collaborative participation and leadership opportunities as features of teacher professional development (Scott & Mouza, 2007.) The three concepts of problem based learning, authentic assessment and meaningful community combine together to create a powerful set of learning tools, integrating real world learning contexts, a collaborative community, digital tools and multiple types of learning artefacts and outcomes (Barber, King & Buchanan, 2015.) Encouraging teachers from different schools to collaborate together, both in class and for assessments, helps to promote an extended professionalism that builds on both intra-school and inter-school collaborations (Austin et al., 2010.) The capstone assessment for the course is a longitudinal blog (or other e-portfolio) that addresses a structured series of topics. These can optionally be public, to gain ongoing peer feedback. One recognised advantage of this type of approach is that the assessment outcomes can be valuable for reflective practice even after the course has finished (Chesney, 2010).

The motivation for this paper is to explore to what extent the certificate programme is reaching its objectives of transforming teaching practice in the classrooms and schools of its graduates. Since the programme is still very new, it is too early to expect to gather empirical evidence of changes in achievement by school students. However we have begun some initial investigations by asking our recent cohorts of teachers to reflect on their practice and to consider

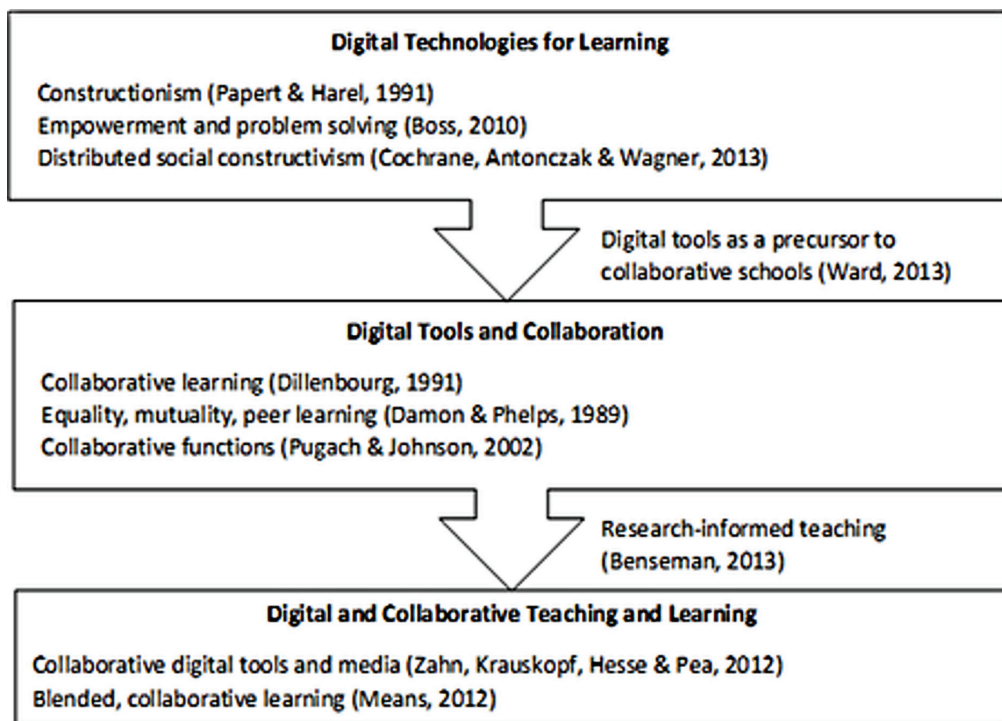
to what extent they see their own practice changing as a result of attending the face-to-face part of the course (the first 16 weeks).

THEORETICAL BACKGROUND AND RELATED WORK

The main concepts addressed in this section are digital technologies and collaborative learning, and how these two may be integrated together through a research-informed teaching process. Figure 1 outlines the relationships between these concepts with some indicative literature. Note that in this structure digital tools are assumed to be a precursor to collaborative schools (Ward, 2013) and that research informed teaching (Benseman, 2013) is assumed to be required to enable teachers to successfully integrate digital and collaborative learning into their classrooms.

Our theoretical approach is based on the belief that a number of innovative approaches to learning that were hypothesised in the past have now been fully enabled by digital technologies, allowing students to create things that, in Brooks' (1975) famous phrase, 'never were, nor could be,' yet increasingly they are. While Brooks was referring to screen-based artefacts, we now see, through the potentials of robotics, 3D printing, augmented reality, holograms etc., these things become more pervasive, immersive and tactile. Much of what underpins this activity is, therefore, constructionist. While we note that constructionism is much more than 'learning by doing', nevertheless at its core is the understanding of abstractions through the use of multiple creative materials, enabling the production of knowledge by students (Papert & Harel, 1991), a process that begins with empowerment and ends with problem solving (Boss, 2010.) This process alone

Figure 1. Concepts from related work that support digital and collaborative learning



is not, however, enough. Equal to the emphasis on digital tools is the process of collaboration, and the types of contemporary social constructivism enabled by distributed tools (Cochrane, Antonczak & Wagner, 2013.) Finally, there is the role of leadership. In particular, the types of thought leadership developed by research informed teaching (Benseman, 2013.) These new approaches to teaching and learning will not work if confined to a few individuals. Those early adopters also need to learn how to disseminate their own learning. Thus the course investigated in this article brings together digital teaching and learning, collaboration, and leadership skills in an attempt to transform the philosophy of education in New Zealand.

Digital Tools and Collaboration

Dillenbourg notes that a broad but unsatisfactory definition of collaborative learning is that it is 'a situation in which two or more people learn or attempt to learn something together' (1999 p.1.) It is an unsatisfactory definition because the number of people, the type of learning and the nature of the interaction are all significant variables. A theoretical definition of collaborative learning takes into account situation, interactions, processes and effects. In the context under discussion, the typical situation within the classroom is that of explicit shared goals, symmetry of action and collaboration rather than cooperation (though on occasion we have observed that groups operate in a cooperative rather than collaborative manner.) Interactions are synchronous and negotiated within naturalistic settings. Processes are primarily based on induction, in that tasks frequently require groups to abstract out common concepts and principles. The effect is primarily to develop intrinsic collaborative skills, though as has been acknowledged, this is hard to validate cognitively, despite its popularity as an assumed effect (Dillenbourg, 1999.) One might ask why such a generic approach has been taken to collaborative learning when so many variations are possible. Perhaps the main justification is that what is being modelled in the learning space of the teachers is not a direct corollary of the learning spaces that they operate in where, for example equality and mutuality will differ (Damon and Phelps, 1989.) An open, negotiated approach to collaboration allows the participants to define their own collaborative strategies for transfer to the classroom. Of course there are many other ways of analysing collaborative learning, for example, Pugach, & Johnson (2002) define a framework encompassing facilitative, supportive, informative, and prescriptive collaborative functions, while Damon and Phelps (1989) contrast broader themes of peer learning. Further, any collaborative form does not stand alone but depends on other aspects of learning. For example Perkins (1992) states that collaborative learning only acts beyond 'Theory One'; clear information, thoughtful practice, informative feedback and motivation. Whilst we acknowledge this complexity, we nevertheless understand that the practice of mutual, synchronous, negotiated collaboration has a reciprocal effect on the ability to collaborate and to foster collaboration in others. Lee and Ward (2013) assert that the use of digital tools is a necessary precursor for fully collaborative schools, a concept that we return to later in our analysis.

The actual relationship between digital tools and collaboration may take a multitude of forms. The tools may support collaboration on line, using cloud based solutions such as wikis (Wheeler, Yeomans and Wheeler, 2008), while others provide opportunities for teams to work together in the classroom around digital tools and media (Zahn, Krauskopf, Hesse & Pea, 2012.) Further, specialised tools such as group awareness tools may be used (Janssen & Bodemer, 2013.) A meta-analysis by Means et al (2010) showed the value of blended, collaborative approaches to learning that integrated face to face and online resources, providing further evidence in support of the well-known e-learning dictum that the introduction of technology in the absence

of curriculum redesign results in ‘no significant difference’ in student learning. Our aim in this article is to measure the impact of the course curriculum on digital and collaborative practice.

METHODS AND MATERIALS

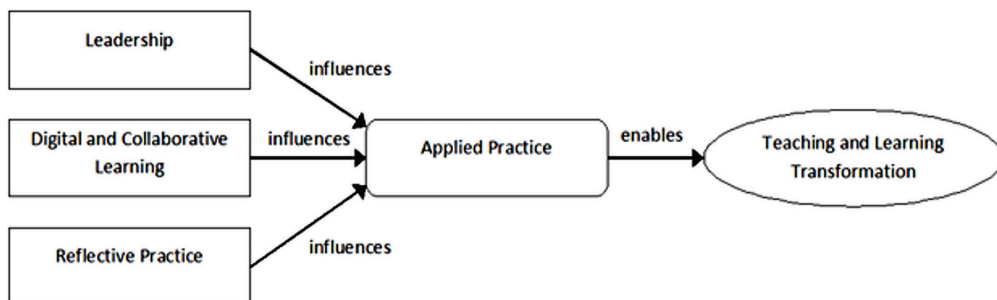
Figure 2 shows a very simple research model adopted for this study. The inputs are the key objectives of two course modules that we are investigating, which form the basis of the first 16 weeks of the course. One module focuses on digital and collaborative learning in context, the other on leadership. Both modules are based on encouraging reflective practice. Since these course modules are undertaken in parallel with practice, we expect them to influence the (research-informed) applied practice of the teachers on the course. Changes to applied practice should enable transformation of teaching and learning. To evaluate the effectiveness of these course modules, we aimed to measure the extent to which the course members perceived that change had taken place in teaching and learning in their classrooms and schools. Stahl, Koschmann & Suthers (2006) note that research methodology in computer supported collaborative learning tends to fall into one of three camps; experimental, descriptive and iterative. Our approach in this study is entirely descriptive.

Our research question is, therefore, to what extent has attendance on the two digital and collaborative course modules impacted on the applied practice of the participants, in terms of transforming their approach to teaching and learning? Sub-questions were; what aspects of applied practice are evident in examples of transformation? and, what negative forces have been encountered that may inhibit changes in practice?

The data reported in this paper is based on two surveys administered in July 2015 and November 2015 to two different cohorts of students who had completed the courses on digital and collaborative learning, and leadership. It is based on a total of 113 returned surveys from July (54% out of 210 enrolled) and 190 from November (73% out of 260 enrolled). The specific survey question addressed in this paper was ‘Please give examples of which aspects of your practice have changed during first 16 weeks?’ The surveys were voluntary and anonymous, and the course registration process includes a disclaimer that student survey data may be used in our ongoing research into the effectiveness of the course.

It should be noted that the analysis took place in two phases. Initially, the July survey was analysed and coded, and themes and constructs were identified. When the November survey was undertaken the same set of themes and constructs were used as a starting point for the analysis.

Figure 2. Research model



The data was analysed to see to what extent the constructs and themes from the first survey were supported or altered by the second survey.

To provide some comparative framework for assessing the changes in practice of our students, we have adopted the teacher-focused components of the e-Learning Planning Framework, developed by the Te Toi Tupu Consortium on behalf of the New Zealand Ministry of Education (Te Toi Tupu Consortium, 2014.) This is a tool designed to help schools and teachers reflect on, and evaluate, their e-learning capability. The framework describes five phases that schools and teachers might pass through as they work towards integrating and embedding e-Learning; pre-emerging, emerging, engaging, extending and empowering. Broadly, from a teacher's perspective, these phases encapsulate a journey moving from the preparatory stages of using e-learning to creating an innovative learning community (Figure 3) As the figure indicates, an important change in perception is required for teachers to move through these stages, so that instead of decisions being driven by technology, they are driven by curriculum learning needs. The assessment process within the course links closely with the stages outlined at the bottom of this figure, beginning with preparation and planning, then trialling, followed by transforming practice and ultimately innovating, enquiring and reflecting as a community. Given the stage of the course at which the surveys were administered, we were focusing on gathering evidence of establishing digital technology use within the curriculum and transforming practice (the 'engaging' and 'extending' phases of the framework.)

RESULTS

Our results are based on an analysis in NVivo of free text data, coded using emergent themes (developed from repeated ideas) and subsequently gathered together under more abstract constructs (Auerbach & Silverstein, 2003.) Figure 4 shows a chart of the core constructs that emerged from this analysis (the themes within these constructs are presented later.) Following a simple content analysis of repeating ideas, this figure shows the numbers of responses under each of these constructs. The actual numbers from each survey are shown in Table 1. Responses focused substantially on how respondents believed they were transforming their teaching and

Figure 3. The five phases of the e-learning planning framework (adapted from Te Toi Tupu Consortium, 2014)

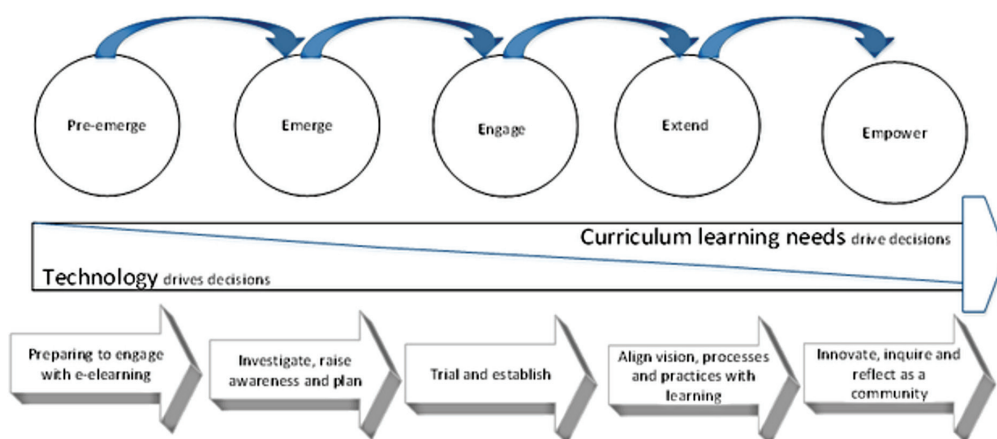


Figure 4. Core constructs that emerged from the analysis

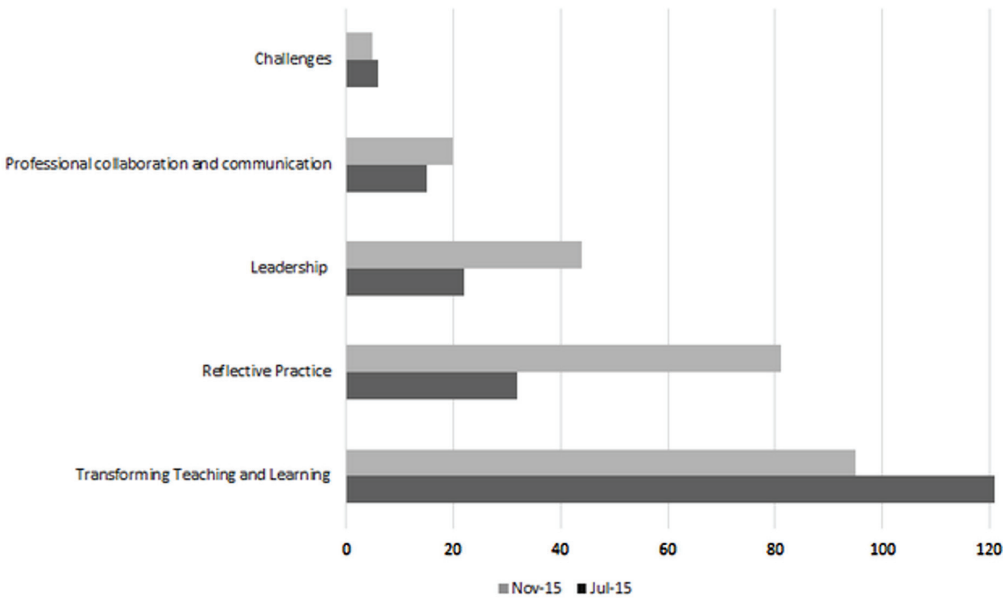


Table 1. Numbers of coded responses to core constructs that emerged from the analysis

Constructs	Repeated Ideas (July 2015)	Repeated Ideas (November 2015)
Transforming Teaching and Learning	121	95
Reflective Practice	32	81
Leadership	22	44
Professional collaboration and communication	15	20
Challenges	6	5
TOTAL	191	245

learning in their classrooms and schools. In identifying what aspects of applied practice are evident in examples of transformation, the responses made clear that a move towards greater self-reflection was important, and that professional interactions, including leadership skills, were significant components in the transformation process. Although a small number of challenges were identified, these were very few in terms of the overall responses. Whilst the general pattern of responses was quite consistent between the two surveys, there was a greater emphasis on reflective practice and leadership in the later cohort. We believe that this is a result of changes to the course content made between the two surveys to give greater coverage to these factors.

Transforming Teaching and Learning

The major construct that emerged from the analysis was that of transforming teaching and learning. Figure 5 shows the themes that were identified within the data under this construct, suggesting a chain of relationships.

Simply put, the use of digital tools in the classroom enabled changes in teaching practice, including both what was taught (for example a greater range of skills) and how it was assessed. This led to changes in the learning activities of students, with more collaborative, individualised and inquiry based learning. Although outcomes were not specifically asked for in the original survey question, a few responses claimed an increase in student motivation or even knowledge as a result of changes in teaching and learning. Table 2 shows the number of repeating ideas in each theme.

Changes in the use of digital media encompass a broad range of tools and contexts. Being introduced to these tools on the course enables many of the teachers to explore these with their own classes.

Increase of technology use in the classroom in many areas I had not yet investigated yet. This sparked a lot of new trials/experiences/experiments.

The introduction of digital tools however has not taken place in a vacuum. These are always contextualised in the course, and subsequently in the classroom, in terms of changing pedagogy to take full advantage of technology.

I now use digital tools with all my classes and have rewritten an entire course based on the philosophies of this course.

Figure 5. Themes and relationships in the ‘transforming teaching and learning’ construct

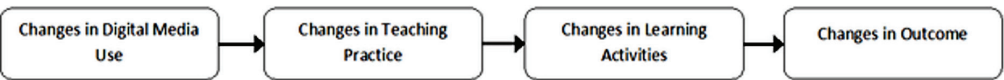


Table 2. Themes in the Transforming Teaching and Learning construct

Construct and Themes	Repeated Ideas (July 2015)	Repeated Ideas (November 2015)
Transforming Teaching and Learning	121	95
Changes in digital media use	37	29
Changes in teaching practice	54	39
Changes in learning activities	21	25
Changes in outcomes	4	1

My classroom runs totally differently to what it did at the beginning of the year. I have learnt heaps and my students are loving taking control of their learning.

As a result of these changes in technology and practice, the learning activities of the students have also evolved.

My relationships with my students have undergone a change. One specific change is the degree to which I promote independent learning at all year levels.

I gave students more responsibility in driving the digital aspect of their learning. I was amazed at what they discovered if I let them engage and explore more on their own terms.

Ultimately, a small number of teachers noted what they perceived as changes in outcome, in terms of motivation and even achievement (though this is just an unverified perception).

The boys have higher levels of engagement and are choosing to continue projects at home!:))

The biggest change is the positive impact of using Kahoot in my class on student achievement.

Reflective Practice

In the 'reflective practice' construct, the key themes were that embarking on a process of reflective practice led to more personal use and understanding of digital technologies, which fostered greater independence and insights into the role of these technologies in teaching and learning. This led to greater confidence in the classroom, enabling changes in practice (Figure 6).

Perhaps the most interesting aspect of this construct was the difference in themes between the first and second survey (Table 3). In the November survey, strong themes emerged in appreciation of 21st century skills, and research informed practice, which did not emerge as themes in the July analysis. This directly reflects changes made in the course curriculum between these two cohorts.

Figure 6. Themes and relationships in the 'reflective practice' category

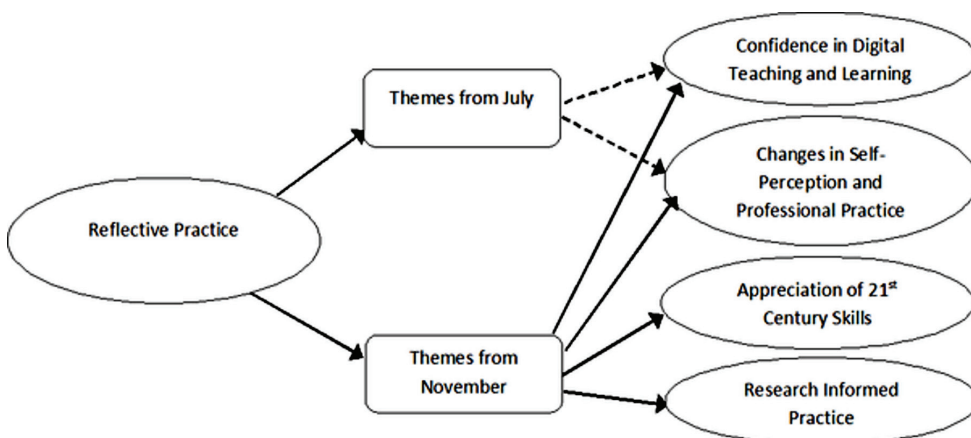


Table 3. Themes in the reflective practice construct

Construct and Themes	Repeated Ideas (July 2015)	Repeated Ideas (November 2015)
Reflective Practice	32	81
Appreciation of 21st century skills	0	14
Changes in self-perception and professional practice	26	46
Confidence in digital teaching and learning	6	12
Research informed practice	1	10

The beginning of the reflective journey starts with the context knowledge of digital tools and skills, supported by leadership insights.

A lot of thinking about which 'tool' suits my lesson. A lot of thinking about pros and cons of digital tools available.

I am more reflective in my practice, this course has caused me to think more about what I am doing, especially my leadership.

Once this thinking is applied in the classroom, the potential affordances of digital tools in teaching and learning can lead to classroom transformation.

Increasingly able to individualise learning where appropriate as well as teach a wider range of collaborative and thinking skills.

I use more technology in the classroom and find myself thinking very deeply about what I am doing in school and why. My entire pedagogy has been turned on its head and I am questioning everything.

Ultimately changes in self-perception can lead to personal transformation, as well as changes in professional practice.

I've become more open minded and question my practice...why am I doing what I am? what's its purpose?

I am generally a more awesome human being professionally, and less of a pain in the arse to those around me, which is a good thing for everyone.

The appreciation of 21st century skills centred on the way that these can be specifically used to direct teaching and learning.

Clarity about 21st century teaching and learning and about digital tools and how can I utilise them in class. It has helped me to change my mind set.

Research informed practice has helped guide teachers to change their practice through an awareness of wider sources than their own intuition and experience.

I have reflected on technological tools and approached them from a research base rather than a gut-feel approach.

Leadership

In the leadership construct, few explicit themes were identified. Most responses mapped to aspects of seeing oneself as a leader, based upon an awareness of leadership styles and theories and how they might be applied, thus being able to lead new initiatives in school (Figure 7).

Table 4 shows that the dominant theme was seeing oneself as a leader, while awareness of leadership styles and theories increased in the November survey, reflecting a change in emphasis in the course curriculum towards more coverage of leadership theory.

The first step to leadership is reflecting on professional practice through leadership eyes, with an awareness of theory regarding leadership styles.

Much more clarity, reflection and focus on the way my leadership is operating on a day-to-day basis.

I look at things now with leadership eyes.

This path towards seeing oneself as a leader opens up opportunities to consider how leadership theory might work in practice.

I see myself as a leader but I didn't before and I'm watching for ways in which I can influence school.

Figure 7. Themes and relationships in the 'leadership' category



Table 4. Themes in the Leadership construct

Construct and Themes	Repeated Ideas (July 2015)	Repeated Ideas (November 2015)
Leadership	22	44
Seeing oneself as a leader	13	22
Awareness/application of leadership styles	8	18
Leading new initiatives in school	1	4

I am becoming a more reflective leader in my team and I am asking myself if I am being transformational or not every day, and how I can do things differently.

The end of this process is putting these leadership skills and reflections into practice.

Spearheading a new collaborative practice initiative in the school.

Professional Collaboration and Communication

In exploring the themes within the ‘professional collaboration and communication’ construct we could see that the teachers were developing their connections both within school structures and beyond. Being better able to communicate with colleagues was leading to more collaboration, and other staff were being encouraged to reflect on, or change, their own practice (Figure 8). There is an important distinction here between encouraging other staff (cooperation) and collaboration, as discussed earlier.

Table 5 shows a greater degree of collaboration with colleagues in the November survey, which may reflect an increase in opportunities for group work in the assessments.

We found that teacher agency within school structures was stronger, with our respondents becoming more aware of the needs of their colleagues and improving communication with them.

Figure 8. Themes and relationships in the ‘professional collaboration and communication’ category

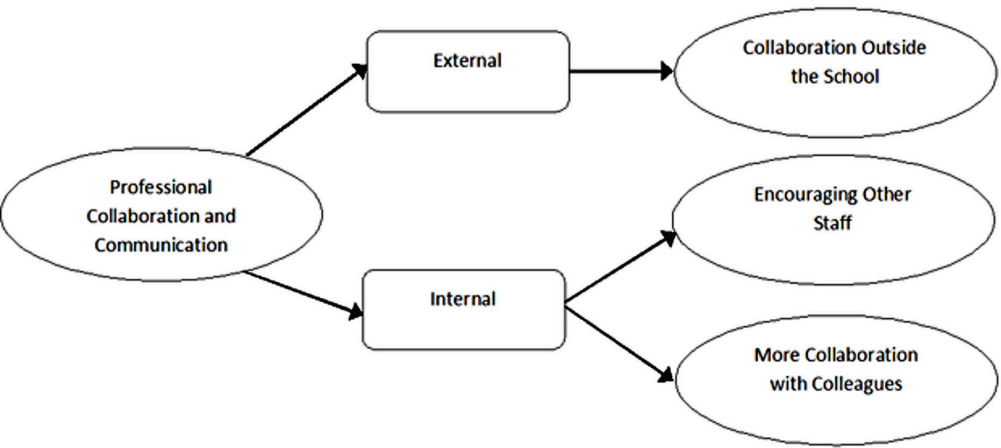


Table 5. Themes in the professional collaboration and communication construct

Construct and Themes	Repeated Ideas (July 2015)	Repeated Ideas (November 2015)
Professional collaboration and communication	15	20
External structures: collaboration outside the school	3	4
Internal structures: encouraging other staff	6	1
Internal structures: more collaboration with colleagues	2	15

I think I communicate with staff better and gather evidence about what they need rather than making assumptions or relying on conversations with few.

These changes enable teachers to positively influence their colleagues.

More thoughtful and informed collaboration with colleagues.

I've changed the way I schedule and run my syndicate meetings to be more transformational and I'm running techie brekkies that meet the needs of my colleagues.

Increased agency leads to impacts on both structures and cultural practices.

Our school culture has changed, my colleagues and I are having more professional discussions. I am also more proactive at staff meetings and am keen to be a little disruptive with how we do things at school.

Beyond the school gates, there was better communication with parents, and collaboration with other teachers.

I've also improved my communication with parents.

Collaboration with teachers outside of my school.

Challenges

The challenges that were identified by some of the participants were few in number but fell under the themes of personal agency and institutional barriers (Table 6). The latter were mostly related to the school structures within which the teachers were working, such as having large classes, poor wireless infrastructure and resistance from colleagues, though there were some comments about the nature and scale of the course assessment. Both the schools and the course apply workload pressures. It should be noted however that these themes were based on isolated responses, and as such they do not warrant further elaboration.

The identification of these challenges as being centred around the course and the school provide additional support for historical research positing the hypothesis that two of the critical factors involved in successful integration of technology into the curriculum are the attitude and skills of the teacher and the quality of school management (Veen, 1994; Ten Brummelhuis, 1995; Ely, 1999; Mooij & Smeets, 2001). That some teachers should be encountering these same

Table 6. Themes and relationships in the 'challenges' construct

Construct and Themes	Repeated Ideas (July 2015)	Repeated Ideas (November 2015)
Challenges	6	5
Personal agency	4	3
Institutional barriers	2	2

particular perceived challenges after twenty years of integrating technology into the school curriculum should give us cause for reflection, if not concern.

DISCUSSION

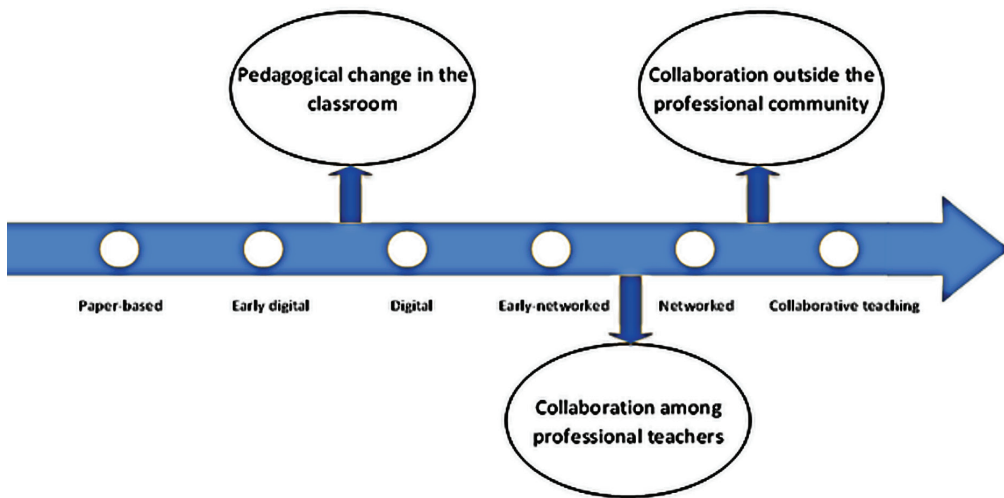
Recalling our main research question, to what extent the course has impacted on the applied practice of the participants, our results reveal a range of responses from relatively small impacts to major transformations. It is possible to see that the teachers' responses to the survey can be mapped to the five phases of the e-Learning Planning Framework (Te Toi Tupu Consortium, 2014) from the teacher perspective (Table 7).

As teachers participate in the postgraduate course, they are exposed to a range of practical digital and collaborative tools that they take back to their classrooms and implement. As teachers learn about what is possible, and experiment with digital technologies in the initial stages of the course, they are moving from the pre-emerging to the emerging phase as described in the e-Learning Planning Framework. Teachers report that further trialling of digital technologies, as the course and their own professional learning progresses, leads to changes in their teaching practice, in terms of adapting the content that is taught and the modes of assessment used. In turn this leads to more collaborative, personalised and inquiry-based learning experiences being designed for learners. These higher-order activities fit well within the engaging phase. Some teachers report shifting their practice and pedagogy in such a substantial way that it is possible they work in the extending phase, where teachers begin to collaborate with students to use digital technologies appropriately to support authentic, higher order, co-constructed learning. The shift that is required here to support this is moving from a teacher-centric, technology as substitute, level to a learner-centric, technology as a tool to enable activities that were not previously possible. The various responses of the teachers to the surveys indicate that we had members of the cohorts at different stages of their journey through the continuum, but the themes in transforming teaching and learning (Table 2) indicate that a majority of them were within the engaging or extending phases.

Our first research sub-question, regarding what aspects of applied practice are evident in examples of transformation, shows some interesting similarities with Lee & Ward's (2013) 'side journeys' on the way to collaborative teaching (Figure 9). While our respondents report being increasingly digital and networked, we also see significant pedagogical change in the classroom and collaboration among professional teachers, though we saw limited evidence of collaboration outside the professional community or collaborative teaching. Our findings also reflect those of

Table 7. Descriptions of the five phases of the e-learning planning framework

Pre-Emerging	Emerging	Engaging	Extending	Empowering
You need to build awareness of how digital technologies can enable effective learning or what might be possible.	You find out about digital technologies, and supplement teacher-directed, lower-order (surface) approaches of teaching	You trial and begin to use digital technologies appropriately to support higher-order (deep), collaborative teaching and learning.	You begin to collaborate with students to use digital technologies appropriately to support authentic, higher order, co-constructed learning.	You work collaboratively alongside students to create personalised, higher-order, real-world learning.

Figure 9. Side journeys on the way to collaborative teaching (adapted from Lee & Ward 2013)

Archambault, Wetzel, Foulger & Williams (2010) in that the majority of the respondents found themselves changing their classroom role, in a significant number of cases to that of facilitator.

To our final sub question, what negative forces have been encountered that may inhibit changes in practice, we can clearly state that these forces have been few and far between. Only a small minority of our respondents reported issues within their schools. Nevertheless, these cannot be ignored and we should seek to at least address issues of personal agency over which we have influence.

CONCLUSION AND FUTURE WORK

In this article, we have investigated how a digital and collaborative teaching and learning programme has impacted on teachers' practice, self-reflection and leadership skills. Results from two on-line surveys, gathering free text responses from teachers regarding how their classroom practice has changed during the first part of the course, indicate that the main focus of change is the transformation of teaching and learning, followed by reflective practice, leadership and professional collaboration and communication. Thus the answer to our main research question, asking whether the course had impacted on the teachers transforming their approach to teaching and learning, has been answered positively. The results from the study indicate that the majority of teachers can be categorised as being in the 'engaging' or 'extending' phases of the e-Learning Planning Framework (Te Toi Tupu Consortium, 2014.) In addition, many teachers were engaging in 'side journeys' on the way to collaborative teaching, through pedagogical change and collaboration (Lee & Ward 2013.) Regarding the sub-questions about what aspects of applied practice are evident in examples of transformation, themes in the data focused not just on pedagogy but on changing roles to become more leadership focus and building more extensive professional networks. To our final question, what negative forces have been encountered that may inhibit changes in practice, we found very few, but those that were reported focused on the difficulties some individuals have to enact change within resistant institutional restrictions. Whilst we acknowledge that the course needs to constantly evolve and improve, these results indicate that it

is meeting its main objectives of enabling teachers to change their practice towards more digital and collaborative pedagogy.

There are a number of limitations to this study. To mitigate any ethical risk, respondents were self-selecting and anonymous, and were not required to measure student outcomes, only to report on their own perceptions. Only a single method (online surveys) was used, limiting triangulation to consistency of constructs and themes between multiple surveys. A more in-depth study might use additional methods such as interviews, focus groups and relevant empirical measures of outcome.

Notwithstanding these limitations, results so far indicate that the course has been successfully addressing its mission of empowering and enabling teachers to understand how to transform their practice and that of their pupils and colleagues. The consequent question is whether there is a correlation between changes in teachers' practice and improvement in learners' outcomes. In future work, we will need to investigate whether the new pedagogies adopted by our graduates as a result of the programme have led to improvements in student outcomes, and what other impacts may be felt in the structures and cultural practices within which they operate, as a result of their agency. To this end, a longitudinal study is planned.

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