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A case study of blended teaching and learning in a New Zealand secondary school, using an ecological framework

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Abstract

This paper reports on the findings of a case study that investigated how blended teaching and learning was implemented in a New Zealand secondary school. An ecological perspective was taken to clarify the complexity of blended teaching and learning implementation by researching the roles of students, teachers, school leaders and other educational stakeholders, in and beyond the school. An ecological framework was developed that gives rise to several recommendations for individuals and groups within the three levels of the school's multi-level ecology: the classroom, the school, and the wider ecosystem in which the school is located.

Keywords: e-learning; blended learning; school education

Introduction

Schools all around the world are increasingly using blended approaches that combine online and face-to-face teaching and learning (Horn & Staker, 2011). In New Zealand, where school and home access to Ultra-Fast Broadband (UFB) keeps increasing with the government's UFB and Ultra-Fast Broadband in Schools (UFBiS) initiative, schools have the opportunity to benefit from a range of blended learning opportunities. Students in over 250 schools across the country can enrol in distance courses that are enabled by the Virtual Learning Network (VLN), in addition to the face-to-face courses that their schools offer (Barbour, Davis, & Wenmoth, 2011; Bolstad & Lin, 2009). Students in these courses experience blended distance learning because their VLN courses combine online distance learning through video conference (VC) with their e-teacher, and asynchronous online learning at their school (or home) with the support of an onsite facilitator who is often called the e-dean. This type of learning fits with Horn and Staker's (2011) description of the Online Lab model, where students, in addition to their face-to-face courses, can enrol in courses where they are taught entirely online by an online teacher, with the onsite assistance of an adult facilitator.

At the same time, another blended approach has been developing in New Zealand. In this approach, teachers implement online content to enhance their face-to-face classes, enabling students to experience blended web-enhanced learning.

Research on blended teaching and learning

Research indicates that blended approaches involve a range of advantages for students including, but not limited to, increased flexibility (Pratt & Trewern, 2011; Parkes, Zaka, & Davis, 2011), student engagement and motivation (Barbour & Reeves, 2009; Wang & Reeves, 2006), development of independent learning (Bolstad & Lin, 2009; Parkes et al., 2011) and new ICT skills (O'Dwyer, Carey, & Kleiman, 2007; Tunison & Noonan, 2001). Most importantly, e-learning, including blended approaches, is regarded as a means for educational reform, modernisation of schools, and increased access to a world-class education (Powell & Barbour, 2011).

However, the effective implementation of blended approaches is a complex process, especially when aiming for educational change rather than supplementing traditional practices (Davis, 2008). Research indicates that some of the main challenges that emerge are linked to students and their readiness to learn in a blended environment (Wright, 2010; Bolstad & Lin, 2009; O'Dwyer et al., 2007), teachers and their commitment and capability to effectively teach through blended approaches (Frailich, Kesner, & Hofstein, 2007; Mupinga, 2005; Parkes et al., 2011), and school leaders and their provision of adequate support to teachers and students (Lee, 2006; Parkes et al., 2011; Stevens, 2011).

Given the growth of blended teaching and learning in New Zealand and internationally (Horn & Staker, 2011) and the complexity of educational change as a result of Information and Communication Technologies (ICT), it is apparent that there is a need for further research on the use of blended approaches in schools and the implications for key stakeholders to inform professional and organisational development. In New Zealand in particular, further research is needed at a time when the government is implementing UFBiS, and the need to increase flexible learning opportunities becomes more and more important, especially in light of disruptions caused by natural hazards in the last 3 years (i.e. Canterbury earthquakes, 2010–2011) (Parkes et al., 2011).

Methodology

In 2011 a case study was carried out to provide a rich and in-depth description of the use of blended teaching and learning in one New Zealand secondary school. Case studies allow for collection of rich descriptive data that are highly relevant to reality, therefore providing "a natural basis for generalization" (Cohen, Manion, & Morrison, 2007, p. 256).

The case study, which was part of the author's Master of Education research (Zaka, 2012), aimed to answer the main question: *How is blended teaching and learning implemented in a rural New Zealand secondary school?* This question included four sub-questions (see Appendix 1). In this article, in addition to the main question, the focus is on the fourth sub-question: *What are the implications of implementing blended teaching and learning for students, teachers, school leaders and other educational stakeholders?*

Before this case study, a pilot study was carried out in a New Zealand urban high school (see Parkes et al., 2011). The pilot study provided advance evidence of potential challenges during the research process and enabled the researcher to test the appropriateness of the data collection methods (Teijlingen & Hundley, 2002).

Informed by the case study designs described by Yin (1994), the research investigated blended teaching and learning at one high-decile rural secondary school (Years 7–13; approximately 750 students; 60 teaching staff) (main case). This school was one of the early adopters of blended approaches within its e-learning cluster, CantaNet. The school's vision was to enable students to become engaged and independent learners. Using blended teaching and learning in the form of

blended web-enhanced or blended distance approaches was seen as a way to achieve this vision. Within this main case there is also an embedded case of a class in which blended approaches were used. Table 1 provides an overview of the research participants and their key characteristics.

Table 1 Participants and their key characteristics

Participant	Key characteristics
CantaNet e-principal	• A strong supporter of blended approaches and networked learning, supported by the development of a regional ICT PD cluster and its BLP, in collaboration with WestNet and the University of Canterbury. • Based at this school as a teacher, teaching through the VLN.
School principal	• Encouraging teacher experimentation with a variety of online tools, acknowledging the potential of blended approaches to enhance the school's vision for engaged and independent student learning. • Member of the rural e-learning cluster committee.
Teacher 1	• Teaching Level 3 Physics through blended distance approaches. • School's e-dean. • One of the first teachers to teach through the VLN in this school.
Teacher 2	• Blended distance course e-teacher and blended web-enhanced course teacher. The year of the study was her second year of teaching a blended distance course for Year 11 French language students.
Teacher 3	• Planning to teach a blended web-enhanced course the following year for the first time in his senior Technology class.
Teacher 4	• Blended web-enhanced course teacher, implementing a variety of online tools in her Year 8 class, including e-portfolios, which she implemented for the first time in the year of the study.
Teacher 5	• Blended web-enhanced course teacher, implementing a variety of online tools in her Year 7 face-to-face class for the third year, including e-portfolios, wikis and other Web 2.0 tools.
Teacher 6	• Blended web-enhanced course teacher, using a variety of online tools in his Year 9 form and Science class, including e-portfolios, Moodle and other Web 2.0 tools. • Early adopter of blended approaches in the school, involved in professional development offered by the regional ICT PD cluster.
Students 1–6	• Mixed abilities and skills. • Access to computers and internet from home, sharing a family computer, mainly used for social networking with friends, entertainment and homework. • Using e-portfolios for the first time in the Year 9 form and Science class. Have used other online tools in other classes.

Data collection methods involved:

1. an interview with the e-principal of the school's e-learning cluster, CantaNet
2. two interviews with the school principal
3. individual interviews with six teachers who are using blended approaches in their classes

4. observations in the blended web-enhanced class of the embedded case
5. group interviews with six students from the same class
6. review of documents and web resources.

Grounded theory (Strauss & Corbin, 1990, p. 273) was used for the primary data analysis. Data were analysed using codes and themes, and continuous interrogation was applied to include alternative interpretations and linkages (Coffey & Atkinson, 1996). After the primary analysis, Davis's (2008) ecological framework of change with digital technologies was used for secondary data analysis. Embedding findings of the grounded analysis in this framework enabled the development of a new framework to discuss blended teaching and learning at the school and its implications for students, teachers, school leaders, and other educational stakeholders.

As with any other case study, the findings of this research are grounded in the specific case and therefore have limited generalisability. However, a rich description of the selected case is attempted to enable the reader to generalise for similar contexts.

Key findings

Advantages and challenges

Blended teaching and learning, either in the form of blended web-enhanced or blended distance courses, involved a range of advantages.

Opportunities for independent learning

Blended approaches encouraged student-centred learning. As a result, the students developed independent learning skills that depended on their confidence, maturity, and available support.

> I have noticed an increase of independence when they are working…I don't have to give them specific instructions of what to do. (Teacher 6)

> …it is teaching them to manage themselves, clearly much more than a face-to-face class does. (Teacher 2)

Students' development of new ICT skills

The students developed new ICT skills because they explored a variety of new tools in their classes. Some students taught these skills to their parents who were less familiar with computer use.

> It was six months later and they still remembered how to get in [their e-portfolio] and 'blog' their learning, how to upload their assignments and all those things. (Teacher 5)

> What was challenging for me at the beginning was learning how to work on the computers and how to put photos on there…it's easy for me to do this now. (Student 6)

Increased flexibility and student choice

Flexibility was enhanced for the students because they had extended learning opportunities beyond school hours. This was particularly important when access to the school was limited.

> It's worked quite well. [During the 2011 snowstorms when the school was closed] a few that were keen obviously thought about it, got bored, got online and started doing their learning from home. (Teacher 5)

Student choice was one of the most significant advantages of offering a blended programme that included blended distance courses in addition to face-to-face ones. At the time of the study, approximately ten students from the school were enrolled in blended distance courses, mainly as a result of timetable clashes with face-to-face courses offered at the school.

> My year 11 is actually a video conference class, so I have students from other schools and also two students from this school. (Teacher 2)

More opportunities for interaction

Students in blended web-enhanced courses had more opportunities to interact online or face-to-face with one another. Some students also benefitted from face-to-face collaboration, while supporting or receiving support from other students in their class. Some teacher participants mentioned that some students were developing useful online collaboration and communication skills.

> You got a web chat in the bottom [of your e-portfolio], you can always ask questions. (Student 4)

> The students did enjoy looking at others' e-portfolios and there was some good constructive feedback given by the students to each other. (Teacher 6)

Increased student engagement and motivation

Student engagement and motivation increased for a range of reasons, such as the opportunity to work independently, use multimedia, learn new ICT skills, or showcase their work to others, including their parents.

> …they knew that if they did a really good piece of work, then that piece of work goes on the [class e-portfolio] page. (Teacher 4)

> I like it because it gives me time to do my own stuff. (Student 3)

Encouraging parental involvement

Some students' actions in teaching their parents the new ICT skills they were developing at school resulted in parents being more involved in their learning. Parental involvement also increased because parents could easily access examples of students' work online.

> The internet allows greater connections with parents, the teacher, the school, the students—they see what is going on and evidence of learning getting involved. (e-principal)

> I've recently set up my own pages for parents. I was really surprised how well parents have responded to that. (Teacher 4)

Using blended approaches also raised several challenges.

Limited access issues

Student access to adequate resources at home was a challenge, mainly due to the slow speed of their home internet connection. The school was already responsive to increased resource demands, but as the number of teachers experimenting with blended approaches increased, some teacher participants expressed concern about the current resources and their access to them.

> Kids are on dial up…the difference between dial up and broadband isn't just the speed, it's the way that you use things. (Teacher 6)

> I need to be able to make sure I've got access to the resources, to the computers when I need it. There will be other people needing them… (Teacher 3)

Students' low readiness for blended learning

Students' low readiness to learn in a blended environment was an important challenge, especially in terms of learning independently and confidently, and effectively interacting online, as well as understanding the usefulness of the implemented practices.

> That will depend on the individual, how well they can do this and manage themselves …There are students who can do that, but there are students who struggle with that. (Teacher 3)

> They just don't talk to each other [online] that much really (Teacher 1)

Capacity building among teachers

The potential to build capacity among teachers was a challenge at the school, especially in terms of using teaching in a blended environment with adequate pedagogical foundations. This challenge encompassed increased time demands, some teachers' attitudes towards blended teaching and learning, and pedagogical approaches that needed to change to teach in a blended environment.

> It's good to have the e-portfolio pages with the kids…but are they going to be able to continue next year? It depends on who the teacher is. (Teacher 4)

> I think that I kind of found my personal approach and techniques in my face-to-face class, but I don't feel that I'm still that comfortable with the video conference. (Teacher 2)

Parental support

Despite increased parental involvement in student learning as a result of blended approaches, some teachers experienced limited support from parents. Teachers explained that this issue often occurred because of parents' limited knowledge of how blended approaches could support student learning.

> A lot of parents contacted me thinking [students' online activities] are games. (Teacher 4)

> [My parents] don't like the fact that it's all going on to computers. Because if your computer breaks down or something, everything is gone. (Student 2)

Usability of tools

Most participants noted that, despite the affordances of blended learning, some usability challenges prevent them from effectively using online tools. This also challenged the goal of seamless blend of online tools with face-to-face teaching and learning.

> There is a huge amount [online tools] can do, but the different tools don't necessarily interact that well together. (School principal)

> [One student] said "Facebook is way easier than this [e-portfolio]". Made me think that he was probably right. (Teacher 6)

An ecological perspective

Taking an ecological perspective, Davis (2008) presented a framework that shows the many varieties of stakeholders and their organisations that hold important roles in the process of change with ICT in schools. Teachers "are the keystone species in the educational ecologies of the twenty-first century world" (Davis, 2008, p. 517), but the whole school ecology (including individual teachers, students and school leaders) is also affected by a range of external organisations (professional, bureaucratic, political, commercial/Open Educational Resources [OER]).

Embedding the findings of this study in Davis' (2008) ecological framework illustrates the complexity of educational change with blended approaches and the multiple connected threads affecting and being affected by the process of change. Figure 1 presents a view of the school ecology and the multiple organisations and stakeholders that affect/are affected by the development of blended teaching and learning at the school. The framework is also informed by

Fullan and Stiegelbauer's (1991) model on the meaning of educational change that acknowledges multiple change agents.

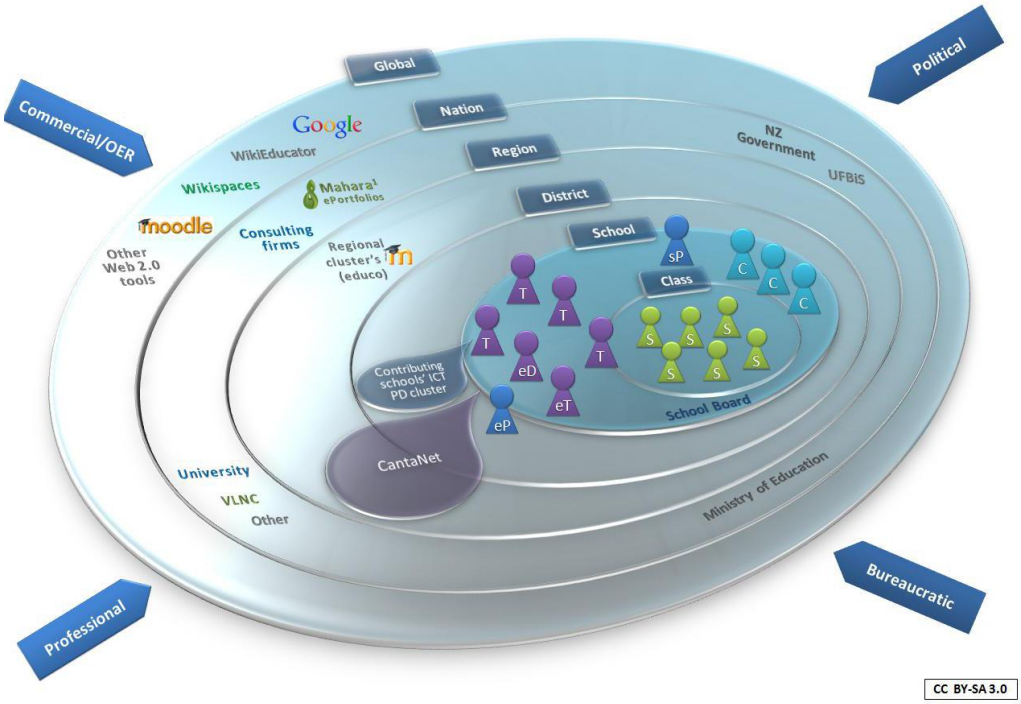

Figure 1 Davis, Eickelman, and Zaka (in press), adapted from Zaka (2012)

The class in which blended teaching and learning is implemented is at the centre of the figure. The students and the teacher (or e-teacher, in the case of courses through the VLN) are in the centre, affecting/being affected by the implementation of blended approaches. This class is positioned within the rural secondary school, where there are additional teachers/e-teachers (one of whom is also the e-dean) the school principal, as well as parents/community, who also have an effect on the development of blended approaches at the school. The school is placed in a wider context, where professional organisations, such as the rural e-learning cluster, the regional ICT PD cluster, and the VLN and its community of schools are also part of the school's ecology. Bureaucratic organisations (such as the Ministry of Education), political organisations (such as the New Zealand government), and commercial/OER organisations also affect the school's ecology.

The ways in which organisations and stakeholders are interrelated is now described, beginning from the class and then moving out towards stakeholders and organisations in the outer ecosystems in which the school is located.

The student

The findings in this study suggest that blended approaches had a direct effect on students' learning experiences, because they benefited from a range of advantages (as presented earlier) such as opportunities for independent learning, increased engagement and motivation, flexibility and student choice.

In addition to being affected by blended approaches, students also had an effect on the uptake and effectiveness of blended teaching and learning. Fullan and Stiegelbauer (1991) argue that students are members of the school as an organisation and are therefore important stakeholders in the change process.

Students' attitudes and expectations to use blended learning in their classes contributed to the development of blended teaching and learning at the school. As the school principal explained:

> …they'll talk to their friends, the friends talk to the teacher, the parents talk to them. So you build up kind of a 'moral pressure' almost to make changes and to get things happening. (School principal)

The students' role was also important in encouraging parental involvement in their learning. Some students' actions in teaching their parents new ICT skills led to involving the parents more in their learning. However, there was not enough evidence to further indicate students' effect on parental involvement.

Student readiness to learn in a blended environment also had a direct effect on the implementation of blended approaches, as discussed earlier. Such difficulties mainly related to the students' low confidence in learning independently during their self-study, either at school or from home. For example, one of the students commented:

> I always double-check with the teacher…because you may understand it but not be sure if that's the right task—that's probably the problem that I get sometimes. (Student 5)

This not only illustrates the importance of the effect of individual students on how blended teaching and learning is implemented, but also indicates the direct implications for teachers and parents who need to provide students with adequate support, as discussed in the following section.

The teacher

The teacher, the keystone species in the education ecosystem (Zhao & Frank, 2003; Davis, 2008), has one of the most important roles in change with blended approaches because "educational change depends on what teachers do and think" (Fullan & Stiegelbauer, 1991, p. 117).

The teachers in this study enriched their teaching with a variety of resources, depending on their confidence to experiment with blended approaches. Teachers' use of online tools varied from incorporating simple Web 2.0 tools in their face-to-face classes, to implementing digital portfolios, online learning environments, and VC tools. Some teacher participants and students shared their concerns about other teachers' involvement with blended approaches, as the adoption of blended teaching and learning was not yet widespread. For example:

> It would be great if I could pass this [Year 7] class to a class in Year 8 where they would have such an ICT-rich environment. (Teacher 5)

Blended teaching changed the role of teachers, who were encouraged to move away from their traditional role towards facilitating student-centred learning. As the school principal explained, the degree of change depended on teachers' attitudes and their curriculum area, confirming that teachers are not only affected, but also have an effect on change with blended approaches.

> You are trying to change peoples' ways of doing things and…teachers are remarkably resilient as a group to big changes. (School principal)

Teachers needed to be adequately prepared to effectively support students who were learning in a blended environment. However, teacher participants explained that capacity building, including learning how to effectively implement blended approaches and supporting students, was one of their biggest challenges. For example, teacher participants commented that they were willing to walk the extra mile, but some also shared their concerns about the need for effective professional development in conjunction with increased time demands and busy workloads. Of course, this

further affects the decisions of school leaders and other educational stakeholders who have to address teachers' increased need for professional development, as discussed later.

Teachers were encouraged to engage in self-directed professional development, often led by themselves in communities of practice. They formed formal or informal interest groups and worked together to develop their knowledge and skills, sharing their experiences and suggestions. For example:

> We do have three teachers here that are teaching through VC, so we talk to each other. I know for example our e-dean is always more than happy to help. (Teacher 2)

The attitudes and willingness of the teaching staff to engage in this form of professional development affected their and other teachers' capacity building. For example, Teacher 6 shared the enthusiasm and knowledge he was developing through the regional BLP with other staff at the school and with colleagues from other schools involved in the regional BLP. The school principal explained that:

> …the things that [Teacher 6] is picking up and learning and developing with the blended learning, sort of come through with his enthusiasm and his support for people implementing LMSs like Moodle. (School principal)

Of course, the role of school leadership in encouraging a supportive culture is essential, as discussed in the following section.

The school principal

Outside the classroom, Fullan and Stiegelbauer (1991) argue that educational change depends not only on teachers' attitudes and practices, but also on the school leadership team.

Based on his experience with different schools across the cluster, the e-principal of CantaNet commented that, regardless of what teachers do, school leadership is essential in supporting teachers and stimulating change with blended approaches. He explained that school principals' attitudes towards change varied in schools across the cluster.

> We might have teachers doing innovative things but without leadership [there will not be change]—and that's where the main challenge is. (e-principal)

In this school, the principal had a very positive attitude to blended teaching and learning, acknowledging the importance of effective pedagogy rather than the use of ICT as an end in itself.

> Our focus is not that various ICT and online tools are the answer, but they are just a tool. At the base you still need to have good teaching. (School principal)

The principal encouraged experimentation with new tools depending on teachers' and students' needs, and encouraged teachers to create their own professional development groups (e.g. Moodle professional development [PD] group, e-portfolio PD group).

> …all the teachers have a key goal that they choose themselves…We haven't at this point put any restrictions. (School principal)

The school principal also acknowledged the importance of sharing skills and knowledge, not only among teachers at the same school, but also among teachers from different schools. He supported the school's involvement in the regional ICT PD cluster and the BLP, and the school's active participation in the contributing school's ICT PD cluster and its Digital Citizenship project.

The role of the school leadership was also very important in providing teachers and students with adequate infrastructure to support blended teaching and learning. As discussed earlier, the school was already responsive to increased resource demands and was planning to further improve the available infrastructure. The school also planned to move towards a Bring Your Own Device (BYOD) policy to make the blend of online and face-to-face teaching more seamless. Of course, the availability of resources at the school also depended on other factors (e.g. internet speed, cost of resources, funding), as discussed later.

The parents/community

Fullan and Stiegelbauer (1991) argue that, although parents/community are important stakeholders affecting educational reform, their role "has been both sadly neglected and underestimated" (p. 246).

In this study, the school principal explained that there is often a driver from parents who, when they have seen the benefits of blended learning in one class, expect their children to experience blended learning in more classes. However, based on his observations in schools across the cluster, the e-principal commented parents often slow down the rate of change to using blended approaches because it does not correspond with their expectations of schooling:

> There's also parents' expectations of school and what it is like, it's their own experience of it, so there's a real challenge there as well. (e-principal)

Some teacher participants confirmed that some parents' traditional views of education prevented them from understanding the rationale behind implementing blended approaches. This had implications for students, who needed support from their parents at home as well as access to adequate infrastructure.

> I've got about five students in my class at the moment who are not allowed to use the computers at home, because their parents fear that they use them too much. (Teacher 5)

However, the e-principal talked about the potential of blended approaches to change parents' attitudes by strengthening home–school connections and parental involvement. Although this was not reported by the majority of teacher participants, Teacher 4 confirmed:

> I've recently set up my own pages for parents. I was really surprised how well parents have responded to that. (Teacher 4)

The parental role was also important in ensuring that students had adequate access to computers and internet from home. Most students had access to only dial-up internet and, because they were living in a rural area, it may not have been possible to provide students with high internet speed. This illustrates the further implications for other key organisations, as discussed in the following section.

Professional, bureaucratic, commercial and political organisations

Outside the school context, **professional** organisations in the school's district and wider region (such as the rural e-learning cluster [CantaNet], the regional ICT PD cluster, and the contributing schools' ICT PD cluster), affected the development of blended teaching and learning at the school. The e-principal talked about CantaNet's approach and vision to change school structures with blended approaches and to encourage personalised and networked learning. The cluster has employed several approaches to support this vision and effect on teachers' and school leaders' attitudes, including the development of the regional ICT PD cluster in collaboration with WestNet and the University of Canterbury, involving more than 30 schools in the region, providing professional development through the BLP. The school principal shared that:

> The impact [of the BLP] has been more related to the fact that the teacher who was doing it also serves as an ICT expert at the school. (School principal)

The school was also involved in the contributing schools' ICT PD cluster, where teachers and school leaders from the involved schools collaborated and supported one another to implement blended approaches, while also aiming to develop a digital citizenship curriculum for the students in primary and secondary schools in the area.

The ICT PD initiative was funded by the New Zealand Ministry of Education, a **bureaucratic** organisation. The initiative enables schools across the country to connect, share and develop teachers' and school leaders' professional learning. However, both the e-principal and the school principal commented that the year after this study would be the last year of funding from the Ministry of Education for the ICT PD clusters. The e-principal expressed his concerns:

> The challenge will be when that funding finishes—how can we continue that? Because resourcing and funding are always the big problems and challenges with schools. (e-principal)

The school's involvement in the VLN, also managed by the New Zealand Ministry of Education, changed the way students learned by providing them with opportunities to enrol in blended distance courses, in addition to face-to-face courses at their school, at the same time encouraging teachers to experiment with new tools in their face-to-face courses. For example, many teachers from the school engaged in professional development on using Moodle in the face-to-face classroom. This training was developed as a result of the school's involvement in the VLN.

The effect of **commercial/OER** organisations was also evident in this study, because the availability of tools affected participants' attitudes and practices. The school principal explained that teachers were experimenting with tools in their classes as more became available, developing their skills and confidence at the same time. Some of these tools encouraged the use of student-centred approaches in the class, which had a direct effect on teachers' pedagogy, while others encouraged the strengthening of home–school relationships (e.g. VLN e-portfolio by Mahara), improvement of students' quality of work (e.g. various Web 2.0 tools, such as Voicethread, Animoto) as well as connectedness and collaboration between schools (e.g. regional cluster's Moodle, VLN portfolio by Mahara).

Participants talked about the importance of increasing the ease of use and compatibility of online tools, indicating further implications for commercial/OER organisations in improving these aspects:

> I am looking forward to a time when the usability is easy, the reliability to pull together different things and they work together quite nicely. (School principal)

The effect of commercial/OER organisations was also evident considering the costs incurred by schools to provide adequate access to resources. The cost of updating and sustaining the infrastructure was mentioned by the school principal as a factor affecting change. He contended that, as portable devices become more affordable, it will be easier for the school to encourage students to bring their own digital devices to class.

Finally, most adult participants talked about the challenge of limited access to the internet, either at school or from home, as a consequence of being in a rural area. Participants in this study expect that the New Zealand government's UFB initiative will address this issue, indicating the important role of **political** organisations in the process of change:

> Once we all get to fibre and start giving some capacity building in terms of the online side of things, I think that will make real change. (e-principal)

Conclusions and recommendations

This case study illustrates the complexity of educational change with blended teaching and learning that involves many contributing factors, in and beyond the school. The role of the teacher as the keystone species in the educational ecosystem is acknowledged (Zhao & Frank, 2003; Davis, 2008), but the study also identifies the roles of other stakeholders such as school leaders, students, parents/community and individuals involved in professional, bureaucratic, commercial/OER and political organisations.

The findings correspond with existing research literature and give rise to several recommendations that can inform professional and organisational development. Three main categories are used to group these recommendations, addressing individuals in the classroom, the school, and the wider ecosystem in which schools are embedded. However, given the methodological limitations of this case study, researching only one school and individuals from within the specific context, the following recommendations need to be taken cautiously.

The classroom

In the classroom context, it is important to develop effective partnerships among teachers, students, and parents. Key recommendations towards achieving this goal include:

Gradual student transition from traditional to independent learning

Although blended learning encouraged students to learn independently, their low readiness to learn in a blended environment was a significant challenge that was found in this case study and also confirmed by other relevant research (e.g. Bolstad & Lin, 2009; Parkes et al., 2011). The teacher's role, or the role of an onsite facilitator, is very important in effectively supporting students to overcome such challenges (Parkes et al., 2011; Pratt & Trewern, 2011; Stevens, 2011). Teachers/onsite facilitators may need to provide more direct support at the beginning and then gradually increase learner control (depending on students' skills and confidence) therefore allowing students to gradually become more familiar with independent learning.

Clear explanation of learning goals and objectives

Student challenges in learning independently, their increased need for more guidance and their difficulties in understanding the usefulness of some implemented practices, were not unexpected in this study. Students often face difficulties in using ICT educationally, as reported by the literature (e.g Wright, 2010; Parkes et al., 2011). The need for student input has been a key recommendation of studies researching student engagement with ICT at school (e.g. Spires, Lee & Turner, 2008). Therefore, ensuring that students have a clear understanding of the learning goals, while at the same time encouraging them to take part in the process of goal setting, is recommended to inform teachers' practices and pedagogy and to enable them to provide students with adequate support.

Interactive parent-teacher communication

Parents' attitudes affected teachers' decisions about blended teaching and learning, as found in this study and also confirmed by the literature (e.g. Wellington, 2005; Luckin et al., 2009), indicating the need for parent–teacher communication. This can be achieved by sharing student learning through online tools that also provide parents with opportunities for input, in order to increase their involvement in student learning (Grant, 2009). This will enhance parents' understanding of the usefulness of the implemented practices, enabling them to provide adequate support to teachers and students. At the same time teachers will be more aware of the implications that blended learning involves for parents to inform the planning of their implemented approaches.

The school

For these partnerships to work in the class, it is also necessary to have a supportive culture within the school itself. This culture includes the following elements.

In-school professional development

Teachers' capacity-building challenges, including increased demands on their time, their attitudes towards blended approaches, and their pedagogical approaches were evident in this study and were also confirmed by the literature (e.g. Parkes et al., 2011; Ward, 2008). Not all teachers in the school were willing to walk the extra mile and experiment with new approaches, but for the teachers who were already using or were interested in blended teaching, engaging in professional development at the school enabled them to support one another and share their ideas and concerns. Providing teachers with in-school professional development opportunities can contribute to teachers' capacity-building regarding blended teaching, but may also enable collective professional growth at the school through communities of practice (Lai, Pratt, Anderson, & Stigter, 2006).

Teacher choice, balanced with adequate guidance

The opportunities for teachers to experiment with new tools and engage in professional development—depending on their own needs and confidence—were important for their capacity building. That the role of the school principal is pivotal in encouraging this culture is also confirmed by relevant literature (e.g. Zhao & Frank, 2003; Davis et al., in press). Findings in this research and other studies also indicate that teachers often need extra support when they start to experiment with new tools (Frailich et al., 2007; Lee, 2006). Enabling teacher choice, balanced with adequate guidance, encourages experimentation with new approaches, but at the same time it points teachers in the right direction for further support, depending on their needs and confidence.

Access to adequate infrastructure at the school

Teacher participants talked about the challenges of having access to adequate infrastructure at the school owing to increased resource demands from other teachers. This is a common challenge also reported by other studies (e.g. Bingimlas, 2009). For some students in this study, using the available resources at the school was their only option when engaging in blended learning, because they have limited access to resources at home. As Lee (2006) argues, adequate access to hardware and software is essential for effective implementation of blended teaching and learning in schools. Providing teachers and students with adequate access to resources at school is therefore necessary to enable more seamless implementation of blended teaching and learning.

The wider ecosystem in which schools are located

In order for schools to effectively provide the above-mentioned support, there needs to be a supportive culture from organisations beyond the school itself. For example, professional, bureaucratic, political and commercial/OER organisations can provide/implement:

Opportunities for out-of-school professional development

Although most schools encourage in-school professional development, few take the next step and support teacher engagement in networks outside the school walls (Riel, 2009). In this study, opportunities for professional development beyond the school contributed to teachers' capacity-building and the growth of blended learning at the school, and enhanced the school's collaboration with other schools. Given the benefits of collaboration in online communities of practice (Lai et al., 2006) professional organisations such as universities and e-learning clusters are recommended to provide/continue providing professional development and support that is customised to differing school needs, while at the same time encouraging teachers, e-deans, and school leaders from different schools to work together online, regardless of their location.

Financial support and visionary policies

Initiatives funded by the Ministry of Education (e.g., funding for ICT PD clusters) contributed to teachers' capacity-building and to the growth of blended teaching and learning at the school—this agrees with findings from relevant research (Powell & Barbour, 2011). Participants also expect that blended approaches will further develop with the roll-out of UFBiS, funded by the New Zealand government. Bureaucratic and political organisations are recommended to provide/continue to provide financial support and to implement visionary policies regarding e-learning, targeting professional organisations and the wider educational context and considering the needs of schools. Capacity-building among schools and the development of a common vision towards teaching and learning in the 21st century can therefore be enhanced.

Affordable, reliable tools, incorporating 21st-century learning affordances

The school principal explained that the availability and cost of tools affects teachers' decisions about blended approaches, and on school-wide decisions that relate to blended learning. The online tools used by teachers and students incorporated several affordances and constraints which facilitated or prevented teachers from effectively implementing blended teaching and learning. Gilbert (2007) acknowledges the potential of ICT to change education by enabling collaboration, multi-media literacy, and active knowledge building. It is therefore important that commercial organisations/OER continue to develop affordable, reliable and easy-to-use tools that are compatible in and across schools in New Zealand, and to consider the needs of today's schools and teachers' level of confidence.

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Appendix 1

Research questions (as designed for the author's Master of Education research)
Main question: How is blended teaching and learning implemented in a rural New Zealand secondary school?

Sub-questions:

1. How do school leaders experience the implementation of blended teaching and learning at the school?
2. How do teachers experience the implementation of blended teaching and learning at the school and what are their practices with blended teaching in their classes?
3. What are the practices in one blended class and how do the teacher and the students experience blended teaching and learning in the same class?
4. What are the implications of implementing blended teaching and learning for students, teachers, school leaders, and other educational stakeholders?

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