OtagoNet: One region's model for virtual schooling

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Abstract

Virtual schools are increasingly common in New Zealand and internationally as schools are challenged to meet the needs of their students. This article presents a description of the distance-learning model used by a group of schools in rural Otago for the last decade. The leadership team and roles are described, and the funding model, which is based on reciprocity, is outlined. The most common teaching and learning practices are described, and support mechanisms identified. Finally, a summary of the research conducted since OtagoNet's inception is presented. This research shows that this model is generally effective for teachers and learners although, as is the case for other models of virtual school, a number of factors affect this.

Keywords: distance learning; virtual schools; online learning; online teaching; schools sector; secondary; virtual learning; Virtual Learning Network; virtual teaching

Background

Schools are increasingly being challenged to rethink the nature of what they do (Hipkins, 2004). They are being asked to address the needs of diverse students (Alton-Lee, 2003) to prepare them for further study in a range of topics, and for work. Many of New Zealand's schools face difficulties in increasing the range of subjects available to their senior students. New Zealand is a sparsely populated country with, on average, 15.0 people per square kilometre (McKinnon, 2012). Because most people live in a small number of large cities, the rural areas are even more sparsely populated. But the population distribution means that New Zealand, and particularly rural New Zealand, has many small schools. These schools are unable to have specialist teachers in all subject areas, and this has restricted the range of subjects students can study, even before the advent of more recent challenges to provide for their students' increasingly diverse needs.

Internationally, it is increasingly common for secondary students to be involved in distance learning. They might replace attending a traditional school (full time) or augment the classes available at their home school by studying at a distance, which is known as taking supplemental classes (Archambault, 2011; Barbour & Plough, 2012; Barbour & Reeves, 2009; Davis et al., 2007; Davis & Niederhauser, 2005; Mupinga, 2005; Watson, Murin, Vashaw, Gemin, & Rapp, 2012; Wicks, 2010). Wicks (2010) identified 10 dimensions to describe online programmes, highlighting four as being particularly important. The first of these is the *comprehensiveness* of the programme, which identifies whether students enrol in the online programme full time, or take the class to supplement those from another school. Secondly, programmes also vary in their

reach; for example, they may enrol students from across school districts, states, or countries. Thirdly, the *delivery* mode of programmes also varies, because it involves asynchronous, synchronous or a combination of modes. Most programmes in the United States use an asynchronous approach, while Canadian programmes are more likely to involve synchronous elements (Barbour & Reeves, 2009). Finally, programmes vary in terms of their *type of instruction*, which ranges from fully online to blended programmes, and includes elements of online and traditional face-to-face instruction. Programmes which use blended instruction would not generally be considered to be distance courses, because participants do not meet the required element of being separated by space (iNACOL, 2011).

In the United States, funding for students taking online courses varies from state to state. Full-time online programmes generally receive between 87% and 100% of the funding a traditional school would receive if that student enrolled with them (iNACOL, 2013). In a small number of states, funding for students taking supplemental courses also follows them (iNACOL, 2013) but in the majority, state funding is not available for these students (Watson & Gemin, 2009), although it is increasing (Watson et al., 2012).

Research into distance education at this level has shown that students have varying levels of success (Roblyer, Freeman, Donaldson, & Maddox, 2007), but that it is generally as effective as other forms of teaching and learning (Cavanaugh, 2001). It is now accepted as a "legitimate form of schooling in the 21st century" (Archambault, 2011, p. 74). A number of factors affect students' success and experience in these programmes, including factors related to the technology, the teacher, and the student (e.g., see Archambault, 2011; Barbour & Plough, 2009; Cavanaugh, 2001; Ferdig, Cavanaugh, Dipietro, Black, & Dawson, 2009; Kapitzke & Prendergast, 2005).

In New Zealand, secondary schools have been augmenting their offerings with distance education provided through Te Aho o Te Kura Pounamu (The Correspondence School, commonly known as Te Kura) since 1928 (Te Kura, n.d.). While Te Kura provides online support and teaching materials, most of its lessons are delivered in a paper-based format, and information is mailed back and forth between the teacher and the student. In 2001, a group of schools in Otago identified a need for alternative programmes because staff and students believed students achieved at a lower level in these courses, and enjoyed them less. In line with the literature on distance education, schools identified a need to offer their students supplemental distance programmes that involved higher levels of interactivity and the opportunity for greater relationships (Downs & Moller, 1999; Searle & Mandile, 2003; Zhao, Lei, Yan, Lai., & Tan, 2005).

The small numbers of students at many Otago schools also meant that specialist teachers did not always have students to teach, which contributed to the difficulty of retaining these specialists within rural communities. After discussion, staff at these schools decided to use their specialist staff to teach their subjects to students in any of the participating schools, thus increasing the options available for students, and enabling staff to teach their specialist subjects. The distances involved meant teachers could not travel from school to school, so it was decided to use video conferencing, along with text- and web-based resources, to deliver lessons. While they could have used a fully asynchronous model, staff believed this would retain many of the problems they faced with the print-based correspondence material they were currently using.

Although Cantatech had used audio conferencing to offer distance education since 1994 (Langley, 2003), OtagoNet was the original video-conference cluster in New Zealand. The use of video conferencing alongside asynchronous delivery methods is now used throughout New Zealand, and 13 active clusters, involving more than 200 schools, tertiary organisations, and private providers, are registered with the Virtual Learning Network (VLN)

(http://www.vln.school.nz). These schools and other providers offer classes and extension work to each other's students.

At the time of OtagoNet's inception, a number of examples of synchronous video conferencing to deliver lessons were identified (e.g., see Bauck, 2001; Branch 2001a, 2001b; Downs & Moller, 1999; Salvati, 2001; Searle & Mandile, 2003). These models commonly involved teachers at one site delivering all or most classes each week to distance sites by video conference. This model, however, was unaffordable for the OtagoNet schools, resulting in their choice to use a combination of synchronous video conferencing and asynchronous methods. Over time, the use of synchronous video conferencing appears to have become less common elsewhere, with web-based technologies taking its place. In addition to this unusual feature of OtagoNet, the funding and management model is different, as described below.

The OtagoNet model

The initial funding for OtagoNet was largely provided by the original schools and a local funding group, The Community Trust of Otago. The Ministry of Education and Telecom New Zealand Limited provided additional support. Money from these groups was used to provide each school with the essential equipment (a television set, a document camera, and one video-conferencing camera/microphone system), which was housed in a room chosen by the school. As well as providing a room, some schools provided additional peripheral equipment such as a video player, and many of the teachers took their own laptop computers into the room to use in the video-conference session. By 2010, the range of equipment available in each room had increased, with many of the rooms now having additional equipment such as DVD players, and several schools now provide computers or laptops for students. In addition, all teachers have access to a laptop as a result of the Digital Horizons Laptops for Teachers scheme, funded by the Ministry of Education (see Pratt, Lai, Trewern, Concannon, & Sutton, 2010), which they frequently use during their video-conference sessions.

In its first year of offering classes, the OtagoNet cluster offered 11 courses to 60 students. This number has grown each year and, in 2012, 340 students from 15 schools took one or more of the 26 classes on offer. In addition, with the development of other video-conference networks within New Zealand, the number of courses available has increased. While priority is given to students from schools within a cluster, students from other video-conference clusters are able to be involved if there are places left. This process is facilitated by the VLN (http://www.vln.school.nz).

As well as offering classes to students, the OtagoNet cluster uses the video-conferencing equipment to offer scholarship mentoring. They also use it to provide a support network for students with special needs and their teachers, and to facilitate formal and informal networks of teachers in these schools. Two tertiary institutions are also using the video-conference network to provide opportunities for students in rural areas. Previously only students in city schools could pay fees and take classes offered by two local polytechnics, but some of these courses are now available to rural students by way of OtagoNet.

The video-conferencing system allows an unlimited number of remote sites to connect at one time, although how many do so depends largely on the video-conference experience of the teacher. The cameras are voice-activated, so the site where a person is talking is automatically shown. However, when video or computer presentations are shown on the monitor, students in the remote sites are generally not able to see their teacher or classmates at other sites. In most cases, class sizes are small (averaging 10 students) and the majority involve three or four sites, with some linking up to five sites.

Most subjects taught within the OtagoNet cluster are at the senior secondary level. The courses taught each year depend on whether there are students wishing to take the class and the extent to which schools and teachers are willing to support the subject. Over time the number of classes offered at lower levels of school has increased, particularly when individual schools have small numbers of students—these are often in areas such as languages, or for gifted and talented students.

Staffing

Teachers who deliver subjects by video conference (known as e-teachers) continue to be employed by their home school, and their video-conference class is incorporated into their teaching load. The e-teachers have varying levels of ICT skills and experience and are supported by school coordinators. Each school has a coordinator whose role is to work with the teachers and students to ensure that everything runs smoothly. In some cases these coordinators do more than provide an administrative role by working to support students with their course content in addition to providing pastoral support (Barbour, Davis, & Wenmoth, 2013).

In addition to the e-teachers and school coordinators, OtagoNet has four staff members. It has a full-time project leader or e-principal whose role includes leading, visioning, planning and managing projects; working with, encouraging, and mentoring existing and potential e-teachers, coordinators, and principals; and networking with other clusters. He is supported by a 0.2 full-time equivalent (FTE) e-dean, who supports the e-teachers and works with the project leader as part of the leadership team. The e-dean has a particular focus on ensuring the professional growth of e-teachers. The OtagoNet e-librarian (0.1 FTE) provides a service for digital sources and other resources for the e-teachers, and helps to prepare digital resources. The final member of the team is the executive officer, who is responsible for the financial administration of OtagoNet. She is paid an honorarium rather than being funded on a FTE basis.

Students do not pay for classes through OtagoNet, and neither do schools, which have already received the funding for that student. Instead, they use a model of reciprocity in which they receive classes from, and deliver classes to, each other. Each member school contributes 0.1 FTE staffing, either by transferring staffing or through a unit or monetary equivalent, as well as delivering one subject. As a school's involvement grows, such that large numbers of their students are receiving classes from other schools, they are encouraged to offer more subjects. OtagoNet has received some funding from the government, but this support is usually contestable, and available only for special projects. The funding for leadership and administration comes largely from school funding.

The e-teachers and coordinators involved in OtagoNet receive support in a variety of ways, both from their home school and those involved in OtagoNet. Initially, a video-conference training session was held for those who were going to be involved, and periodic training sessions, both formal and informal, have been ongoing. The teachers receive ongoing support from the leadership team, and attend an annual e-hui, which involves e-teachers and coordinators coming together over a 2-day period to share experiences and learn from one another. In addition, the Ministry of Education funding for special projects is usually available for professional development.

The technical support for the project was initially provided by a teacher with technical expertise who was appointed by OtagoNet to act in this role. This teacher now provides technical support to a larger group of schools, and continues to provide some technical support to OtagoNet. Day-to-day support, however, is provided within the schools and, to some extent, by the project leader.

Although professional development and technical support were important, time was the critical support for many teachers. Most principals recognised that the teachers involved in this project were going to require extra time while they became more familiar with this way of teaching; however, schools varied in how much time they allocated, and this affected how happy teachers were with their OtagoNet experience. In general, though, e-teachers get the same time allowance as they would for teaching any other class. While there is no formal policy within New Zealand, participating schools agree to OtagoNet's protocols that give teachers an appropriate time allowance.

Teaching approaches

As identified previously, OtagoNet teachers are timetabled for one 50-minute video-conference session each week. Classes start on the hour, irrespective of the start times of classes in their home schools. Students are expected to be timetabled for their OtagoNet classes, and to be released from other classes for their video-conference session.

Teachers use a range of resources including traditional printed resources such as textbooks, and others such as workbooks, write-on workbooks, videos, and websites. They also use email and, in some cases, text messaging, to keep in contact with their students. Teachers can also access a learning management system (Moodle) and are now moving into a Web 2.0 environment, where Google apps is the central feature, and other tools are added as they are needed. Teachers use these tools to varying degrees, and use is increasing over time.

OtagoNet teachers and students are encouraged to attend two face-to-face day-long meetings in addition to the video-conferencing sessions. The first meeting is held near the start of the school year, in February, and the other in August. These days are a chance for teachers and students to meet each other and enhance their relationships. In addition, they provide opportunities to conduct practical assessments.

Over time, teachers have adopted a range of approaches to manage their OtagoNet classes. Five general approaches are described here. It should be noted that most teachers use a combination of these approaches throughout the year, depending on the topic, the teacher, and the time of year.

Video conference only

The 50-minute video conference is the only synchronous contact some teachers have with their students.

Video conference plus face-to-face

In some cases, OtagoNet teachers take advantage of being within driving distance (e.g., 30 minutes) of their students, and augment or replace their scheduled video-conference sessions with face-to-face visits.

Video conference plus additional sessions

Several teachers augment their scheduled video-conference sessions with additional sessions. These are usually delivered to a subset of their students, such as individual students or students from only one school. They are often run on a question and answer basis, or are used to go over work with which students are struggling. These sessions may be offered regularly, or added as students need them.

Video conference to each off-site schools separately

Sometimes, when teachers are working with students from more than one distance school, they choose to split their scheduled session and deliver to each school separately.

On-site students

E-teachers have two approaches to working with those students from their own school who are scheduled to take their OtagoNet class. In some cases, students join the distance students in the video-conference class and are treated in the same way, with the teacher emailing work back and forth. In other cases, teachers prefer to teach the on-site students separately because they find that they tend to focus solely on the distance students during the weekly video conference, to the exclusion of their onsite students.

Evaluation of OtagoNet

Students' participation in some form of virtual schooling has been increasing for some time (e.g., see Barbour, 2011; Barbour & Reeves, 2009; Cavanaugh, Barbour, & Clark 2009; Watson, Gemin, Ryan, & Wicks, 2009). However, research evaluating this model is less common (Barbour, 2011). The research that has been conducted has been generally positive, finding that it is at least as effective as other forms of teaching and learning (e.g., Bolstad & Lin, 2009; Cavanaugh, 2001). Barbour (2011) cautioned, however, that the nature of the research being conducted, and of the students whose performance is being reported, is such that is not clear how effective this mode of learning is or whether it is suitable for all students. In particular, he noted that questions are being raised regarding the suitability of this form of learning for rural students. This raises questions regarding the choice of virtual schooling for the OtagoNet schools.

Questions regarding the potential effectiveness of this form of learning have been part of OtagoNet's history. The Community Trust of Otago, which provided part of the initial funding, did so on the proviso that research be conducted as the project developed. Partly due to this requirement, and partly due to recognition that knowledge of what was happening elsewhere would be useful, researchers have been part of the OtagoNet development since discussions began regarding the form it would take. Table 1 summarises this research.

Table 1 Overview of OtagoNet-related research

Year	Focus	Methods	Key findings	Publications
2001-02	Overall evaluation of implementation	• Staff interviews • Student surveys and interviews	• Implementation took time • Teachers and students needed to change their approach to teaching and learning • Seen as more effective than alternatives	Lai & Pratt, 2004; 2005; 2007; 2009
2004	Effective teaching practices	• Teacher interviews and stimulated recall interviews • Student surveys and interviews	• Previous experiences did not prepare teachers or students for this form of learning • Professional development was critical • Formed powerful communities of learners	Walsh-Pasco, 2004
2009-10	Student support	• Teacher surveys and interviews • Student surveys and interviews	• Students with diverse skills and abilities could succeed • Levels of support varied widely between schools • Support appeared to be critical to student success	Pratt, 2011 Pratt & Trewern, 2011; Pratt, Pullar & Trewern, 2011
2009-11	Effectiveness	• Grade comparison	• Most students performed as well or better in their online classes	

As this table indicates, the initial research project began in 2001, when discussions began regarding the direction OtagoNet should take. Despite some early setbacks, after 3 years the OtagoNet model was seen by staff and students as being a more effective model of teaching and learning than the alternatives. Students did, however, identify a desire for additional contact time with their teachers.

Research conducted in 2009 and 2010 focused on the experience of students involved in learning through OtagoNet, and through other distance delivery modes and vocational schemes. At this time OtagoNet was in its ninth year of delivering classes using this model, and many students identified this way of learning as simply what was expected in their school. Because between 26% and 90% of students at each of the 10 schools were involved in some form of learning other than their traditional face-to-face classes, this is perhaps not surprising. In addition, this research compared students who chose to take OtagoNet classes with those who had not, based on their self-rated independence, or on their study skills (as measured by the Learning and Study Skills Inventory (LASSI)—High School Version (Weinstein & Palmer, 1990), finding no significant difference (Pratt, 2010). While previous research (e.g., Barbour, 2011; Barbour & Reeves, 2009) seems to suggest that in order to succeed at virtual schooling students needed to be highly motivated and independent learners, this did not seem to be the case with this group of students. While identifying these skills as important, OtagoNet students with varying levels of academic ability, motivation, and independent study skills were able to succeed, if appropriate support strategies were put in place (Pratt & Trewern, 2011; Pratt et al., 2011).

While this research suggests that the OtagoNet model of virtual schooling can be effective for all students, these measures rely on self-reporting and perceptions of success. Given the small numbers of students in each class, and the variability in the academic abilities of the students in different classes and from year to year, it is difficult to determine effectiveness in terms of academic achievement. To provide some evidence of this, the OtagoNet e-principal has compared students' performances in their OtagoNet classes with their performances in their other classes and rated them as performing better, as well, or worse. The rating is based on their performance in the National Certificate of Educational Achievement (NCEA), in terms of the number of credits they have achieved, the level at which they have achieved (level 1, 2, or 3), and the overall quality of grade achieved (achieved, merit or excellence). As the following table shows, the majority of students achieved as well or better in their video-conference classes, with only between 17% and 22% of students performing worse. While there are limitations to this approach, it does provide some further information regarding the effectiveness of this form of learning.

Table 2 Students' performance in their video-conference classes compared to their other classes, in percentages

	Worse	**As well**	**Better**
2009	17	58	26
2010	17	52	30
2011	22	39	39

Overall, then, it appears that the picture presented by the research conducted on the OtagoNet group of schools is of a model of teaching and learning that can be effective for rural students with varying levels of pre-existing skills and abilities.

Conclusion

The OtagoNet model can be described in terms of Wicks' (2010) dimensions. It is a supplemental programme with a country-wide reach, using both synchronous and asynchronous delivery modes. It is also generally an online programme. However, there are some key variations. Although students throughout the country can take OtagoNet programmes, priority is given to students from the region. In addition, the synchronous elements involve video conferencing rather than web-based synchronous tools. Finally, although OtagoNet is designed as an online or distance programme, there are face-to-face elements, such as the face-to-face days and the teaching approaches taken by individual teachers. In addition, having students take supplemental programmes while remaining enrolled in their own school is unusual, as is the approach to staffing and funding.

In general, the OtagoNet project is seen as a success, and this group now works with many of the clusters around New Zealand that have formed since its inception to develop their own models of online learning. As those involved had hoped, senior students are now able to take a wide range of subjects in a more interactive form than was their only previous option, while remaining in their home school. In addition, teachers are now able to teach their specialist subjects without having to leave their home communities.

While students have had to adjust to learning in this new format, change has been no less marked for their teachers. It is well recognised in the literature that teaching at a distance requires a change in teaching approach; however, the change required is more significant in this case, where there are restrictions in the time available as well as in the technology. Initially, teachers found themselves reverting to an information-transmission model of teaching because they were very conscious of the limited time they had available to work with their students. With experience, however, most teachers adjusted their approach to their video-conference sessions, making them more interactive and using other means to cover the required content. This way of learning has been increasingly accepted by teachers and students, and in some schools has become the norm, rather than the exception.

The 14 schools currently involved in OtagoNet are working on a system of reciprocity that is unlike any found in the literature. However, a commitment from these schools to work collaboratively to improve the opportunities for their students and their specialist teachers means they have responded to their situation in ways that are both innovative and (the research conducted to date seems to suggest) effective.

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Ken is the current project leader of OtagoNet. He has been involved with OtagoNet since its inception, first as an e-teacher, and more recently as its leader. As well as working to ensure the success of OtagoNet and other clusters throughout New Zealand, he is involved in a project that relates to the use of a knowledge building approach to learning.

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