

# The Development of the Virtual Learning Network in New Zealand: An Actor Network Theory Analysis

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## Abstract

*The Virtual Learning Network (VLN) is a videoconference based course sharing system between schools in New Zealand. The goal of the VLN is to share and personalise learning resources, based on the learning choices, needs, abilities and skills of the students and staff, otherwise not available within their own schools or group of neighbouring schools (cluster). The problem is that some rural clusters use the VLN successfully but others struggle to sustain a cluster. The objective of this study is to examine how the VLN is currently being used in rural clusters in New Zealand and to identify factors that facilitate or inhibit the development of a successful VLN rural cluster.*

*Literature has addressed videoconferencing as an e-learning solution, particularly for compulsory education in schools. In addition to that, two other dimensions of the VLN application, resource sharing and bottom-up development approach have been reviewed. The use of the Actor Network Theory (ANT) provides a theoretical lens to this study.*

*This research will follow an interpretive approach and case research method to help investigate the research problem. Qualitative interview techniques will be used for data gathering and individuals in the VLN will be the unit of analysis.*

## Keywords

Actor Network Theory, Community Informatics, E-learning, Shared Learning, Videoconferencing, Virtual Learning Network

## Introduction

The Virtual Learning Network (VLN) is a video-conferencing system between the schools based in New Zealand which originated within The Correspondence School system in early 2000 (Roberts, 2009). In the VLN, a number of neighbouring schools group together to form a cluster and member schools share learning resources among their students and teachers (Powell, 2011). The VLN aims to enhance learning opportunities by providing greater access to curriculum choices, autonomy and subject experts (Zaka, 2013; Wright, 2010). The system is particularly suited to rural New Zealand (Ministry of Education, 2011) and has been over-represented by the rural clusters (Roberts, 2009). One of the VLN's main objectives has been to help overcome the geographical isolation of the rural clusters and to strengthen the existing interactions between the geographically dispersed communities (Ministry of Education, 2011; Bolstad & Lin, 2009).

The VLN intends to personalize learning for the students and teachers based on their need, skill, interest and enthusiasm (Powell, 2011; Roberts, 2009). The personalization aims not only to provide greater subject choices but also to improve their overall satisfaction and performance by engaging them in their own subject areas (Wright, 2010). A typical example of personalization occurs when 4 to 5 students in a school want to study, for example, Japanese or Astronomy and the school is unable to offer the course. In that situation, the VLN responds to the need for personalised learning by facilitating member schools to form a common virtual classroom for students from different schools but with the similar need or interest.

Many rural clusters are using the VLN successfully and an increasing number of urban clusters are also joining the network, however, there is a problem that some rural clusters are struggling to fully utilize the VLN. According to Barbour et al. (2011a, p.11) “One example of a struggling cluster is TaraNet”. Using the same VLN platform in a similar rural context, some rural clusters struggle to sustain themselves successfully whereas others have maintained themselves successfully. The facilitating and inhibiting factors for a successful VLN cluster have remained unidentified and the problem is yet to be answered.

## Rationale

The VLN uses exchange and sharing approach to overcome the geographical issues of the rural schools in New Zealand. In the VLN, learning resources are shared as an initiative based on community needs and not on a monetary or business basis – and that makes it unique of its type. In addition, the significance of the VLN model is its self-sufficiency, because it utilizes the existing resources of the member schools.

Few studies have discussed the VLN and very little information is available online. Bolstad & Lin (2009) report about students’ experiences, Powell (2011) describes e-learning initiatives in secondary schools in New Zealand, the Ministry of Education (2011) provides a guide for cluster schools and Barbour et al. (2011a) report on the VLN process. These are the major studies about the VLN but have not specifically addressed the problem. Powell (2011) briefly mentions that some clusters have easily adjusted to the VLN while other clusters are struggling with the change. Therefore, this study considers the need for a broad and methodical research to cover the gap.

In order to cover the gap and investigate the research problem, this study will attempt to answer the following two main research questions. Firstly, the study objective is to examine how different clusters are currently practicing e-learning using the VLN. Secondly, the objective is to identify the two major categories of the factors – the facilitating and inhibiting – maintaining or preventing a successful VLN cluster. Therefore, the proposed research questions are,

RQ1: How is the Virtual Learning Network (VLN) currently being utilized in some clusters of rural schools in NZ? And

RQ2: What are the factors that facilitate or inhibit the development of the Virtual Learning Network (VLN) in some rural clusters in NZ?

The goal is to identify the learning problems that existed before the VLN and the needs for the VLN. The study aims to examine the level of interaction and convergence of needs and interests of each stakeholder in the VLN. This is to recognise the challenges faced by the member schools in the VLN.

## Literature Review:

### E-learning and Videoconferencing

Since the emergence and growth of the Internet, electronic learning (e-learning) has re-invented the method of learning (Harper et al., 2004). E-learning literature details an enormous range of e-learning applications and definitions depending on the context. It can be regarded as web-based learning, online learning, distributed learning, computer-assisted instruction, or Internet-based learning (Ruiz et al., 2006; Khan, 2001). From an educational perspective, e-learning is generally regarded as learner centred, internet based, flexible delivery of learning contents (Seok, 2008; Nicholson, 2007). The flexibility dimension in e-learning allows learners to communicate through a synchronous or asynchronous mechanism depending on their needs (Sun et al., 2008).

Videoconferencing (VC) is one of the synchronous (real-time) information delivery mechanisms (Celikkan et al., 2013; Stevens, 2011) used for content delivery. It is most successful during structured activities (Lawson et al., 2010). One-to-many, one-to-one, one-to-some and some-to-some are different modes of interaction in VC (Smyth, 2005). These modes indicate the richness and learner-centeredness of the system and an interesting solution for distance learning (Baudin & Villemur, 2009; Smyth, 2005). Initially VC was mainly used in higher education for distance learning (Lawson et al., 2010) and now, it has been widely established in primary and secondary schools for virtual and distance learning (Lawson et al., 2010; Baudin & Villemur, 2009; Roberts, 2009; Seok, 2008; Martin, 2005; Smyth, 2005, Setzer & Lewis, 2005).

## Shared Learning:

Sharing of educational resources is one of the main dimensions of the VLN. This dimension aligns strongly with the government's strategy to encourage a culture of shared learning (Powell, 2011). According to the New Zealand Curriculum, "This evidence tells us that students learn best when teachers facilitate shared learning" (Ministry of Education, 2007, p.34) and ICTs can facilitate that by improved connectivity (Hogan, 2007). However, technology does not ensure sharing of resources and it all depends on the users and the creation of an environment of shared learning (Bolstad & Lin, 2009). Experience suggests that helping students to know each other and giving them more control over their learning may help a shared learning practice (ibid).

According to Barbour et al. (2011a), sharing of learning resources depends on 'e-learning vision', which includes sharing of resources as well as the provision of distance education. That means that e-learning does not merely involve the provision of distance learning; shared learning must also be the main part of any such vision. Otherwise, lack of such a (complete) vision would be one reason leading to the fact of struggling clusters (ibid). The above literature indicates that shared learning can be achieved by creating an environment, culture and vision while using technology as an enabler.

## VLN as a Community Informatics (CI) practice:

Previously, the Information Systems (IS) approach to Community Development has been a Top-Down business oriented approach (Stillman and Linger, 2009). Therefore, IS lacks appropriate examples relevant for a community focus (ibid), perhaps because of the dominance of the corporate and industrial models and activities in IS. This gap builds up the case for a different approach in contrast with the traditional top-down business approach.

Community Informatics (CI) practitioners (Stillman and Linger, 2009; Gurstein, 2007) have proposed a different 'Bottom-Up Approach' for Community Development. The approach pays attention to physical communities and the design and implementation of technologies in order to achieve the community objective of overcoming the digital divide (ibid). In New Zealand, the VLN was established as grass-roots movements at the local level (Barbour et al., 2011b). The bottom-up approach behind the VLN practice makes the practice very relevant to the CI perspective. Therefore due to its nature and approach, the VLN can be regarded as a true community informatics practice; a community-initiated practice that virtually connects geographically dispersed learning communities in a network and facilitates e-learning via Videoconferencing.

Videoconferencing is a good system for e-learning in schools where the objective is to share learning and the move is led by the community from grass roots levels to provide greater access to learning resources. The VLN establishes videoconferencing as distance learning and a shift from the norm (Bolstad & Lin, 2009). From the literature, a shift can be seen from VC initially being used only as a facilitator to a basic need for distance and flexible schooling. However, the adoption of virtual learning has brought many challenges for the cluster schools in the VLN. This study intends to examine the system and identify the factors necessary for sustaining a successful cluster.

## The research theory

Literature suggests the existence of two extreme approaches (socio-centric and techno-centric) in situations involving implementation of information systems and technological innovations (Tatnall and Gilding, 1999). Contrary to these one-sided approaches, the Actor Network Theory (ANT) suggests a symmetrical approach between both the technological and social aspects simultaneously (Callon, 1986; Latour, 1986; Law, 1992). This is because we live in heterogeneous societies where all the materials – be they human or non-human – connect together in networks and play their roles to stabilize the network (Callon, 1986; Latour, 1986; Law, 1992). Therefore, the ANT does not merely encompass humans but also objects and organizations – called 'actants' (Latour, 1994). However, an argument exists in the literature over the ANT's symmetrical approach (Law, 1992; Andrade & Urquhart, 2010).

A key part of the ANT is the translation process that is the "program of action" (Latour, 1994, p.31). The process offers definition of the relationship and agreement protocols between the actants for building and defending a stable network (Tatnall & Gilding, 1999). The purpose of the four-phase

translation process is to strengthen the network internally (Naber et al., 2013) by translating and integrating the interests of each actant in a network as common interests of the whole network. It is an attempt to create a forum – a central network in which all the actors agree that the network is worth building and defending (Tatnall & Gilding, 1999).

The sociotechnical approach of the ANT is very suitable for this study because the users and technology are the two main facets in the VLN. Such an approach is much needed in situations where both technology and users need to be treated equally to achieve project goals (Tatnall & Gilding, 1999). The theory will facilitate this study by ensuring a balance between the technical and social aspects of the VLN case. Also, the four phases of the translation process in the ANT efficiently provide the required theoretical lens to methodologically investigate the research problem. Therefore, the theory is highly appropriate for this study to lead this research towards the right direction.

## **Research Method and Paradigm:**

### **Paradigm:**

Generally the literature from social sciences suggests three sets of paradigms to guide a researcher towards the understanding of a reality (Guba, 1990). These paradigms are positivism, interpretivism and critical research (Denzin & Lincoln, 2005; Klein & Myers, 1999; Orlikowski and Baroudi, 1991). The positivist paradigm is generally regarded as an approach to verify knowledge, and, independent of a researcher, it is used to test and validate a reality (Myers, 1997). But, the VLN is a relatively new practice and this study does not aim to validate the practice. Hence, this study does not intend to use the positivist paradigm. The critical approach is generally chosen to critique a reality by taking a moral stance (Myers, 2009). This approach is inappropriate here because this study is not aimed at criticising the VLN practices. Also, the use of the Actor Network Theory (ANT) here in this study is intended to provide a diagnostic lens not as a lens to criticise the project. Accordingly, the critical research approach is also not suitable for this research.

From the interpretive researcher's perspective, reality is constructed (Orlikowski and Baroudi, 1991). Contextual factors in the ANT need to be reported and interpreted by the researcher in order to sketch a complete picture of the phenomenon. In addition to that, literature generally associates the theoretical lens of the theory (ANT) with the interpretive approach (Cordella and Shaikh, 2003). Therefore, this study will follow an interpretive paradigm.

### **Method:**

Varied contextual factors play an important role in the VLN. Qualitative research methods better facilitate a researcher to understand and report contexts of a phenomenon (Myers, 1997). The Case Research method is one of the most commonly used methods in Information Systems which easily accommodates the contextual and specific organisational information (Orlikowski and Baroudi, 1991). Therefore, this study intends to use a Case Research Method and proposes semi-structured interview techniques to flexibly collect data. The unit of analysis for this study is the individuals in the VLN (students, teachers, ePrincipals) and the cluster representatives (eDeans). Also, the VLN technicians and system administrators are the unit of analysis as the potential agents representing the non-human influences (Vidgen and McMaster, 1996, cited in Luoma-aho and Paloviita, 2010).

### **Value of the research:**

This study is expected to contribute to the theory by extending the use of the Actor Network Theory. This study adds value by the application of videoconferencing for e-learning in schools in a developing regions setting. Also, the VLN is an application of the Community Informatics (CI) perspective using a bottom-up approach proposed by the CI community (Gurstein, 2007). Possible implications and transfer of the VLN system to other developing regions make this study highly practical and add value to policy development as well. By exposing the VLN practices to the wider research community and helping to gain wider focus, this study is mainly going to benefit the struggling clusters and consequently the students and staff in need.

## **Anticipated Challenges:**

### **Identification of a similar practice:**

A possible limitation to this study may be the failure to identify a similar practice which can be compared with the VLN in New Zealand. A similar practice in similar geographical settings will help this study to maintain its focus and remain highly valuable. Therefore this study has to restrict this problem by identifying similar e-learning and videoconferencing practices and research studies in developing region's settings. Also, this study may deal with this issue by having intense consultation with relevant literature studies to restrict this problem.

### **Pedagogical challenges:**

This challenge is the possible identification and classification of pedagogical issues from the information systems' issues in the VLN. This is because, the pedagogical issues have to be dealt in terms of the art of teaching and learning and that is not the area of this research. Such as, Stevens (2011) identifies leadership challenges for the eTeachers, Site Supervisors and ePrincipals participating in the VLN. According to Wright (2010, p.15), "knowledge and confidence of the teachers, prevailing pedagogical thinking in the schools and social cohesion of the classrooms" are the key pedagogical challenges that inhibit technology to facilitate the process. This study perceives that these pedagogical challenges are more relevant to the art of teaching. Therefore, this research admits that this is a grey area that might possibly push this study to deviate from its objectives. Hence, to counter this issue, this study must maintain close relation with its objectives by continuous reflection on the main research objectives.

### **Theoretical Challenge:**

A challenge is posed to this study due to the participation of the non-human actants proposed by the research theory. Vidgen and McMaster (1996) cited in Luoma-aho and Paloviita (2010) propose to represent the non-human influences in a research by their potential agents. The VLN technicians and system administrators are the possible agents of the non-human actants in this study. Also, the ePrincipals and eDeans are the potential organisational representatives of the cluster schools in this research. As per the theory requirement, this study has to interview these technological agents and organisational representatives. The degree of how well this research succeeds to represent the non-human actants by their agents remains a challenge for this study.

## **Summary**

ICTs have effectively been used to facilitate face-to-face learning in tertiary and compulsory education, particularly in developed countries. Also, ICTs are widely being used for distance education as primary tools for real-time communication. However, the use of technology in compulsory education for synchronous distance education has remained a challenging practice. The cluster schools in rural New Zealand have taken up that challenge in the form of the VLN and are relatively successful. But, the issue of some struggling rural clusters must be addressed methodologically to help overcome the challenge of synchronous distance learning for compulsory education. To address the research problem, the use of the Actor Network theory in this study is expected to provide the analytical lens required to methodologically investigate the problem.

Given the self-reliability nature of the VLN as a grass roots level initiative by some rural clusters and following a shared-resource strategy, the practice has remained unnoticed in the wider literature. One of the reasons could be due to the demographic limitations of New Zealand as a geographically smaller and isolated country. For this reason, there is a great need for this study not only to answer the research questions but also to widen the scope of the VLN by giving it the due exposure it needs. While the New Zealand Government and the VLN community are attempting to outline the VLN's future directions, it is the right time to expose the VLN to the wider research community. Therefore, this study is expected to be transferable and highly practical.

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