ATHABASCA UNIVERSITY

NETWORKED TEACHER PROFESSIONAL DEVELOPMENT: ASSESSING K-12

TEACHER PROFESSIONAL DEVELOPMENT DELIVERED WITHIN A SOCIAL

NETWORKING FRAMEWORK

BY

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Approval of Dissertation

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Dedication

I dedicate this dissertation firstly to my darling wife and friend Susan Ostashewski

who has supported and encouraged me during this learning journey. Secondly, I

dedicate this work to my parents, William and Marcella Ostashewski, who instilled in

me the drive and capabilities needed to accomplish such a task as this. To these three

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anything is possible – all you have to do is try!

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Abstract

        This study evaluated the third design iteration of a networked teacher

professional development (nTPD) implementation. In particular, the study explored

the kinds of teacher technology professional learning that resulted as a consequence of

nTPD participation. As part of an ongoing design-based research program, the goal of

this study was to evaluate the teacher learning resulting from participation in online-

delivered TPD activities. In addition the results inform an evolving model of nTPD

articulating the components and elements of the online learning activities that have

value in supporting and/or advancing teacher practices. The results of this study

indicate that teachers who participate in nTPD find the experiential learning activities

and the sharing of resources and lesson plans to be valuable for their professional

practice. NTPD, delivered in a social networking site environment, results in new

kinds of teacher learning opportunities. Some of these new learning opportunities

include shared digital curation activities and unique cognitive-apprenticeship type

activities described further as "learning over the shoulders of giants." In theory, nTPD

provides teachers with opportunities to connect with others who are teaching in

similar curricular areas to identify, develop, and share resources that can support their

teaching practice. In practice, the articulation of a revised nTPD model and design

principles provides developers of online-networked TPD with guidelines for the

development of valued learning activities, particularly for technology TPD topics.

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Definition of Terms

Action-reflection process: A cycle of action-reflection activities that involves teachers working collaboratively to plan, implement, and reflect on a series of lessons. This process is the basis of the collaborative partnerships model (Jones, 2008) that focuses on cooperative discussions between teachers and co-planning of teaching practices.

Baby boomers (Boomers): A category of technology use generation delineated by age that includes learners who were born 1946-1964 (Oblinger & Oblinger, 2005). The boomers are characterized as having optimistic and workaholic attributes who like responsibility, the work ethic, and have a can-do attitude.

Design-based research (DBR): A research methodology for detailing when, why, and how innovative educational solutions work in practice (Design-based Research Collective, 2003). The goal of DBR research is to develop, evaluate, implement, and disseminate a solution to a complex educational problem (Herrington, McKenney, Reeves, & Oliver, 2007). Design-based research blends empirical educational research with theory-driven design of educational environments and goes beyond perfecting a specific product or artifact to generate a model of a successful innovation (Design-based Research Collective, 2003) which is supported by design and implementation principles.

Communities of Practice: Professional learning communities where peers rely on the expertise and support of one another to adopt innovative practices. These communities involve reciprocal interactions, where members take responsibility for each other's learning and development. (Glazer & Hannafin, 2006, p. 61)

Connectivisim: A pedagogy of self-paced networked learning that views learning as a process occurring within environments of shifting core elements that are not entirely under the control of the individual (Siemens, 2005).

Experienced teacher: A category of career grouping representing a teacher with 5-14 years of teaching experience (Fuller, 1969; Podsen, 2002).

Generation X (GenX): A category of technology use generation delineated by age that includes learners who were born 1965-1982 (Oblinger & Oblinger, 2005). The GenXers are characterized as having independent and skeptical attributes that like freedom, multitasking, and a work-life balance.

Mashup: An online software application that pulls and combines data and/or functionality from two or more sources.

Master teacher: A category of career grouping representing a teacher with 15+ years of teaching experience (Fuller, 1969; Podsen, 2002).

Matures: A category of technology use generation delineated by age that includes learners who were born 1900-1946 (Oblinger & Oblinger, 2005). The matures are characterized as having command and control and self-sacrifice attributes who like authority, family and community involvement.

Net Generation (NetGen): A category of technology use generation delineated by age that includes learners who were born 1982-1991 (Oblinger & Oblinger, 2005). The NetGeners are characterized as having hopeful and determined attributes that like public activism, latest technology, and parents.

Networked Teacher Professional Development (nTPD): Online-delivered teacher professional development activities utilizing a social networking environment that supports and promotes teacher connections while learning together, both formally and informally, allowing teachers to retain control over their time, space, presence, activity level, identity, and relationships (Ostashewski & Reid, 2010b; Ostashewski & Reid, 2012).

Novice teacher: A category of career grouping representing a teacher with 0-4 years of teaching experience (Fuller, 1969; Podsen, 2002).

Online learning community: A virtual or online learning communities are online groups of learners who have come together with similar interests and learning goals (Gan & Zhu, 2007).

Online Teacher Professional Development: Online-delivered teacher professional development activities that increase the knowledge and skills of teachers with the understood goal of improving student learning (Dede, Ketelhut, Whitehouse, Breit, & McCloskey, 2009). oTPD has the unique ability to provide ongoing, scaffolded professional learning anytime, anywhere allowing teachers to access them at convenient times in their busy schedules.

Plug-in: A piece of software that adds specific capabilities to a larger piece of software. An example is a Twitter feed plug-in within a social networking site.

Scaffolding of oTPD, Scaffolded learning materials: The provision of multiple versions of course materials in order to provide experience-appropriate materials for participants of varied prior subject matter experiences.

Social Networking Site: Online networked tools that can be used to support and encourage individuals to learn together while retaining individual control over their time, space, presence, activity, identity and relationship (Anderson, 2006). Examples are Facebook, Ning, Elgg, and Dolphin that are customizable and user-managed software platforms.

Online TPD discourse: The written or spoken communications that teachers have with other teachers using online tools, i.e., teacher-teacher (learner-learner) interactions (Moore, 1989).

Online TPD activities: Interactions that teachers had with any of the courselet materials, i.e., teacher-resource (learner-content) interactions (Moore, 1989).

Online TPD facilitation: Written or spoken communications that the facilitator had with any of the courselet teachers, i.e., teacher-teacher (teacher-learner) interactions (Moore, 1989).

Teacher Professional Development (TPD): An ongoing process that includes regular opportunities and planned experiences intended to promote growth and development in the professional practice of teachers (Villegas-Reimers, 2003).

Technology Courselets: Online mini-courses of about 10 - 20 hours of teacher interaction time delivered for the purpose of technology professional development within a social networking framework (Ostashewski, 2010; Ostashewski & Reid, 2010a).

Technology TPD: Teacher professional development that focuses on supporting technology integration into an educational setting.

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CHAPTER 1: INTRODUCTION

Introduction

Education, media, and communication technologies have long been linked together on the common ground of sharing and providing user access to information. The emergence of the Internet and the World Wide Web made the Information Age at the end of the 20th century possible. Today social media literacy continues to rise in importance as a key skill in almost every profession (Johnson, Levine, Smith, & Stone, 2010) and field of business (Joel, 2009; Li & Burnoff, 2011). News media are delivered to the Internet simultaneously while they occur in personal tweets, blogs, and news publication websites. Communication technologies continue to expand to allow users to collaborate, track each other's movements, and in real time create and share social media with the world. Education is no longer bound to the physical classroom as students are ever exploring ways of connecting with others, networking, and accessing online information. Over the next several years this use of technology for learning will become more learner controlled, collaborative, and utilize online relationships in addition to online resources (Johnson, Smith, Willis, Levine, & Haywood, 2011; Johnson, Adams, & Cummins, 2012). It is in this ever-shifting milieu of information and communication technologies that today's teachers find themselves. Education is in a transition from the Information Age to the Social Media Age as tools for social networking, online collaboration, and media sharing are all rapidly maturing and becoming accessible online (Hovorka & Rees, 2009).

While technology is increasingly becoming an ubiquitous and inherent part of students' lives, empowering both their communication and socializing, the

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educational system appears unable to keep pace in adopting these technologies (Howard, 2009; Johnson, Smith, Levine, & Haywood, 2010). Students are expecting to be able to study whenever and wherever they want to as the demands on their time continue to increase (Johnson, Levine, Smith, & Stone, 2010). At the same time educational innovations that would support these kinds of learning environment changes are difficult to implement and increasingly more complex to sustain (Bereiter, 2002). Brown (1992) points out that, even when educational innovations do make it to the classroom, they are met with significant challenges that affect their success or adoption. Ordinary teachers' frustrated attempts "to adopt the new methods in the absence of support, followed by the inevitable decline in use, and the eventual abandonment of the program" (Brown, 1992, p. 172) seem to be a common problem for educational innovations.

One key to supporting any type of educational change that results in sustaining changes and innovations for student learning is teacher professional development (Borko, 2004; Desimone, 2009). Teacher professional development (TPD) is the basis upon which educational systems and policymakers bring about plans for educational reforms (Borko, 2004). Yet there seem to be significant issues in education with identifying and providing high quality TPD that will support teachers in meeting the needs of educational reforms. This is especially true in a time where student technology use continues to grow as fast as new technologies themselves. Borko, Whitcomb, and Liston (2009) argue that the new innovative digital technologies, such as online social networks or online professional development programs, may, in fact, provide one way of meeting the complex and emergent needs for educational reform.

The goal of teacher professional development is to increase the knowledge and skills of teachers with the understood goal of improving student learning (Dede, Ketelhut, Whitehouse, Breit, & McCloskey, 2009). Even when TPD is abundant in an educational system, it may not provide the needed support for a variety of reasons – timing, access, or lack of a supportive community (Desimone, 2009). Unfortunately, TPD often does not adequately meet the needs of teachers and this remains one of the most serious unresolved challenges in the field of education (Borko, 2004). With regards to technology TPD planning, for example, Cuban (2001) points out that, despite being recognized as experts for exemplary practice, teachers historically have not been involved in designing or implementing TPD planning.

> Even fewer teachers design professional development programs specifically targeted toward their peers. When teachers do engage in such deliberations, and when they design programs for themselves, when their opinions are seriously considered, changes in classroom practice occur that even the teachers themselves had not contemplated. (Cuban, 2001, p. 184)

This study evaluates an educational technology innovation that is intended to remove barriers for teacher participation in professional development. The innovation utilizes online communication and media to provide teacher access to quality specialized professional development opportunities. The study is grounded in the areas of technology teacher professional development, successful methods of professional development support for teachers, and the emerging possibility of distance education and online learning as potential solutions for some of the TPD challenges. Online teacher professional development (oTPD), where "online" refers to

the delivery mode, as a method of TPD and ongoing teacher support for sustaining educational innovations is the big picture view that situates this study in educational research.

Background of the Study

Distance education and online learning

In order to adequately frame this study, a general overview of current distance education and online learning fields is necessary. The differences between distance education and online learning are blurred and a hotly debated topic of discussion (Anderson, 2009a). One side of the debate argues that online learning, by default, happens at a distance and is therefore a form of distance education while the other side insists that it is a distinct kind of learning experience originating from computer-assisted instruction (Anderson, 2009a). At the core of the comparison of these two fields are pedagogical frameworks. Arguably distance education models originate from an independent study model while online learning stresses technology-based communication and collaboration. Regardless of the definitions or origins, the surge in new communication and information technologies over the past 10 years has resulted in an overlap of the distance education and online learning fields. Today, distance education models and pedagogies of learning, mentoring, and independent study are guiding a trend toward increased student enrollments in online learning courses (Anderson & Dron, 2012; Johnson, Smith, Levine, & Haywood, 2010). In summary, distance education continues to adopt technologies and pedagogies that deliver quality education as evidenced by new models of distance education utilizing networks (Dron & Anderson, 2009) and connectivist pedagogies (Downes, 2007;

Siemens, 2005; Siemens & Conole, 2011).

The role that technology plays in both distance education and online learning has also been changing due to a plethora of communication technologies that support education. Today technology is recognized as a primary way to stay in contact, collaborate with others, and generally be in control of one's own learning (Johnson, Smith, Levine, & Haywood, 2010) and this trend appears likely to continue (Johnson, Adams, & Cummins, 2012). The question for distance education and online learning as fields is how to utilize these new communication technologies and create effective learning opportunities for students. Anderson (2009b) points out that currently some distance education researchers are studying the uses of social software in self-paced study models. Researchers of online learning are also exploring new technologies such as online immersive 3D virtual learning environments that can provide greater opportunities for experiential learning, increased learner motivation, open and distance learning, and increased engagement of learners (Dalgarno, & Lee, 2010; Jakobsdottir, McKeown & Hoven, 2010). New communication technologies appear then to be enabling change in both distance education and online learning.

The stigma of distance education

Distance education as a field of study began over a hundred years ago, but it carried with it a stigma of being less effective than traditional classroom education; it was placed outside the regular educational realm of interest (Keegan, 1991). In the 1970s distance education emerged with a new image and by the 1990s came of age (Keegan, 1991). The potential of distance education was initially clouded by research that described it as industrial and lacking in the key component of education –

interpersonal communication. Keegan identified one of the first research-based definitions of distance education written by Otto Peters in 1973.

[T]he central theme of the academic study of distance education is the abandonment in that form of education of interpersonal face-to-face communication, which was previously thought to be a cultural imperative for all education both in east and west and its replacement by an apersonal, mechanical, or electronic 'communication' created by the technology of industrialization. (Keegan, 1991, p. 8)

The stigma attached to distance education, inferring that it may be less effective than classroom education, appears to be disappearing as the trend towards more online K-12 and post-secondary learning continues to increase (Allen & Seaman, 2007; Southern Regional Education Board, 2009b). The replacement of interpersonal face-to-face communication with electronic communication is, in fact, a defining characteristic of new distance education models that provides "compelling but not compulsory interaction opportunities via online technologies" (Anderson, 2009a, p. 114). The exploration and development of online learning networks and collectives that can facilitate and support distance education student interaction (Anderson & Dron, 2012; Anderson, 2009a) is one of the current distance education research challenges.

Transactional distance and teacher professional development

A limiting factor of distance education that research has identified is the "distance" between the learner and the teacher. The distance has been described as more than distance in a geographical sense. Distance also includes the gap between

student/teacher understandings and perceptions, which need to be overcome if effective planned learning is to occur (Moore, 1991). One of the first articulations of a theory for distance education was the theory of transactional distance. Transactional distance is the "physical separation that leads to a psychological and communications gap, a space of potential misunderstanding between the inputs of the instructor and those of the learner" (Moore, 1991, p. 2-3). Emerging distance education models address this distance, in the physical sense, and provide potential solutions for the professional development of teachers who are far apart from each other geographically. As Anderson (2009a) points out, distance educators continue to innovate in the development of more effective learning by utilizing affordable and accessible communication technologies, especially the Internet. The Internet and digital networks make distance education and online learning for TPD accessible in a way not previously possible. This accessibility provides a solution to significant challenges in the field of TPD: resources not available locally, just-in-time support, and accommodating teachers' busy schedules (Borko, Whitcomb, & Liston, 2009). Distance education models, as a direct result of constantly being responsive to the issue of transactional distance, are then uniquely suited to provide successful solutions (Anderson & Dron, 2012) to these longstanding TPD challenges.

Why online teacher professional development?

The enrollment statistics of K-12 and post-secondary students in online courses are important considerations of distance and specifically online learning opportunities for teacher professional development. One of the compelling reasons that teachers should have opportunities for oTPD is that it provides them with an understanding of

the type of learning environments that increasing numbers of their students are experiencing. A study by Picciano and Seaman (2008) reports that there has been a substantial increase in the number of K-12 students in the U.S. engaged in online courses in 2007-2008, up 47% from the 2005-2006 school year. The study further states that three quarters of the participating public school districts offer online or blended courses, and that it is anticipated that these online enrollments will continue to grow. Perhaps the most significant comments relate to the participants representing small rural school districts. For rural students the opportunity for online learning is a lifeline and allows small rural school districts to provide students with course choices that would not otherwise (Picciano & Seaman, 2008, p. 1) be part of the offered curriculum. This opportunity afforded by online learning of increased accessibility for students is also true for the teachers in rural school districts.

The trend towards increasing online course participation is also evident in the post-secondary enrollment statistics in the United States. Online enrollments (Allen & Seaman, 2008) continue to grow at rates far in excess of total post-secondary population rates today show no signs of slowing down (Allen & Seamen, 2011). This growth translates to over twenty percent of United States post-secondary students taking at least one online course in 2007. By the end of 2010 the trend resulted in thirty-one percent of U.S. students taking at least one course online (Allen & Seamen, 2011). As these statistics demonstrate, increasingly, students and their teachers are participating in online education. There is a critical need for teacher access to online learning experiences that are similar to the kind that their students will engage with in the future. A model of TPD that delivers online PD opportunities should be able to

provide teachers with those kinds of learning experiences. Online TPD may prove invaluable for those teachers, with little or no previous online learning experiences, who need to prepare themselves to engage students in online activities as well as support students for future online learning opportunities.

Online learning communities

The supportive role that teacher communities play in successful TPD programs has led to considerable interest in online teacher communities of learning (Sinha, Rosson, Carroll, & Du, 2010). According to Gan and Zhu (2007) virtual or online learning communities are online groups of learners who have come together with similar interests and learning goals. Online learning communities provide environments for rich reflective collaborative learning that supports a variety of educator practices. These types of communities provide a model for informing educational practice, professional development, and the transformation of schooling to support the development of students' knowledge and skills for the future (Dede, 2004). Of particular note to TPD researchers are the types of online tools, media, virtual environments, and social networking software that can provide support to online TPD learning communities. Collaborative discussions, peer-support, and file-sharing are key affordances (qualities that allow users to perform actions or activities) of these online communities that move the traditional teacher PD and cooperative planning into online environments (Sinha, Rosson, Carroll, & Du, 2010). The potential of these kinds of online learning communities, as a more formalized system for supporting TPD activities, is one reason for researching them in detail.

Summary

　　In summary, the number of oTPD opportunities over the past several years has been increasing to meet professional development needs (Carrington, Kervin, & Ferry, 2011; de Kramer, Masters, O'Dwyer, Dash, & Russell, 2012; Masters, de Kramer, O'Dwyer, Dash, & Russell, 2012; O'Dwyer et al., 2010; Reeves & Li, 2012; Reeves & Pedulla, 2011). Leading professional development organizations in the U.S. such as the Association for Supervision and Curriculum Development (ASCD) and the International Society for Technology in Education (ISTE) (two organizations that have seen the significant potential of oTPD) are currently delivering some of their TPD programs using online modules. These professional development organizations promote personalization and teacher access to resources anytime, anywhere as key motivations for teachers to participate. In the 2011-2012 school year, ASCD offered over 60 self-paced oTPD courses covering a wide variety of TPD topics. ASCD's oTPD promotional materials (ASCD, 2011) point out that their updated courses offer improved navigation, more video content, downloadable materials, and job-embedded applications to assist teachers with classroom implementation. In 2012, ISTE began formally offering online courses for teachers using three different models: facilitated series, facilitated stand-alone courses, and self-paced learning labs (ISTE, 2012). These oTPD providers have been increasing their online topic offerings in the past several years, and this trend will likely continue in the future. One U.S. educational organization, the Southern Regional Education Board (SREB) anticipates this trend, particularly for online or distance education teachers, and has published a set of standards that should be considered (Southern Regional Education Board, 2009) for

oTPD offerings.

At the same time, popular social networking sites continue to grow in popularity at incredible rates. Over 5000 Ning networks are created every day (Ning, 2010). Facebook, in twelve months, doubled its active members from 250 million in July 2009 to over 500 million users in July 2010 (Facebook, 2010). By July of 2012, Facebook reported almost a billion (955 million) users are active monthly (Facebook, 2012), an increase of 29 percent over the previous year. Ning and Facebook are social networking sites that provide individual users with a customizable set of collaborative online tools ranging from photo and video sharing to live chat, messaging, and discussion capabilities. As well several models of oTPD currently are being delivered around the world (Dede, Ketelhut, Whitehouse, Breit, & McCloskey, 2009; Whitehouse, 2011). What is missing, according to Dede (2006) is a body of research that can guide organizations in designing, implementing, and evaluating teacher professional development in order to make it effective from both cost and impact perspectives. This study will contribute to the existing research on online teacher professional development by exploring and developing a model of oTPD within a social networking site.

Purpose of the Study

The purpose of this study is to describe and evaluate the nature of oTPD activities that can occur within a social networking site. This study will explore and report on a specific stage of an in-progress design-based research project that the researcher is engaged in. There is considerable interest (Borko, Whitcomb, & Liston,

2009) in online PD opportunities that meet the TPD needs just-in-time, wherever, and in a manner convenient for busy teachers' schedules. TPD that meets the just-in-time criteria can be characterized as both teacher-selected and available at a time that is relevant to the teacher's curriculum delivery schedule. As Dede, Ketelhut, Whitehouse, Breit, and McCloskey (2009) have stated, a knowledge base for the development and delivery of oTPD is limited. This study addresses gaps in the distance education and TPD literature, with respect to oTPD delivery, which is identified in Chapter 2.

Numerous challenges are identified in the literature for effective delivery of TPD that online learning may be able to address. Some of these challenges are the transfer of professional development to teaching practice, accessibility to specialized professional development in rural areas, and day-to-day professional support for entry-level teachers (Dede, 2006). OTPD is ideally suited to be available to teachers during times that are convenient in their busy schedules. In this study, the oTPD being evaluated conforms to design principles acknowledging teacher participation needs to be just-in-time, wherever, and convenient for teachers' schedules.

TPD delivered within the framework of a social networking site, with capabilities similar to those in Ning or Facebook, is of specific interest for the delivery of oTPD. It becomes even more relevant for the TPD subcategory that supports teacher understanding and the uses of technology in education. Issues of scalability, ease of replication, and use of familiar social networking site capabilities are all components driving the instructional design of the oTPD in this study as these are current challenges facing oTPD developers (Dede, Ketelhut, Whitehouse, Breit, &

McCloskey, 2009). The overall goal of this study is to develop and evaluate the effectiveness of a model of oTPD delivered within a social networking site framework.

Technology oTPD

The type of oTPD being examined in this study is oTPD that focuses on supporting technology integration into the K-12 educational setting. The formal learning activity structure for the oTPD delivery is defined as a courselet (Ostashewski, 2010a); a content-focused unit of professional development delivered within a social networking site. The particular oTPD courselets developed and delivered, in this particular oTPD community, center around numerous topics of educational technology use. Some of the courselets delivered are: Lego robotics in the classroom, utilizing interactive whiteboards in the classroom, and digital storytelling in Grade 1-2 classrooms. The design considerations for the oTPD courselets are based on constructivist activities, authentic teacher tasks, and learner-centered discourse. Utilizing familiar social networking software capabilities in the oTPD design increases the likelihood of replication of the findings of this study that adds value to the significance of the findings of this study for the wider teacher educator community.

Researchers in the field of instructional design argue that effective instructional design only emerges from the deliberate application of a particular theory of learning (Bednar, Cunningham, Duffy, & Perry, 1992). The learning theory utilized in the design of the oTPD courselets is constructivist in nature where learning is viewed as a self-regulatory process having learners struggle with the conflict between existing

knowledge and new information, constructing new understandings and representations of their new knowledge. There are a wide range of descriptions and perspectives of constructivism (Duffy & Jonassen, 1992; Fosnot, 1996; Kanuka & Brooks, 2010; Moore & Kearsley, 2012) describing its application and resonance with online learning designs. For oTPD courselets, learning is understood as a flexible process, meeting the needs of the learner with the approach to teaching that gives learners the opportunity for concrete, meaningful experiences "through which they can search for patterns; raise questions; and model, interpret and defend their strategies and ideas" (Fosnot, 1996, p. *ix*). One way in which learners, or oTPD participants in are connected to practice is to contextualize the learning activities as authentic tasks; tasks which are relevant to the teacher's professional activities and workplace. These authentic tasks can be understood as situated learning tasks that present learning resources and activities in contexts that reflect the way they will be useful in real life (Herrington, Reeves, & Oliver, 2010). While this provides an overview of the instructional design of the oTPD courselets being examined in this study, a more detailed discussion of courselets and the design component of this study are provided in Chapter 3.

<div align="center">Context of the Study</div>

The context of the study is within a not-for-profit teacher professional development organization in the province of Alberta, Canada, called the 2Learn.ca Education Society. The mission of the 2Learn.ca Education Society is to initiate, advocate, and share with Alberta educators technology-enriched teaching, learning

and leadership options for the future of education (2Learn, 2010). The society is sustained by funding and support generated through an alliance of educational, government, and community partners. These partners include the Education Ministry of the Alberta provincial government, the Alberta Teachers Association, the University of Alberta, and the College of Alberta School Superintendents. The organization is governed by a board of directors consisting of one member from each of the Alliance partners, and at any given time employs between five and ten educators, researchers, programmers, and digital librarians.

In 2009 an online Alberta Educators Community (www.2Learn2Gether.ca) was established by the 2Learn.ca Education Society to support Alberta educators in a collaborative online environment. This community was based on a social networking software platform that was modified to provide members with social software tools available in networks such as Facebook and Ning. Participation in this online Educators community is through user-created online groups and forums, personal and group blogs, calendars, and membership connections. Other community opportunities include registration in classroom events, access to professional development videos, uploading and sharing of files, and the online oTPD courselets.

Since 2009 the 2Learn2Gether.ca online teacher community has engaged in considerable design, testing, and promotion initiatives to Alberta teachers through the 2Learn.ca and other educator networks. The 2Learn2Gether.ca community has been successful as a teacher community and continues to grow, reaching over 1000 members by the spring of 2010. There appears to be growing acceptance of the 2Learn2Gether.ca social network among K-12 Alberta educators based on the

community activities. Numerous discussions and events are posted and participated in by the membership in both public and private groups within the community. The 2Learn2Gether.ca online teacher community is becoming established in Alberta as one oTPD site that is capable of meeting the technology professional development needs of teachers. The extent, to which the Alberta educational community adopts this site on a long-term basis, remains to be seen. Sinha, Rosson, Carroll, and Du (2010) identify research on the capabilities of this kind of oTPD site as key in moving forward with identifying how online platforms can successfully meet oTPD needs.

Research Questions

According to Borko, Whitcomb, and Liston (2009), in order for teacher educators to realize the potentials of new communication technologies for developing tech-savvy teachers who can use the technologies, research that provides guidance is sorely needed. Dede et al. (2009) argue that research in the field of oTPD is best served by a design-based approach due to the myriad of complex issues surrounding technology and education. Furthermore, design-based research (DBR) is a constructive activity that allows researchers to refine implementations while adding to the foundation of educational technology theory (Wang & Hannafin, 2005). The DBR approach is unique because the development and refinement of innovative solutions is situated in ongoing practice. In consideration of these views regarding the need of oTPD field and research design, as well as the potential for contribution to the field, this study will follow a DBR approach.

It has been argued that the term oTPD can describe a variety of implementations

(Sinha, Rosson, Carroll, & Du, 2010). They state that there is a need to differentiate between oTPD communities, oTPD resource sites, and oTPD course delivery sites. Further, it appears that the purpose and affordances of an oTPD learning environment has a direct impact on the potential connections teachers can make with each other before, during, and after a formal learning oTPD event occurs. As mentioned previously, in this study "online" refers to the mode of delivery, rather than the online role of some teachers. However in the case of the oTPD implementation being studied here, delivered in a social networking site, the characterization of being "networked" describes both the environment as well as potential teacher connections. The definition of networked learning further supports this characterization where communication and information technology networks are "used to promote connections: between one learner and other learners, between learners and tutors; between a learning community and its learning resources." (Jones, Asensio, & Goodyear, 2000) This leads to the identification a specific sub-type of oTPD that shall be called networked teacher professional development (nTPD) (Ostashewski & Reid, 2010b; 2012a).

There is a need to differentiate the sub-type of nTPD experience from other oTPD opportunities. Distinct new kinds of teacher professional learning can occur in networked learning environments (Whitehouse, 2011). Whether it is teachers collaborating, discussing, or simply viewing online activities teachers are engaging in with their students, networked environments promote connectivity among teachers. Other emerging networked learning TPD research (Vrieling, Bastiaens, & Stijnen, 2010; 2012) reports that communication and information technologies, such as email,

discussion boards, blogs, and social media, supports the development of working and learning networks.

Networks using information technology can optimize the connectivity among teachers. Strengthening existing connections, enabling new connections and getting a speedy response can increase the extent and density of the network. The interplay between community and network processes thus enhances social learning. (Vrieling, Bastiaens, & Stijnen, 2012, p. 103)

Applying an educational environment context results in the term "communities" being defined as groups of learners working towards a common goal while the term "network" defines the set of connections among groups of learners. From this, nTPD is defined as teacher professional development delivered in an online social networking environment that supports and promotes teacher connections while learning together, both formally and informally, allowing them to retain control over their time, space, presence, activity level, identity, and relationships (Ostashewski & Reid, 2010b).

The specific goal of this study is to evaluate a model of networked teacher professional development activity delivered within a social networking site framework and further refine this model of nTPD. The specific research questions that guide the study are:

1. What kinds of profession-centered technology learning do teachers who participate in networked professional development activities engage in?

2. What components (discourse or activities) of professional development delivered in an online social networking site do teachers identify as having

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professional value?

3. What design elements of the networked teacher professional development experience affect teacher practice?

Outcome of the Study

The primary outcome of this study is a refined model and design principles for nTPD that are supported by research findings and utilize social networking site capabilities. The potential value for the 2Learn.ca Educational Society as a teacher educator association is in the identification and implementation of such a model. As Alberta is a province that is geographically large and has a relatively scattered population, the development of a new model for teacher technology professional development is significant to the advancement of the Alberta teaching profession. The findings have potential application beyond the Alberta context as Canada, and other countries such as Australia, have similar geographic challenges for technology professional development. Detailed information about nTPD characteristics, including strengths and weaknesses of the nTPD implementation, will allow the 2Learn.ca Education Society, and other oTPD providers, to support and provide efficient connections to teachers in the field while provide ongoing, just-in-time teacher professional development.

Significance of the Study

The significance of this study rests upon the evaluation of online-networked technologies for providing meaningful learning experiences to teachers involved in

nTPD Courselet activities. Research in the field of teacher professional development has identified a critical need for high quality online TPD, particularly in the area of technology use in the classroom (Borko, 2004; Borko, Whitcomb, & Liston, 2009; Dede, 2006). Another identified need is that of support for the increasing numbers of teachers who support students in distance-delivery or online courses. The Southern Regional Education Board highlights that the ability to deliver TPD in flexible, off-site work environments is even more crucial for teachers who are working in online environments (Southern Regional Education Board, 2009a). A 2011 study of almost 1500 Alberta teachers (Alberta Teachers' Association, 2011), exploring conditions of professional practice, reported that teachers view online professional development as potentially useful and are on the cusp of being used frequently. The study also reported that teachers often do not receive the PD they need to use technology in a manner that supports learning. For these reasons, the evaluated nTPD model and design principles presented herein provide one potential solution to these identified needs and the interest in online teacher professional development.

Online professional development for teachers within a social networking software framework is new in terms of how teachers access professional development. This study breaks new ground on the use of social networking software in delivery of asynchronous professional development opportunities for K-12 Alberta teachers. There is considerable potential for teacher educator organizations and providers to utilize inexpensive, scalable, social networking frameworks to meet the ongoing PD needs of teachers, using the nTPD model.

According to an extensive review of TPD literature (Desimone, 2009), there is

consensus regarding critical features of professional development for teachers that leads to increased teacher knowledge and skills and improving of their practice. These features include content focus, active learning, coherence, duration, and collective participation (Desimone, 2009). Evidence indicates that the most influential features of teacher professional development success are the content focus and discussions of strategies that will help students best learn that content. One action research study (Graham, 2004) conducted with 58 teachers in a large urban high school demonstrated that the online format of TPD was as effective as the traditional face-to-face TPD format. The study included pre and post-professional development surveys. Graham (2004) concluded that technology TPD can be delivered in an online format as an alternative to the face-to-face format without any loss of overall effectiveness. The challenge with respect to oTPD is despite that these programs are becoming increasingly popular very little research is being conducted to explore the effectiveness of these programs (Borko, Whitcomb, & Liston, 2009). This nTPD study will therefore endeavor to shed light on teacher learning that occurs from content-focused TPD delivered as nTPD technology courselets.

<div align="center">Summary</div>

Chapter 1 has introduced the goal of this design-based research study which is to evaluate the a model of networked teacher professional development activity delivered within a social networking site framework and further refine this model of nTPD. The outcomes of the refined nTPD model (a Technology Courselet model) and design principles, which are supported by research data, is the contribution to the field of online teacher professional development. The context for the study, which is within

a working teacher professional development organization involved in technology teacher professional development, grounds the study in oTPD practice where significant need for research has been identified (Borko, Whitcomb, & Liston, 2009).

Looking ahead, Chapter 2 will review thus the literature providing a theoretical framework for the study situating it in the current literature with regards to teacher professional development and online learning. Chapter 3 will describe in detail the methodology for this design-based research process understood within the ILD model of design-based research. Chapter 4 presents the data analysis, and Chapter 5 will present the findings of the study, discuss the results and conclusions relevant to the current online professional development field. Chapter 6 will outline the evaluated nTPD model and design principles looking forward to the future and contextualized in the online and distance education fields of professional learning.

CHAPTER 2: LITERATURE REVIEW

Introduction

This review of the literature examines the field of oTPD and introduces an emerging subtype described as networked teacher professional development (nTPD). NTPD has evolved from traditional face-to-face models of TPD into a distinct new type of online teacher professional development (oTPD)(Ostashewski & Reid, 2010b; Ostashewski & Reid, 2012; Whitehouse, 2011). OTPD differs from traditional TPD in two distinct ways: a) as an alternative delivery model for teacher professional development, and b) as an alternative design for teacher professional development. Current literature identifies a critical need for quality research in the area of teacher professional development that focuses on models of online teacher professional development (Borko, Whitcomb, & Liston, 2009; Dede, et al., 2009; Desimone, 2009). Worldwide considerable effort is being targeted towards school and teacher improvement, and oTPD is being seen as a viable alternative model that can address these needs (Borko, 2004; Dearn, Fraser, & Ryan, 2002; Dede, et al., 2009; Latchem, Odabai, & Kabakçı, 2006; National Research Council, 2007).

This literature review will identify the key areas in the literature that situate and bring into focus the current research and practice in oTPD. The methodology of this research study follows a design-based approach; as such it is iterative in nature working from an existing theoretical framework which is described as the Networked Learning Framework (Ostashewski & Reid, 2010b). Another purpose of this review is to provide an overview of relevant research that informs the design iterations on

which the study is based. It is important for the oTPD and distance education fields of research that this study builds on what has already been described in the literature. In summary, this review will reflect on recent literature that identifies research agendas for online teacher professional development research (Dede, et al., 2009; Sprague, 2006) and attempt to augment components of those research agendas. The literature forming this review falls into six distinct categories:

1. Defining and Determining the Need for Teacher Professional Development
2. Restructuring Teacher Professional Development
3. Successful Teacher Professional Development
4. Models of Professional Development
5. Online Teacher Professional Development
6. Networked Teacher Professional Development

Defining and Determining the Need for Teacher Professional Development

Teacher professional development encompasses many different goals, models, beliefs, challenges, and benefits. Teachers also are in need of continuous training to keep abreast of their profession and evolving pedagogies. With the increasing sophistication of educational practices and the demands placed on teachers, the requirements of teacher professional development programs become considerable.

Pressures and demands in some countries for students to acquire new competencies, and become accustomed to new approaches to teaching and learning call for new styles of teaching - meaning that more and more teachers are now having to teach in ways they were not themselves taught. (Hargreaves,

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2000, p. 151)

Teacher professional development has changed over the past 30 years. Today it can be best defined as "a long term process that includes regular opportunities and experiences planned systematically to promote growth and development in the profession" (Villegas-Reimers, 2003).

The belief in the benefits of teacher professional developments for improving instruction, and in turn bringing substantive reforms to systems of education, has been evident for over 40 years (Sparks, 1983; Vanderberghe, 2002). In the early 1980s, the realization that structured teacher "development" could result in increased student test scores (Sparks, 1983) began a field of educational research focused on identifying models of teacher professional development. Sparks (1983) states that teacher professional development offers "one of the most promising roads to the improvement of instruction" (p. 1). The perspective of educational strategists, at the time, suggested that efforts to improve education lay in the improvement of teaching practices. Joyce and Showers (1988) made the case "that staff development and student achievement are crucially, causally linked and that the knowledge exists for designing and implementing programs that make a difference in the lives of students" (p. 10).

The theme of teacher professional development resulting in teachers learning more effective teaching practices prevails in the literature today. Considerable research over the past 20 years (Borko, 2004; Corcoran, 1995) indicates that there are educational practices that teachers can learn which will directly help their students. Borko (2004) states that the educational reform movements around the world are setting ambitious goals for students, and that these reform visions will ultimately rely

on experienced teachers engaging in professional learning.

The urgent call for TPD continues at a time in education when increasingly there is a need for additional support systems to keep teachers in the profession (Borko, Whitcomb, & Liston, 2009). One study by the National Education Association (Lambert, 2006) indicates almost 50% of beginning teachers leave the profession after five years while a teacher shortage continues to exist across much of North America. The teacher shortage, coupled with increasing demands for high-quality TPD (Borko, Whitcomb, & Liston, 2009), has prompted persistent calls for ongoing, content-based professional development support of beginning classroom teachers.

One theme that appears in the literature, in regards to teacher professionalism and professional development, is the low societal status of teachers in western cultures and how that status negatively affects TPD efforts (Robinson, 2008). Fullan (2008) claims that teachers, as much as students and their parents, need to be valued within the school systems because it is not possible for the schools to exceed the "quality" of the teachers. Fullan (2008) explains that teachers are the key to any change in the educational system, and that teachers must be working under conditions in which they can succeed. It is crucial that school systems, as is true with other employers, help "all employees find meaning, increased skill development, and personal satisfaction in making contributions that *simultaneously* [italics in original] fulfill their own goals and the goals of the organization" (Fullan, 2008, p. 25).

Key forces driving the renewed interest in teacher professional development have been identified throughout the literature (Knight, 2002; Lieberman, 1995;

Putnam & Borko, 2000; Villegas-Reimers, 2003). They identify renewed TPD interest

as being driven by: a need to include technology in teaching and learning, a shift

towards constructivist pedagogies, a standards-based education, and a new

understanding that teacher professional development is best understood as career-long

teacher education. Vrasidas and Glass (2004), in their extensive review of oTPD

literature identifying TPD issues and trends, state that good professional development

resembles the best teaching as currently identified by research and practice. Another

key driving force is the sweeping technological changes to the affordances available

in online personal and social media that are making their way into the educational

context (Allen & Seamen, 2011; Anderson & Dron, 2012; Sharples, et al., 2012).

These changes, reflected in the technology curricular reforms in the past ten years, are

adding to the increased need for teacher professional development.

The challenges in providing effective teacher professional development

activities, according to Schwille, Dembélé, & Schubert (2007) are a controversial

issue all over the world:

> While everybody agrees that teacher education and teacher training are very
>
> important, the question of how much formal teacher preparation is needed and
>
> how it should be delivered is the object of much debate in developing as well as
>
> developed countries. (Schwille, Dembélé, & Schubert, 2007, p. 11)

A national US study of 1027 teachers (Desimone, Porter, Garet, Yoon, & Birman,

2002) identified that only 23% of teachers participated in TPD that could be

considered effective. This longitudinal study found that TPD focusing on specific

teaching practices increased the use of those practices in the classroom. The study

further determined that changes to teaching practices occur if teachers are provided with consistent high-quality TPD. However, the authors also concluded that most teachers had not experienced high quality TPD activities.

These TPD issues are further confounded by the challenge of delivering effective TPD that supports new infused information and communication technology (ICT) curricula. According to Borko, Whitcomb, and Liston (2009) the complexity of technology TPD becomes "wickedly" difficult. In a review of research manuscripts accepted for a special "technology TPD" edition of the Journal of Teacher Education, Borko, Whitcomb, and Liston (2009) described the complexity of technology TPD. Not only did they claim that there is a need for online delivery of TPD utilizing new technologies, but also that educational technologies in general are unstable and unreliable which adds to the complications in designing effective TPD. They stated that new online technologies, however, allow for significant innovations for online TPD, for example the scaling up to reach larger teacher audiences, use of social networking software to allow educators to learn and work together, and utilization of databases of video of classrooms. They claim that the challenge is that there is a critical need to identify the design and delivery features of oTPD that support improved teacher practices and increased student learning.

Other design challenges arise from the complexity of the teacher workforce. Not all teachers are at the same stage in their careers nor do all teachers have the same set of skills; therefore there is a need for scaffolding of TPD activities. Technology TPD is one area where these differing levels of teacher experience are evident. Secondly, Vanderberghe (2002) reminds us that TPD has yet another effect on

teachers and that is increased workload. Effective TPD designs need to consider this workload in order to be effective. OTPD may be unique in its ability to provide solutions for two TPD challenges. OTPD can provide scaffolded learning materials to support learning for a variety of experience levels, and oTPD supports access at times that are convenient for the busy schedules of teachers. A more detailed description of how oTPD meets these challenges is described in the final section of this literature review.

Teacher professional development is a topic of considerable interest around the world and is even regarded as a potential manner of promoting social issues in society. Robinson (2008) identifies this, in regard to social justice, in terms of educational quality. This is especially true in countries where there is disparity between the support available to rural and urban teachers. The concept of teacher professional development even receives support internationally as a fundamental need for societal growth. This was stated by Thomas Hammarberg, Commissioner for Human Rights, Council of Europe, on World Teachers' Day, 5th October 2006:

> In our fast-changing world, teachers must be engaged in life-long learning to be able to meet new challenges. It is a grave political contradiction that so much emphasis is being given to the importance of education while so little is being done to give teachers status, support and reward. . . The professional status of teachers should be recognised as one of the most important in society.
>
> (Robinson, 2008, p. 1)

With so much attention and consideration given to the value of TPD by educational systems around the world, what does TPD look like according to the literature?

What does teacher professional development look like?

In 1983 Sparks summarized the types of TPD activities as follows: diagnosing and prescribing, giving information and demonstrating, discussing application, and coaching (p. 3). Many of these activities are described as reading a teaching manual or as "one or two workshops along with manuals that provide vivid verbal illustrations of recommended teaching practices" (p. 3). It is argued that these types of workshop or in-service activities appear to be the mainstay of TPD despite acknowledgement that TPD is quite ineffective when delivered by this model (Corcoran, 1995: Hargreaves, 2000; Knight, 2002; Lieberman, 1995). The reason for this dichotomy between TPD delivery and lack of effectiveness is due to the complexity in design and delivery of TPD (Borko, Whitcomb, & Liston, 2009).

Corcoran (1995) described teacher professional development as almost exclusively formal activities occurring as courses or workshops where teachers are released for a day or half-day in-service programs that "may or may not be relevant to teachers' professional development needs" (p. 2). Teachers attending these types of in-services typically spend a couple hours listening to a presenter and may leave the experience with some tips or materials that are useful to their practice. Corcoran (1995) also reported that "there is seldom any follow-up to the experience, and subsequent in-services may address entirely different sets of topics" (p. 2). Certainly there has been identification of other implementation strategies for teacher professional development that addresses the need for effectiveness. Hargreaves (2000) points out that teachers learn better together than they do alone, and like students, "teachers learn by doing, reading and reflecting, collaborating with other teachers,

looking closely at students and their work, and sharing what they see" (p. 165). The need for TPD models that respect the complexities of teachers' work contexts, incorporate new knowledge about teacher learning, and include opportunities for teacher collaboration is critical (Desimone, 2009).

Other snapshots on TPD activities indicate that much of the PD has "been largely divorced from practice, often taking place outside of schools…. It's been haphazard, with many small service providers delivering idiosyncratic kinds of professional development" (Willis, 2002, p. 5). The view that current TPD models lack many of the characteristics of good professional development identified by research is common around the world (Villegas-Reimers, 2003). Teachers all too often experience a one-size-fits-all professional development model where someone other than they makes decisions about what they are to learn. Many teacher experiences with TPD focus on vague concepts of improvement instead of professional growth, exploration of innovations, new ideas, or promising new pedagogies (Clarke & Hollingsworth, 2002; National Research Council, 2007). The prescriptive top-down models of professional development, despite the findings of educational research on effective models, seldom meets the particular needs of teachers in specific fields or disciplines of education.

Hargreaves' (2000) historical review of the teacher professional learning literature points out that the benefits of in-service education do not often become integrated into classroom practice. The summary of teacher learning from the 1960s that Hargreaves (2000) presents, identifies teacher isolation as a significant issue. He also states that "the individualistic ways in which they experienced in-service courses

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off-site and away from their immediate colleagues, were extensive and disturbing"
(2000, p. 160). This results in individual teachers returning to schools of
unenthusiastic and uncomprehending colleagues who are not involved in the learning
with them. This lack of effective design context for teacher professional development
activities has resulted in teachers being resentful or even resistant to new ideas or
practices. In fact, the application of contemporary learning theory to developing
teacher professional development programs is ironically nonexistent (Clarke &
Hollingsworth, 2002). The complexity of the teacher professional development that is
required is not matched by the complexity or rigor of design of the professional
development programs (Clarke & Hollingsworth, 2002). Clark and Hollingsworth
(2002) bring into focus the change in perspective occurring as a result of research of
TPD:

> [There] has been the shift in focus from earlier conceptions of change as
> something that is done to teachers (that is, change as an event with teachers as
> relatively passive participants), to change as a complex process that involves
> learning. (Fullan & Stiegelbauer, 1991; Guskey, 1986; Hall & Loucks, 1977;
> Johnson, 1989, 1993, 1996a, b; Teacher Professional Growth Consortium,
> 1994). (2002, p. 2)

Villegas-Reimers (2003) characterizes this shift in teacher professional
development occurring around the world as having the following features:

- It is based on constructivism where teachers are treated as active learners;
- it is a long-term process;
- takes place in a particular context;

- closely linked to school reform;

- includes a view of teacher as reflective practitioner;

- collaborative in nature;

- may look and be very different in different settings.

The search for TPD models, that meet these design requirements, is relevant in times of expansive and continually-evolving educational challenges some of which are driven by massive evolutionary changes in communication technologies. A restructuring of the design and delivery of TPD to better meet the needs of teachers, as informed by research, is a second theme found in the TPD literature.

<div align="center">Restructuring Teacher Professional Development</div>

The theme of restructuring TPD to fit requirements, such as being efficient, authentic, and capable of effecting positive changes in student learning, is well represented in the literature (Borko, 2004; Hargreaves, 2000; Lieberman, 1995; Schwille, Dembélé, & Schubert, 2007; Willis, 2002). Lieberman (1995) described this restructuring of TPD as being an integral part of expectations for teachers' roles within the school culture. To meet this goal, teachers need to have on-going opportunities to discuss, consider, try, and hone their teaching practices. They would need to be involved in learning about and developing new ideas that meet their students' needs. Lieberman (1995) describes a number of ways this can be achieved: a) by developing new teacher roles such as teacher-researcher, b) by creating new teacher groups to solve problems or make decisions, c) by working on new tasks such as creating standards or learning about assessment, and d) by creating a community of

inquiry around teaching practice.

Borko (2004) claims that TPD will be most effective when integrated into school cultures that promote career-long teacher learning. A school context where lifelong learning and TPD is an integral part of the culture is the goal that TPD programs need to strive for. Adler (2000, as cited in Borko, 2004) states that from a situational perspective, teacher learning "is usefully understood as a process of increasing participation in the practice of teaching, and through this participation, a process of becoming knowledgeable in and about teaching" (Borko, 2004, p. 4). Learning, for teachers, occurs in the different contexts or environments in which they work, such as: their classrooms, school communities, courses or workshops, but also in the hallways, or after school while in conversations with their students (Borko, 2004).

> James Stigler (cited in Willis, 2002), highlights what TPD should include: (t)oday, people believe that professional development should be targeted and directly related to teachers' practice. It should be site-based and long-term. It should be an ongoing part of a teacher's workweek, not something that's tacked on. And it should be curriculum-based, to the extent possible, so that it helps teachers help their students master the curriculum at a higher level. (Willis, 2002, p. 6)

In Stigler's opinion, one of the key challenges, to improving professional development for teachers, is to create contexts in which collaborative work can be sustained.

Other explorations of successful TPD structures (Hargreaves, 2000) indicate

that there has been a shift in patterns of professional development. Successful TPD has moved to on-site experiences, building ongoing relationships and teams within departments, and occurs while working in interdisciplinary teams. Hargreaves (2000) claims that strong collaborative school cultures can "even make highly effective use of external input including the much-maligned one-shot workshops and inspirational speeches by "experts" because teachers process it together in ways that have value and make sense for the school community in which they work" (p. 165).

McKenzie (2001) contends that the intent and design of TPD should be on the teaching and learning strategies that make a difference in daily practice and translate into stronger student achievement. "We must also convince them [teachers] of the value of engaging students in problem-based or project-based learning with these new tools" (McKenzie, 2001, p. 2). TPD activities that will have a direct effect on new skill integration into teaching practices are those that are structured around informal support systems, partnerships, teams, and collaborative structures (Desimone, et al., 2002; McKenzie, 2001).

The restructuring theme of TPD includes an identification of the need for teachers to be connected with other teachers outside the school. These outside groups may include "teacher-researcher groups, peer review groups, teacher networks and organizational partnerships, and programs that involve teachers in national, state, and local school and curriculum reform activities" (Lieberman et al., 1996, p. 4). The connection to other teachers, either in or outside the school that a teacher works in, is a subject of considerable interest in the literature. This networking or connecting with other teachers is often referred to as teacher collaboration and is identified in the

literature as a requirement of effective TPD models (Desimone, 2009).

Successful Teacher Professional Development

Policy makers understand TPD has a significant positive impact on teachers'

beliefs and practices, students' learning, and on the implementation of educational

reforms (Villegas-Reimers, 2003, p. 19). An understanding of the components of TPD

is a critical tool in gauging the purposes and success of specific TPD programs.

Villegas-Reimers (2003) describes information disseminated in TPD as falling into

one of the following three categories: knowledge for practice, knowledge in practice,

or knowledge of practice. Another tool valuable for planners of TPD is an

understanding of the characteristics that compose successful TPD activities.

According to Villegas-Reimers (2003), the new perspective in TPD as informed by

the literature is characterized by the following: a constructivist approach, it is long-

term, it takes place in a particular context, it is intimately linked to school reform,

views teacher as a reflective practitioner, is collaborative, and may look very different

in diverse settings. A common theme the current literature review identifies for

successful TPD is the interactions between teachers, as collaborators and peers in

practice.

Collaboration as a structure of successful teacher professional development

The theme of collaboration between teachers is one topic that pervades much of

the literature on successful designs of TPD (Jones, 2008; Glazer and Hannafin, 2006;

Ostashewski, 2004; Sparks, 1983). The role of collaboration in small groups during

TPD has been recognized (Joyce & Showers, 1988; Sparks, 1983).

Sparks (1983) states:

> Including opportunities for discussion and reflection in small 'support groups' appears to be a productive training activity. The idea of creating instruction support groups is not new. Bentzen's (1974) I/D/E/A study of school change highlighted the 'peer group strategy' as a powerful force for change. When staff members formed small groups and engaged in group problem-solving activities, changes occurred and persisted in the school. (p. 68)

In other educational systems around the world, such as the Chinese and Japanese systems, collaboration and working together for the purposes of professional development are a long-standing practice (Schwille, Dembélé, & Schubert, 2007). "Unlike countries where teachers are said to be 'isolated in their classrooms', peers play a very important role in efforts to improve what practicing teachers know and do in these countries" (Schwille, et al., 2007, p. 34). The concept of teacher collaboration has been reported in the literature (Butler, Novak Lauscher, Jarvis-Selinger, & Beckingham, 2004; Jones, 2008; Glazer & Hannafin, 2006) as a powerful method of TPD. One of the models, relevant to this study, that utilizes teacher collaboration, Jones (2008) is discussed in the models of teacher professional development section later in this chapter.

Ostashewski (2004) also points to the value of TPD that can result from collaborations between teachers and students, and teachers and other teachers. This mixed method study found that authentic teacher participation in online collaborative projects resulted in teachers learning about teaching practice, new ways to learn, and learning new ways to incorporate technology into classroom practice.

When teachers engage in a variety of learning experiences with school

colleagues, learning groups form which support individual initiative and innovation

(Lieberman, et al., 1996). Teacher collaboration can play a significant role in TPD as

it forms the basis of communities of practice:

> Professional learning is a social enterprise where peers rely on the expertise and
>
> support of one another to adopt innovative practices. Reciprocal interactions in a
>
> community of practice, where teachers take responsibility for each other's
>
> learning and development, may provide an effective means of supporting
>
> situated professional learning. (Glazer & Hannafin, 2006, p. 61)

It is these collaborations and peer discourse, a social interactive process, which forms

the basis for their value in TPD activities.

Professional Learning Communities in TPD

In the literature there are varied definitions of a professional learning

community (PLC), and, over the past 20 years, the definitions have evolved (Stoll,

Bolam, McMahon, Wallace & Thomas, 2006). There now appears to be broad

international consensus that a PLC is defined as "a group of people sharing and

critically interrogating their practice in an ongoing, reflective, collaborative, inclusive,

learning-oriented, growth-promoting way (Mitchell & Sackney, 2000; Toole & Louis,

2002); operating as a collective enterprise." (Stoll, et al, 2006, p. 223) Another

definition of PLC, as elaborated by Seashore, Anderson, and Riedel includes a school

culture framework:

> By using the term professional learning community we signify our interest not
>
> only in discrete acts of teacher sharing, but in the establishment of a school-

wide culture that makes collaboration expected, inclusive, genuine, ongoing,

and focused on critically examining practice to improve student outcomes.

(2003, p. 3)

PLCs are described in the literature as one basic structure where TPD activities are

found to be effective (Koellner-Clark, & Borko, 2004; Lieberman, & Mace, 2009;

Ostashewski & Reid, 2009). PLC success is identified in the literature as the ability of

the PLC to support teacher change that enhances student learning. PLCs share key

characteristics of TPD that have already been explored in this literature review. These

include collaboration, ongoing activities, support for teacher professional

development decision-making, and a context that is authentic and situated in practice.

Bentzen (1974) (as cited in Sparks, 1983) identified teacher peer-group discussions as

having substantive value in being a catalyst for school change. A distinguishing

characteristic of PLCs is that they are part of the entire social system in which a

teacher lives and works, which is a truly authentic teacher environment for TPD

(Putnam & Borko, 2000).

PLCs are significantly more encompassing in their scope and organization than

Bentzen's peer-groups (Feiman-Nemser, 2001; Stoll et al., 2006). What sets PLCs

apart from support groups is that PLCs share a critical stance or purpose and a

commitment to continuing inquiry (Feiman-Nemser, 2001). Teachers in support

groups or peer-groups mainly share ideas and offer encouragement to one another;

whereas, the fundamental building block of a PLC is "teachers meeting as

collaborative inquiry learning teams, building shared knowledge about student

learning and their professional practice" (Coulson, 2008, p. 201).

Evidence for the importance of teacher discussions, as being crucial for successful TPD, can be found in the literature. Feiman-Nemser (2001) explains that the kinds of conversations that teachers engage in regarding teaching practice are different than regular conversations. Professional discussions involve detailed descriptions of practice, examples in common contexts, and examinations of interpretations and possibilities. As teacher conversations take place about practice using common language and shared experiences, new understandings emerge. One recent study of the effects of teacher discourse as a part of TPD activity (Gillies & Khan, 2008) affirms teacher conversation as a key component for successful TPD. Gillies and Khan (2008) found that teachers, who were involved in TPD activities that included opportunities to discuss and share methods of implementing a teaching practice, implemented such practices better than teachers who only had the opportunity to attend a two-day TPD workshop without opportunities for sharing.

Characteristics of effective professional learning communities

Although the literature supports PLCs as valuable TPD activity structures, the development of a PLC is not as simple as putting together a group of teachers. Hargreaves and Fink (2006) make the succinct observation that "[p]rofessional learning communities can't be forced; they can only be facilitated and fed" (p.129). Although there is much to be learned in developing and sustaining PLCs for teacher professional development, the literature does identify characteristics of effective PLCs. According to a 34-month study of PLCs as contexts for teacher professional learning in England (Bolam et al., 2005), it is recognized that PLCs are one means of providing teacher support that leads to improvement in student learning. This study

included a comprehensive literature review, questionnaires, survey responses from 393 schools, case studies of 16 schools, and workshop conferences. The findings of this study supported the findings of previous literature identifying the following effective teacher PLCs characteristics:

- shared values and vision,

- collective responsibility for pupils' learning,

- collaboration focused on learning,

- individual and collective professional learning,

- reflective professional enquiry,

- openness, networks, and partnerships,

- inclusive membership,

- mutual trust, respect, and support (Bolam et al., 2005, p. 145).

Another key finding of the Bolam et al. (2005) study is that student learning is the primary concern of the teachers working in these kinds of PLCs. Two measures of the effectiveness of the PLC, student achievement and professional learning of teachers, showed increased positive association in mature PLCs. Survey analysis and case study factor analysis examining the relationship between student outcomes and survey results supported the conclusion that PLC participation appears to be related to enhanced student performance. In other words, mature PLCs lead to increased student achievement (Bolam et al., 2005).

A review of PLC literature (Vescio, Rossa, & Adams, 2008) examined empirical research on 11 mature communities and concluded that teacher participation in mature PLCs leads to an improvement in student learning. Although this study

acknowledges that there are only a few empirical studies of TPD effect on student learning, the study focused on two basic questions in the literature: a) how does teaching practice change as a result of PLC participation, and b) does the literature support an assumption that teacher PLC participation results in increased student learning. The authors report that there are four characteristics of the PLC that result in effective teacher learning. These characteristics are: collaboration, focus on student learning, teacher leadership, and continuous teacher learning. While traditional models of TPD have focused on providing teachers with knowledge for practice, the PLC framework represents a different approach. Mature PLCs, at their best, focus on providing teachers with knowledge of practice which makes mature PLCs invaluable for effective TPD activities. This review of the PLC research concluded that teacher participation in PLCs does result in increases in student learning, and that the PLC model represents a fundamental shift away from traditional TPD models.

According to the literature, PLCs can also meet a critical need that educational reform requires - teaching practice innovations (Ostashewski & Reid, 2009; Zhang, Hong, Teo, Scardamalia, & Morley, 2008). Reforms that result in integration of new technologies or teaching practices at their core require teacher innovation and collaborations. Zhang et al. (2008) maintain that true educational reform relies on the development of innovative teacher communities that have the capacity to explore, create, share, and deepen new practices. The findings of other PLC studies and literature reviews (Koellner-Clark & Borko, 2004; Lieberman & Mace, 2009; Vonderwell, Franklin, & Zachariah, 2007) support the finding that professional learning communities can provide a medium for successful TPD.

Models of Teacher Professional Development

Numerous models of teacher professional development have been implemented over the past 50 years. Some of these models include complete systemic reform as their goal while others are less encompassing only intending to remediate or add to existing teacher practices. Knight (2002) comments that the limitations of event-delivery models of teacher professional development are well documented yet often defaulted to by policy makers. Examples of these event models include one-day seminars, workshops, or multiday teacher conventions where teachers from different schools come together to hear speakers or sessions relating to teacher practices. Similarly Schwille, Dembélé, and Schubert (2007) report that, around the world, regardless of a country's wealth, there is a lack of sufficient support for TPD. They state that often teachers, having completed a workshop or seminar or other PD event, return to the school with no opportunity for feedback, additional resources, or time to discuss their experiences with colleagues. The dissemination of effective TPD models can lead to more effective educational PD practices around the world. It is therefore incumbent on the TPD research community to continue to examine and disseminate effective models of TPD to better inform future designers of TPD activities (Desimone, 2009).

Many models of TPD have been used to support a wide range of educational contexts. However, a model's effectiveness may rest on factors that are beyond the control of TPD providers. The literature is clear that, for the most part, the in-service or workshop model is out-of-date with current understandings of successful TPD delivery (Corcoran, 1995; Putnam & Borko, 2000; Schwille et al., 2007; Villegas-

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Reimers 2003). PD programs often use a combination of TPD models simultaneously to cause a change in teaching practice (Villegas-Reimers 2003). In cases, where substantial initialization and embedding of a major educational and organizational change is planned, a complex model of TPD that integrates teacher needs and stages of delivery may even be necessary (Starkey, et al., 2009).

A distinct set of characteristics of successful TPD has been identified in the literature (Desimone, 2009; Schwille et al., 2007). The role that teacher collaboration and professional learning communities play in the design of teacher professional development has also been articulated in this literature. Schwille et al., (2007) identify two key dimensions of successful professional development: core features and core structures. The core features are a focus on content, active learning, and coherence. The core structures are duration, form, and participation. Desimone (2009) affirms that recent research reflects a consensus about some of the characteristics critical to successful TPD that increases student achievement: content focus, active learning, coherence, duration, and collective participation. These two sets of effective TPD characteristics form the basis of conceptual frameworks for TPD models that can inform design. According to Desimone (2009) the use of these kinds of frameworks by TPD researchers will "elevate the quality of professional development studies and subsequently the general understanding of how best to shape and implement teacher learning opportunities for the maximum benefit of both teachers and students" (p. 181). The framework identified by Desimone (2009) informs the design of the nTPD Technology Courselets that are the subject of this study.

Models of TPD can be classified into two categories – organizational

partnership models, and small group or individual models (Villegas-Reimers, 2003).

Table 1 highlights types of TPD models that fall into these two categories that have

been identified in the literature.

Table 1

Models of Teacher Professional Development

Organizational Partnership Models	Small Group or Individual Models
Professional development schools	Reflective
University-school partnerships	Project-based,
Schools' networks	Portfolio
Teachers' networks	Case-based
Distance education	Co-operative development
	Cascade
	Self-directed
	Action research

Blended face-to-face/online models of TPD are also becoming more common as the

value of ongoing online support of face-to-face TPD continues to be explored. Two

contemporary models of TPD from the review of the literature are presented. These

models were selected because of their similarity to design principles being evaluated

by this research study as well their successes as reported in the literature. The two

models are the Trek 21 Model (Wells, 2007) and the Collaborative Partnership Model

(Jones, 2008).

Trek 21 Model of Teacher Professional Development

    The Trek 21 Model of TPD is an example of a researcher-led TPD program that

is informed by research, highly structured, flexible, responsive to teachers' needs and

decisions, and is delivered in a PLC framework. The Trek 21 (Wells, 2007) model

development began with a detailed examination of successful TPD characteristics from the last decade of TPD research. The Trek 21 analysis of effective PD studies from 1997 to 2007 followed standard content analysis procedures with two independent reviewers comparing results and reaching consensus on PD descriptors: "Results of analysis clearly indicated what researchers and educators broadly agree are those characteristics or principles that, when integrated together, lead to successful professional development" (Wells, 2007, p. 105). This review resulted in the identification of 10 key design factors for effective TPD. According to Wells (2007) these factors of successful TPD are: evaluation driven, contextual, learner centered, duration of process, engagement, inquiry based, theory/research based, collaborative, supportive, and sustainable.

The Trek 21 study developed and delivered TPD over a three-year implementation plan, using a cyclical model of TPD that followed an academic year. The cycle was iterative based on summative and formative evaluations of previous years and involved four phases of implementation during each year:

1. Pre-Participation phase - teachers submitted proposed lesson plans; skill level data was collected about teachers; instructional leaders planned support needed.

2. Summer Institute phase – involved the delivery of 3 week TPD seminar that included exemplars, technical training, lesson creation, and evaluations; the product was a study unit designed to engage students.

3. Implementation phase - written feedback was presented to participants on evaluation of their units; continuity meetings and site visits to schools were

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conducted; support for teachers' use of their units and minimizing implementation barriers was provided.

4. Post-implementation phase - teachers were brought together once more to reflect/share implementation experiences; make revisions to unit/lessons and discuss the impact of their efforts within schools/communities.

Findings of the 3 year longitudinal study that analyzed qualitative and quantitative data that was collected periodically from over 100 teachers (Wells, 2007), indicated that the following five key design factors appeared to have the greatest influence on the success of a TPD model:

1. Duration of process in both hours as well as the span of time;

2. Learner centered focus: focusing on content and guiding teachers to explore the theory and pedagogy of effective integration;

3. Teacher engagement in active teacher experiences leading to lesson plan development;

4. Teacher collaboration: working with Instructional Leaders, Trek 21 staff, and other teachers;

5. Support: long term, sustained pedagogical and technical support.

These five design factors are consistent with the characteristics of successful TPD models identified by Desimone (2009) and Schwille et al. (2007). The features of this study that describe the Trek 21 TPD Model that make it of interest are the cyclical nature and the time span of the TPD. As well the ongoing nature of the program was organized around collaborations and supporting teaching practice in a structured program. One of the strengths of the program is the considerable time span over

which it occurred thus allowing teachers to consider, practice, revise, and discuss with other teachers. Although this model does inform effective TPD practice, it may not be replicable for every teaching context because of the considerable time and organization of professionals external to the school. One manner in which this time and organizational challenge may be mitigated is with collaborative partnerships between the research and practice communities.

Collaborative Partnership Model of Teacher Professional Development

The contribution that the Collaborative Partnership model makes to effective TPD practice revolves around its innovative approach to utilizing partnerships between pre-service and practicing teachers. The model provides a structure for teacher partnerships to develop, implement, and revise lesson plans in a cyclical action-reflection process. In this model, both groups of teachers are considered learners in an authentic constructivist environment. The basis of this model is cooperative discussions and planning of teaching practices for the classroom (Jones, 2008).

The duration of the online component of the TPD program was a factor to note in this TPD model. Jones' (2008) TPD model requires a significant commitment time of no less than one full school term of approximately 10 weeks. During this time, teacher partnerships plan, implement, and reflect on critical components of lessons. This process continues in a cyclical manner for the duration of the program. The extended time-span of the program, according to Jones (2008), helps move away from the injection-type nature of single-session TPD programs while offering ongoing support for the teacher partnerships.

The components of the Collaborative Partnerships model include the following:

- a set number of sessions over a period of time that are shared by all partners;

- sessions that are facilitated by the university lecturers, incorporate elements of reflective practice and frameworks for the effective delivery;

- partners discuss ideas for lessons and begin planning lessons;

- during the partnership, pre-service teachers would regularly attend lectures;

- tutorials, which are conducted every three to four weeks, focus on students sharing their experiences.

A key factor of a successful Collaborative Partnership as a TPD activity centers on the collaboration in the teacher partnerships. The collaboration between partners, rather than the traditional mentor assessor role for the practicing teacher, is the key to the success of the TPD aspect of the model. Another significant factor is that the model brings the TPD activity into an authentic school setting environment. Other key factors are the ongoing action-reflection process, which is built into the partnership activities, and the opportunities for the partners to link theory to practice. One example of the theory-practice linkage is that the practicing teachers are asking for PD programs that adopt the constructivist approaches, which are the same as what the pre-service teachers are being asked to implement. A second example of linking of theory to practice, which is identified in this study, is the practicing teachers' requests for ongoing TPD that supports the use of specific classroom resources. The strength of the Collaborative Partnership model is that it has the potential to remove the artificial teaching experience that pre-service teachers often find in professional experience rounds. At the same time the model provides constructivist TPD activities

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that connect practicing teachers to university researchers.

Other models of university-practitioner collaboration, such as the Collaborative – Reflection model (Butler, et al., 2004), further support the Jones (2008) findings that the action-reflection process is a successful TPD approach. A two-year case study involving 10 teachers (Butler et al., 2004) found that teachers were actively reflecting on their learning and were constructing new knowledge about teaching. Providing teachers with opportunities to reflect, and have ample time to do so, is one of the characteristics of oTPD that supports its overall effectiveness as an effective TPD activity. Designing reflective oTPD activities about pedagogy for a network of teachers who also have opportunities for discussion of that pedagogy may, in fact, be an effective oTPD model.

Online Teacher Professional Development

OTPD can be defined as online-delivered TPD activities that increase the knowledge and skills of teachers with the understood goal of improving student learning (Dede, et al., 2009). oTPD has the unique ability to provide ongoing, scaffolded professional learning anytime, anywhere allowing teachers to access them at convenient times in their busy schedules. Other positive attributes of oTPD that are discussed in the literature include: access to training or experts in other locations (O'Dwyer et al., 2010), can be provided in scalable and less expensive modes (de Kramer et al., 2012), support for the general benefits of online learning deep learning (Dede, 2004), and utilizing practitioner learning approaches such as learning by design and cognitive apprenticeship (Whitehouse, 2011).

The Potential of oTPD

OTPD has the potential to provide scalable and equitable TPD opportunities that are based on effective models of TPD which include teacher collaboration within a learning community network (Brook & Oliver, 2003; Brook & Oliver, 2004; Herrington, Herrington, Hoban & Reid, 2009; Ostashewski, 2010). One driver for a move towards oTPD is the recent surge in K-12 education practice in the use of online technologies such as blogs, wikis, and discussion forums (Maddux, Sprague, Ferdig, & Albion, 2007). In addition, there is increasing pressure on teachers to build online courses, modify existing courses, and to teach online or in blended models (Crichton & Childs, 2003). Without opportunities for teachers to engage in online opportunities for their own learning, it is not likely that there will be many innovations in K-12 online activities. OTPD has been identified as a way of providing participating teachers with opportunities to expand their own pedagogical tool-kits which may provide the basis for new K-12 student learning experiences (Dede, 2006; Sprague, 2006).

A report of a national US workshop (National Research Council, 2007), where teachers and researchers discussed the potentials of oTPD, identified the following characteristics: flexibility and versatility in PD delivery, the potential to build learning communities among teachers and across groups, and new possibilities for TPD accountability. Graham's (2004) exploratory study comparing teacher who participated in online and face-to-face delivery formats for TPD demonstrated that the online format was as effective as the traditional face-to-face TPD format. The potentials for oTPD to provide effective TPD have been generally articulated in the

literature (Carey, Kleiman, Russell, Venable, & Louie, 2008; Russell, Douglas, Kleiman, & Carey, 2009; Yang & Lui, 2004); what is missing are the researched design principles and refined models needed for implementation and practice.

According to Dede (2004, 2006) there is significant potential for oTPD to be viewed as a unique model of TPD. What is currently missing, however, for effective design and delivery of oTPD are the frameworks grounded in research and evaluation that can provide some direction to the creation and evaluation of online professional development (Dede, 2006; Dede, et al., 2009; Vrasidas & Glass, 2004). Recent literature also identifies a need for more evidence of effectiveness in the field of oTPD where little is currently known about best practices for design and implementation (Sprague, 2006; Dede, et al., 2009). There exists a need for oTPD research with regard to the challenges creators of oTPD face, such as developing online platforms to support oTPD communities in a way which does not involve a steep learning curve (Wideman, Owston, & Sinitskaya, 2007). In summary, the gap that is identified in the oTPD literature is the lack of research contributing to the design and implementation of models of effective oTPD.

Blended learning approaches to oTPD

Another area of research on oTPD centres on the development of hybrid or blended approaches to TPD where an online component further supports or continues the TPD activity. There are several significant challenges to developing and supporting an online learning community. One solution is to incorporate a face-to-face component that can strengthen the social cohesion of the learning community and potentially develop a collective momentum for implementing meaningful change in

teaching practices (Wideman, Owston, & Sinitskaya, 2007).

One TPD model (Walsh & Beckham, 2004) used the blended approach to compensate for the traditional one-off seminar TPD experience and monitor implementation for a system-wide TPD program. In this case, the model included an initial face-to-face TPD program. Following that program, the district and the teachers maintained a fifteen-week online community where direct support was provided to the teachers. A benefit of this kind of oTPD approach was that the district could observe and guide the teachers' growth. Walsh and Beckham (2004) stated that this approach was very valuable for both the teachers and the district:

> (t)he teachers and their schools by receiving the support they need as they learn about and implement high-quality, standards-based professional development, and the school system by having direct involvement in each step of the implementation of its adopted systemic professional development philosophy. (2004, p. 2)

Findings of oTPD research in the blended face-to-face/online TPD approach have also demonstrated that an online community of practice, added to existing face-to-face technology professional development, can be used to increase communication and collaboration among teachers (Vavasseur & MacGregor, 2008, p. 532). This mixed method comparative study of two schools that were committed to TPD found that teachers supported by an online PLC engaged in collaborative reflection. Evidence from both the survey of 74 teachers and focus group interviews, which were conducted in this study, indicated that teachers valued the online discussions. Vavasseur and MacGregor (2008) state that "through their participation in the online

community of practice, the teachers had the opportunity to gather ideas about how others implemented and managed their instructional computing experiences" (p. 528). A study by Green and Cifuentes (2008) exploring TPD opportunities with/without online follow-up activities found that online follow-up to TPD, with or without peer interactions, led to more positive attitudes by the treatment groups toward the PD activity. This study utilized a post-test only experimental design with 450 randomly assigned self-selected participants from 12 Texas school districts. The study concluded that online follow-up with peer interactions increased the completion rates for the TPD task. The treatments in this study were follow-up without peer interaction and follow-up with peer interaction. 125 teachers responded to the survey after the TPD activities:

> (t)he finding of the significant difference in completion and the higher
> likelihood of completion by the Follow-up with Peer Interaction participants is
> consistent with Lou, Abrami, and d'Appolonia's (2001) meta analysis that found
> that participants were likely to persevere in socially mediated technology
> environments. (Green & Cifuentes, 2008, p. 301)

Green and Cifuentes (2008) claim their findings strongly support the blended oTPD approach and suggest that TPD providers should design online follow-up activities for TPD programs.

The relevance of the blended TPD research findings to this study is that some of the models described work to establish online communities of practice. This supports the notion that other TPD developers and researchers acknowledge the significant design value of the online community development. The ability of the online

community to increase or support ongoing teacher-to-teacher communication (Green & Cifuentes, 2008; Vavasseur & MacGregor, 2008) is a key finding for TPD developers working to design effective TPD.

Flexibility and versatility in oTPD

One of the potentials of oTPD as a delivery format is the unique flexibility and versatility in delivery that the online environment provides. OTPD technologies "enable PD providers to draw on resources not available locally, offer 'just-in-time' work-embedded support, and accommodate individual teachers' busy schedules" (Borko, Whitcomb, & Liston, 2009, p. 5). Graham (2004) found that teachers in the online group enjoyed the anytime, anywhere nature of the online experience. Vrasidas & Glass, (2004) further claim that oTPD provides opportunities that would not normally be available for teachers in rural areas. Other studies purposefully designed oTPD utilizing the flexibility and versatility of the online environment:

> [The oTPD experience] was intended to remove participants from the traditional workshop or staff development settings and place them in an extended, content-rich, online learning community with opportunities to read and discuss current research, communicate with peers from within and outside of their own school systems, consult with staff development experts, and implement and report site-based action research. (Walsh & Beckham, 2004, p. 1).

However, the online nature of oTPD also creates barriers to teacher participation. One significant barrier is the limited teacher access to the Internet, that is typical in developing countries where needs for TPD may be the greatest (Vrasidas & Glass, 2004). High-speed Internet access is needed for teachers to be able to participate fully

in the type of media-rich oTPD described in this research.

Learning Communities in oTPD

Research involving online professional learning communities (Brook & Oliver, 2004; Gan & Zhu, 2007; Sinha, Rosson, Carroll, & Du, 2010) has identified significant learning opportunities for teacher learning where there are established online groups of learners.

> [Online] "Learning communities" are a model of classroom instruction and teacher professional development that enables a shift from the traditional transfer and assimilation of information to the creation, sharing, and mastery of knowledge. (Dede, 2004, p. 2)

The concept of learning communities for oTPD has been well researched over the past 10 years (Brook & Oliver, 2003; 2004; Lock, 2006; Oliver & Brook, 2002; Sessums, 2009; Vavasseur & MacGregor, 2008; Vrasidas & Glass, 2004; Waltonen-Moore, Stuart, Newton, Oswald, & Varonis, 2006) describing them as one effective manner of bringing about meaningful communication and collaboration. In a mixed-method comparative case study of 40 teachers in two schools, teachers and principles of one school voiced the need for an online community that encompassed more teachers within the school district (Vavasseur & MacGregor, 2008). In rural school districts, the ability to connect subject matter teachers with each other, for example high school biology teachers, holds considerable value. This study concluded that online communities also allow teachers, who would not normally communicate with each other, the ability to engage in reflective practice and provide support for each other in adopting innovation (Vavasseur & MacGregor, 2008).

The most common design and analytical framework for oTPD is the use of communities of practice (Vrasidas & Glass, 2004). The primary importance identified is that communities of practice are thought of as "sites of mutual learning activities resulting in their becoming valuable contributors to the structure of knowledge industries, such as education" (Vrasidas & Glass, 2004, p. 6). Brook & Oliver (2003) contend that it is possible to both support and prompt rational participant will to form community in an online environment. The inherently social situated nature of online communities can provide learning support for community members, and therefore, many oTPD programs design towards this potential, attempting to build learning communities among teachers and across groups, even including non-profession members like subject matter experts (Brook & Oliver, 2004; Lock, 2006; National Research Council, 2007; Oliver & Brook, 2002; Sessums, 2009; Vavasseur & MacGregor, 2008; Waltonen-Moore, et al., 2006). One recent mixed-method school-based learning community study reported that a community of practice was successfully supported using collaborative inquiry teams (Coulson, 2008). The teams need a shared purpose and values to engage in collaborative inquiry and the study outcomes describe an effective TPD design principle; in order to succeed as an online learning community there needs to be a common learning purpose.

The development and support of these online learning communities is not simply layering online technology onto traditional PD routines and practices (Lock, 2006); instead, it requires thinking about TPD differently by using a community model approach where online technology provides new places to facilitate learning and collaboration which is designed to enhance teaching and learning. One group of

elearning designers (Villa, Colazzo, Conte, & Molinari, 2007) describe their experiences creating virtual or online communities for educational purposes. They state that in their experience a "virtual community cannot be considered simply as a transposition of a real community into the web but, rather, a new organizational form mediated through computer science instruments" (p. 4). Lock (2006) further points out that the process of "developing an online learning culture requires a shared understanding by all educational stakeholders involved in conceptualizing, developing, implementing, and sustaining a community model of professional development" (p. 675). In sum, while online learning may have the technology tools to create an online space, the development of teacher learning in that space is more complex than making use of the technology tools themselves.

Research also identifies the factors and processes for the development of an oTPD community for PD developers (Brook & Oliver, 2004; Luca, & McLoughlin, 2004; Sessums, 2009; Waltonen-Moore, et al., 2006). One comparative study of graduate education students explored the use of an online threaded discussion board to develop and support and sustain an online TPD community (Waltonen-Moore, et al., 2006). This study described five stages of online group development that took place over a five week period: introduction, identification, interaction, involvement, and inquiry. A similar mixed-method inquiry study conducted on the success of learning community development in four online courses (Brook & Oliver, 2004) found that online communities can thrive. These online learning communities are sustained in contexts where there are numerous opportunities for all members to contribute to meaningful and regular discussions. A mixed-method case study describing a

successful oTPD learning community (Sessums, 2009) also identified the key position that the facilitator or coach plays in a successful oTPD learning community.

> Through responding to prompts, seeking and giving advice, encouraging and clarifying information, and casually and intentionally observing one another, the coaches were able to deepen their understanding of teacher inquiry/action research, coaching teacher inquiry/action research, as well as deepen their understanding of their own stance toward their coaching practice. (Sessums, 2009, p. 148)

These types of studies inform the design of and support online learning communities for oTPD. This topic requires much study to support practitioners and creators of oTPD (Whitehouse, Breit, McCloskey, Ketelhut, & Dede, 2006; Vrasidas & Glass, 2004) and forms a component of this study.

Transfer of oTPD learning to the classroom

Does oTPD enhance teacher practice? This question needs to be answered for any TPD evaluation and is, therefore, the starting point for several research studies in oTPD (Coffman, 2004; Herrington, Herrington, Hoban, & Reid, 2009; Norris, 2008). Results of one mixed method study on skills transferred to the classroom as a result of oTPD (Coffman, 2004) indicated that teachers stated they were becoming more interested in enhancing their teaching skills as a result of the oTPD. Another oTPD finding that Coffman (2004) described was the use of new delivery methods as well as the use of technology tools to enhance their professional practice and productivity. Teachers commented that the online community helps them stay up-to-date with current issues. Coffman (2004) determined that collaboration in a learning community

is critical for allowing teachers to interact with their peers. These interactions result in teachers sharing of ideas and support of each other through online discussions. As a result, Coffman (2004) found that the discussion boards were seen as the highlight of the learning community experience since teachers highly valued the discussions with other teachers.

A second and more exhaustive study conducted in Australia by Herrington, Herrington, Hoban and Reid (2009) explored the transfer of oTPD modules to classroom practice. The methodology of this study included a telephone survey and a multiple case qualitative study approach to investigate the impact and transfer of the knowledge of teachers who participated in the online modules program. The case study approach included classroom visits for eight of the classes involved. Findings reported from this study state that when transfer of knowledge happened, it was not constrained to the walls of a single classroom but went beyond to other subject areas, other levels, and even beyond the school community. Learning new skills was also identified as a significant outcome of the oTPD, and one that resulted in a great deal of personal satisfaction from the teachers in terms of their own learning and skill development. Finally, the study confirmed, via classroom observations by the research team, that pedagogical change did occur for many teachers. Benefits identified for students were summarized as: a) students became engaged in authentic and meaningful learning experience, and b) students were able to take greater control of their learning.

Of particular note in the Herrington et al., 2009 study are the design and development findings for future oTPD programs. The study revealed that, when the

oTPD modules were well designed, they assisted greatly in providing teachers with new ideas and skills. When modules did not reflect principles of adult education, or were not based on authentic learning, the modules were less effective. Task designs in some modules were reported to often neglect the fact that teachers bring a variety of contexts and backgrounds to their own learning situations. Teachers requested considerable flexibility in timelines for completion of the modules and stated that numerous options for completion of the modules should be available since many teachers felt constrained by the requirement for completion of the modules within a given time frame.

A third study on teacher knowledge transfer (Norris, 2008) from an oTPD program was described as exploratory. This qualitative dissertation study used three content analysis approaches for data analysis: the Garrison four-stage cognitive processing model, a traditional bottom-up content analysis, and a lesson plan rubric. Data collected included online discussions, online reflections, and lesson plans of oTPD participants. The findings from the study included evidence that the online teacher participants engaged in high-quality discussions, reflected upon new knowledge, and applied their new knowledge to their teaching practice. A limitation of this study, which was noted by Norris (2008), was the lack of specific instruments for use in the analysis of oTPD.

> Tying the course discussions and online activities to real-world teaching and
> learning necessitates the use of protocols that offer alternative systems for
> coding online transcripts and teacher-created artifacts. (Norris, 2008, p. 144)

One combination that Norris presents as a source of a potential oTPD content analysis

protocol is by using both Bloom's Taxonomy and the Garrison Cognitive processing model. Norris's approach to examining transfer of oTPD learning to teacher practices has value as it identifies this kind of professional learning about teaching practice as different from other kinds of adult learning through TPD, requiring alternative forms of measurement of the teacher learning.

Social software in oTPD

The potential for social software to engage learners and aid in the development of community are new research topics in the field of oTPD. Current findings suggest that there may be considerable benefit in using social software tools in supporting the development and activities of online learning communities (Dron & Anderson, 2009; Luca & Cowan, 2005; Maddux, Sprague, Ferdig, & Albion, 2007). Wikis, blogs, forums, and online media sharing sites are examples of the types of social software that are being explored as tools for oTPD (Brownson, 2009; DeSchryver, Mishra, Koehleer, & Francis, 2009; Ferdig, 2007; Karabulut, et al., 2009; Pferdt, 2008; Schneider, 2009). Anderson and Dron (2009) state that the reason that social software has potential is because of the networking capability of social software – effectively leveraging knowledge contained in the minds of others in the community. Research on blogs, for example, highlights the importance of writing in education (Felix, 2008), as well as the blog capacity to provide interactive opportunities to dialogue and collaboration within a community (Brownson, 2009; Luca & Cowan, 2005; Schneider, 2009). Ferdig (2007) describes this potential for blogging as a virtual place in which collaborative and cooperative learning can occur and where students are provided with the opportunity for publication and feedback. The potential for social

software tools grouped together on one website (a social networking site) as a platform in which to provide oTPD activities has yet to be researched in detail. The lack of research on this topic is one of the gaps in the literature that this study will address.

Exploratory studies using social networking sites (SNS) as the delivery medium for oTPD take the social networking topic a step further. Ning, an online platform where people create their own social networks, has been studied as a learning management system for education (Karabulut, et al., 2009). Results of a qualitative study of 76 pre-service teachers indicate that using Ning provides "opportunities for community building by means of features that allow personalization, socialization, communication among class members, as well as organization of the classroom by allowing a convenient access to assignments, readings and resources" (Karabulut et al., 2009, p. 125). The SNS in this study facilitated constructivist and collaborative pedagogical approaches, which were reported to support pre-teachers' practicum experiences by connecting them to the online, distributed community of pre-service teachers. Ning's capabilities allow creators to include blogs, discussion forums, video and photo sharing, and live chat giving it considerable potential as a learning management system (LMS) for TPD. Unlike inflexible LMSs, such as Moodle or WebCT, which are designed to replicate traditional instruction (Karabulut et al., 2009), SNS build around shared collaborative activity for members. DeSchryver, et al. (2009) report that interactions observed in SNS are both personal and professional, thereby providing evidence that this medium can be utilized for online learning and is worthy of continued research.

An embedded opportunity for technology TPD is inherent in the use of social networking for oTPD:

> Unless teachers learn to effectively integrate these technologies into their teaching practices, schools are in danger of contributing to the creation of a new generation of illiterates especially among those children who do not have access to computers outside of school. (Karabulut et al., 2009, p. 126)

Rather than social networking sites being banned and their use blocked within schools, teachers should explore opportunities to use them effectively with students. Providing opportunities for teachers to explore online privacy and security challenges while using social networks for learning may provide teachers with an understanding of the advantages of these technologies. Using social networks for learning provides teachers the opportunity to experience oTPD activities that highlight the advantages of this learning format. This is a powerful argument for the use of SNS in oTPD and forms the basis of the authentic activities that are being examined in this research study. The lack of research in describing the design and delivery of oTPD in social networking sites is a second gap in the literature that this study will address.

OTPD Research Needs

Current literature identifies several themes of oTPD research that are sorely needed to aid oTPD designers and providers in the delivery of efficacious and cost-effective programs. Some issues that have been identified are: differences between online and face-to-face facilitation, online facilitators expertise, changes in teacher knowledge and skills, and impacts on student learning (Borko, et al., 2009). These issues need to be addressed to realize the potential of technology for TPD. The

increased demand for high-quality oTPD programs can only be met through continued

research that informs the creation of rich and continuous oTPD communities. Maddux

et al. (2007) state that research is also badly needed into all aspects of how best to

evaluate online courses and programs. This evaluation is particularly important in the

helping professions such as education. Norris (2008) further recommends that, in

order to confidently research program effectiveness, future studies would do well to

follow longitudinally a cohort of teachers who participate in oTPD. Dede (2006)

summarizes the research needs concisely in his statement that:

> (d)esigners of both conventional and online teacher professional development,
>
> as well as teacher educators, developers of distance education, policymakers,
>
> and scholars can benefit from research findings that contrast current
>
> characteristics of alternative models of exemplary online teacher professional
>
> development, build collective insights to guide design and implementation, and
>
> propose key themes and related methodologies for studying the evolution of
>
> effective models. (Dede, 2006, p. 4)

A further recommendation that is found in the literature is in regards to the research

methodology that would most benefit the oTPD field. The DBR (design-based

research) model offers a "best practice" stance that has stood up to careful analysis in

complex learning situations such as oTPD primarily because formative evaluation

plays a significant role in DBR (Dede, et al., 2009). "DBR answers what works; for

whom; under what authentic, field-based conditions; and how/why this approach is

effective" (Dede, et al., 2009, p. 14). These are crucial questions for oTPD and

provide a basis for the methodology presented in this research proposal which will be

discussed in detail in the following chapter.

Networked Teacher Professional Development

It has been argued that the concept of online teacher professional development can be ascribed to a variety of oTPD implementations (Sinha, et al., 2010). They identify the need to differentiate between oTPD communities, oTPD resource sites, and oTPD course delivery sites. The purpose and affordances of an oTPD learning environment have a direct impact on the potential connections teachers can make with each other before, during, and after a formal learning oTPD event occurs. There is a need to differentiate the sub-type of nTPD experience from other oTPD opportunities.

Ostashewski and Reid (2010b, 2012) proposed a definition of a specific sub-type of oTPD that is called networked teacher professional development (nTPD). NTPD is defined as online-delivered teacher professional development activities utilizing a social networking environment that supports and promotes teacher connections while learning together, both formally and informally, allowing teachers to retain control over their time, space, presence, activity level, identity, and relationships There are three key elements of networked teacher professional development:

1. nTPD allows teachers a technology-facilitated opportunity to develop a network of relationships which they can access to support their classroom teaching practices beyond the more formal oTPD activities.

2. nTPD provides teachers with firsthand experiential learning about online social media tools such as blogs, forums, video and file sharing that affords

teachers an authentic experience of how online tools can be used in their own
classrooms.

3. nTPD allows teachers to participate in professional learning that is just-in-time, accessible, and that is potentially self-guided.

NTPD is a unique type of oTPD implementation that provides teacher-learning activities that utilize a set of online tools. Authentic TPD activities that utilize social networking software are one way that teachers can experience technology usage while also meeting PD needs. Some networked technologies that teachers are being introduced to include blogging, bookmarking, file repositories, tagging, and image/video sharing (Ostashewski & Reid, 2010a; Ostashewski & Reid, 2012). A key affordance of this type of oTPD learning is the provision of convenient teacher access to PD resources that may not be available locally or when teachers need them. This process of defining nTPD grounds the investigation in the design principles and the instructional design model needed to create learning opportunities in social networking environments. The nTPD courselets were designed using a professional learning instructional design model, Ostashewski & Reid's Networked Learning Framework (2010b; 2011; 2012b) presented later in this chapter.

Teacher Dimensions of Effective Learning Matrix

The Globaloria program (World Wide Workshop Foundation, 2010) is one other nTPD implementation that is being used to provide TPD for teachers (Whitehouse, 2011). According to Whitehouse (2011), there is significant potential for networked teacher professional development (nTPD) as a unique model of authentic online TPD. The potential of nTPD is that it allows teachers opportunities to learn from other

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teachers in ways they have never experienced before.

The Teacher Dimensions of Effective Learning matrix (TDEL) is the implementation design of the Globaloria nTPD reported by Whitehouse (2011). Globaloria (World Wide Workshop Foundation, 2010) includes a social network site for student collaboration that supports student design, development, and building of web-based games as part of formal school activities:

> The GLOBALORIA program uses open source social media and Web2.0 technology to empower youth, educators & professionals to create, collaborate, contribute and lead in today's digital and globalized world. (World Wide Workshop, 2010)

Teachers fill several roles in these online student collaborations and participate in the social networked environment in order to support student learning. Constructionism is the learning theory from which the Globaloria project is derived. In this case the theory asserts that learning occurs by designing and making artifacts using technology tools in the process. One distinguishing feature of nTPD is highlighted in the Globaloria project. This feature is the use of technology in the learning process. According to Whitehouse (2011), technology is at play from two distinct perspectives:

> In Globaloria, the effect *with* [italics original] networked technology is that Globaloria staff, teachers and students can easily share their expertise and knowledge across learning contexts. The effect *of* [italics original] networked technology is that teaching and learning become visible in ways not possible in non-networked environments. (p. 11)

This key characteristic of the pivotal role technology plays in enabling learning

highlights a differentiating feature of nTPD. Whitehouse (2011) argues that networked technology allows for new kinds of learning opportunities to occur.

The design principles of the TDEL model (Whitehouse, 2011) are research-based and originate from the use of networked technologies that support nTPD. The TDEL model is based on the premise that teacher learning, in conjunction with social networking tools, helps teachers think in new ways about content. Whitehouse (2011) states that this new thinking will direct teachers to evolve their teaching practices which is one goal of effective TPD.

The four research dimensions that comprise the TDEL framework are:

1. Learner-Centered Learning Dimension:

> Teachers are active participants and are active partners in decision-making about TPD.

2. Knowledge-Centered Learning Dimension:

> Supports development of technological pedagogical content knowledge in context of the needs of the learners (TPACK + L).

3. Community-Centered Learning Dimension:

> Supports teacher professional growth and development through professional learning communities and ongoing professional development

4. Assessment-Centered Learning Dimension:

> Teachers collaborate by sharing experiences in teaching and provide effective peer critique of pedagogy and assessment practices. (Whitehouse, 2011, p. 147)

These four dimensions intersect with three variables of the TDEL model that are: learners, pedagogy, and the technology. The TDEL model includes key components

that TPD research (Borko, 2004, Desimone, 2009) has identified as effective TPD requirements as discussed above.

In the case of Globaloria, the social networking tools make it possible to observe the process and products of the student collaborations. Tools such as wikis and twitter, support teacher learning. According to Whitehouse (2011), teachers are being provided with new ways of learning with other teachers. The Globaloria project reports that there is evidence supporting the occurrence of the following kinds of teacher learning: Teachers

- become learners with their students.

- virtually leave the classroom door open.

- learn by stealth (browsing class wikis).

- do virtual mentoring (Whitehouse, 2011).

These findings are in line with other research about authentic TPD as a consequence of online collaborative projects (Ostashewski, 2004, Ostashewski, 2009). Whitehouse (2011) states that nTPD points the way for future versions of 21st century networked TPD and that much more research is needed to determine the effectiveness of nTPD models.

The nTPD research reported on for this dissertation study focuses on the third iteration of an ongoing design-based research program. The prior published findings of this program of research are supported by those reported by Whitehouse (2011). Key findings of that research are that teacher learning results from: the sharing of resources, the discussions about teaching strategies, and the reflection and planning for classroom implementation (Ostashewski, 2010; Ostashewski & Reid, 2010a; Reid

& Ostashewski, 2010; Ostashewski & Reid, 2010b; Ostashewski, Moisey, & Reid, 2010). In the following section, the design and evolution of the nTPD implementation that is the subject of study is detailed.

The Networked Learning Framework

The Network Learning Framework (NLF) is an instructional design model that evolved during the development of a system for designing formal learning activities within a social networking site environment (Ostashewski & Reid, 2010b; 2011; 2012b). Currently formal learning activities for both teachers and graduate students have been developed in several different types of social networking sites. The subject of this study, the nTPD courselet (Ostashewski, 2010; Ostashewski & Reid, 2010a; Reid & Ostashewski, 2010; Ostashewski, Moisey, & Reid, 2010) is one implementation of the NLF as an instructional design model.

Figure 1. Networked Learning Framework.

The theoretical foundation, from which the Networked Learning Framework

originates, has been informed by the literature and ongoing research.

The Networked Learning Framework (Figure 1) originates from a strong

foundation in the current literature regarding online learning and professional

development. The NLF evolved from, and is informed by, previous research in

distance and online education which includes: the Practical Inquiry Model (Garrison,

Anderson & Archer, 2001), the Networks concept (Dron & Anderson, 2009), and the

Web-based Problem-based Learning (PBL) model described by Malopinsky, Kirkley,

Stein, and Duffy (2000). The Practical Inquiry Model identified a cycle of learner

activities that informed the cycle of activities presented in the NLF; however, the NLF

describes these activities differently. The concentric rings denoted in the NLF

incorporate the aspects of Dron and Anderson's (2009) Networks concept that situate

the learning in relation to the social frameworks available to be accessed by the learner. Finally, the aspects of the PBL model that informed the NLF include the focus on a specific technology-integration problem which progresses from identification to discussion to solution planning.

The theoretical basis from which the NLF originates is a constructivist pedagogy that acknowledges the situated, reflective, and social nature of learning. Learning is an activity that learners themselves carry out (Fosnot, 1996) and this learning is supported in the NLF activities. The resulting artifact, of constructing new knowledge and understandings, has particular value especially when it can be shared and discussed with other learners. As such, constructivism, with a particularly constructionist focus, contextualizes the activities in the Networked Learning Framework. In this model, constructionism is the instructional approach for the creation, by learners, of meaningful active learning artifacts to meet the needs of networked connectionist (Papert, 1992) distance education. In summary, the constructionist approach is important because it suggests ways that communication technologies can be used; ways in which computer-based construction activities support corresponding mental constructs of learners (Swan, 2012).

Numerous definitions of constructionism are found in the literature, but one of the simplest is the following: "constructionism boils down to demanding that everything be understood by being constructed" (Papert & Harel, 1991, p. 2). Papert coined the term to distinguish his particular constructivist focus (Papert, 1992) from Piaget's cognitive constructivism (Swan, 2012). Hands-on learning, learning by doing, and learning through constructive play or gaming are other descriptions of the

application of constructionism and provide insight into the use of this teaching and learning theory. What makes constructionism of particular interest for online or networked learning activities is that the theory is concerned with the constructions of learners that are supported by computer-based technologies.

According to Papert and Harel (1991), constructionism shares the constructivist connotation of learning as "building knowledge structures" irrespective of the circumstances of the learning. It then adds the idea that this happens especially felicitously in a context where the learner is consciously engaged in constructing a public entity whether it is a sand castle on the beach or a theory of the universe (Papert & Harel, 1991, p. 1). According to constructionism theory, tools, digital media, artifact construction, and reflective discourse on the artifact are the basis of new knowledge construction. Similarly, social media provides a framework where learners are equipped with a constantly expanding array of online digital tools allowing them to construct and share their digital artifacts instantly with others around the world, a feat that Papert and others probably considered impossible 30 years ago. As constructionism theory is focused on computer-based artifact creation, collaboration via social media is one framework for the design of these kinds of learning activities. Constructionism, too, supports 21st century literacy skills, of the kind diSessa (2012) refers where: "Computers can be the technical foundation for a new and dramatically enhanced literacy… which will have penetration and depth of influence comparable to what we already experienced in coming to achieve a mass, text-based literacy." (p. 4) The following four tenets of constructionism as a learning theory identified by Bers, Ponte, Juelich, Viera, and Schenker (2002) provide a

context for the NLF approach:

1. Learning occurs by designing meaningful projects and sharing them in a community,

2. Manipulation of objects helps concrete thinking about abstract phenomena,

3. Powerful ideas come from different realms of knowledge,

4. Self-reflective practice and discourse with others is crucial.

In the Networked Learning Framework, Ostashewski and Reid (2010b) have described four cornerstone components:

1. *ENGAGE with research and practices:* new understandings come from learner interactions with content, environment, and other learners.

2. *EXPLORE resources and strategies:* cognitive conflict is a learning stimulus for determining what is learned.

3. *DISCUSS ideas and potentials:* knowledge evolves through reflection and social negotiation.

4. *CREATE implementations and practice:* networks provide opportunities for learners to construct, contribute, and validate new knowledge.

An aspect of the Networked Learning Framework is that it provides a developmental model that can be accessed when utilizing the unique affordances of social networking software for formal education purposes. The formal learning component of this model uses the "group" capabilities of social networking software. This allows participants to come together in a specific segment of the site for the formal learning activities.

The design of the NLF activities is cyclical in nature. The start of the cycle is

triggered with the introduction of a new concept into the group learning space. The design follows a flow of formal learning from the bottom left corner of Figure 1 or the "engage" quadrant of the diagram in a clockwise manner to the "create" quadrant in the bottom right corner of the diagram. The concentric rings leading out from the "learner experience" at the center of the diagram describe the relationship of the group, the social networking site, and the collective in relation to the learner.

Each of the rings in the NLF design (Figure 1) represents the proximity of the learner to the environment structure with respect to the learner's ability to interact with that environment. One example of this interaction potential exists while the learner is participating in the formal learning activities of the group. Supported interactions with the larger network (other individuals in the network) and the collective (all possible online information sources) are easily accomplished and shared with the learning group. This increases the capacity of both the group's ability to collect and evaluate information relevant to the learning activity and the individual's ability to filter all new group information to fit their situational context. The power of this kind of formal learning structure lies in the ability of the group to identify, share, and evaluate information that may be relevant to the learning needs of the group. In essence, rather than one learner gathering and evaluating information for a specific purpose, the information of the collective, filtered by the network, is brought to the attention of the learning group.

A focus of the Networked Learning Framework is the "create" event that results in the production of an authentic artifact, regardless of the learning. As indicated previously, constructionism is possibly the only knowledge framework proposed that

allows the full range of intellectual styles and preferences to each find a point of

equilibrium during an instructional event (Kafai & Resnick, 1996; Papert, 1999). In

contrast to Piaget's constructivism, Papert's constructionism focuses on "learning

how to learn" and on the importance of making things during the learning activity

(Ackermann, 2001; Lindsay & Berger, 2009). Both "learning how to learn" and

"constructing artifacts" are crucial to making the event activities of the Networked

Learning Framework relevant, situated, and socially constructed.

One critical component of the Networked Learning Framework is the online

technologies that it utilizes. These online technologies are a "Mashup" of online tools

combined together to create a social networking site. Examples of such Mashups are

Ning, Facebook, Dolphin, and Elgg. Inherent in these systems is the ability of users or

facilitators to create groups of learners that can be brought together for a particular

learning opportunity. Anderson and Dron (2007) point out that social networking sites

may "spawn groups that are created to meet emergent needs which are usually

associated with explicit leadership and a focused task" (p. 7). The online technologies

by themselves, however, need the support of a facilitator to maximize the formal

learning potentials.

The second critical component of the Networked Learning Framework is the

role of the facilitator. The role of facilitator, or group creator, is pivotal to the

initialization of formal learning activities in the social networking site. The facilitator

would initialize the group formation by *inviting* members to join the group. As with

online course moderation, the role of an online facilitator is significantly different

from that of someone who answers learner questions. This role requires someone

familiar with the processes of online facilitation – providing supportive comments, promoting discussion, and other e-moderation skills needed to be part of the facilitator's skill set in order to lead reflective and supportive online discourse. Research in online tutor competencies (Reid, 2002) guides the description of the role of the facilitator in the Networked Learning Framework. Categories of competencies (Reid 2002; Reid, 2003) identified as crucial for facilitators are:

1. Content expertise: analysis of student questions, having students do relevant educational tasks, enriching students' interactions with the content through finding and providing appropriate content resources.

2. Course management: offering, managing and administrating the online educational experience.

3. Evaluation: evaluation of the entire online educational offering, providing assessment for students as well as evaluating the course and planning changes, modifications or corrections to improve the entire online educational experience.

4. Process facilitation: understanding of online processes, personalization characteristics and online communication skills.

5. Technical knowledge: technical skills and comfort with the use of technology.

    An example of the importance of the role of the facilitator in the NLF is that the facilitator would avoid one-to-one communications with learners and guide online communications toward group learning opportunities. An *educational tour guide* is an analogy that provides one way of looking at this key role in the Networked Learning Framework activities. Without an experienced online "tour guide", the learning

activities of a Networked Learning Framework program may quickly become
meaningless and disjointed resulting in little or no value to the learning experiences of
the participants.

The third critical component of the NLF is the tools of the social networking
site, and how they are used in designing activities based on the four cornerstone
events. These social media tools come in various shapes and forms often being plug-
in type applications. The social networking site toolset allows for what Anderson
(2009b) describes as the "affordances of self-paced learning technologies." (p. 6).
This toolset allows users to interact with resources, other users, and with other tools
themselves at a time and pace that the user controls. The tools include some or all of
the following social media:

- Blogs.

- Calendars.

- Discussion forums.

- File sharing.

- Group functions.

- Live chat.

- Microblogging.

- Social bookmarking.

- Tags.

- User profiles.

- Online videos.

- Wiki pages.

The Networked Learning Framework is an instructional design model that guides the design of formal learning within social networking sites. As the research on capabilities and uses of social networking sites increase, it is expected that the model will continue to evolve. This research study will be able to contribute to the refinement of a model and allow a continuation of the exploration of designs and transferability of the Networked Learning Framework to other formal learning needs.

Online Technology Teacher Professional Development Courselets

Three of the key characteristics of oTPD identified in the literature have been the following: ability for scaffolding of TPD activities, authentic technology TPD as a consequence of online participation, and allowing access for teachers at times convenient for them. These three characteristics have been the guiding framework behind an ongoing design-based program of oTPD research since 2008. This program of research (Ostashewski, 2010; Ostashewski & Reid, 2010a; 2010b; Reid & Ostashewski, 2010; Ostashewski, Moisey, & Reid, 2010; 2011) has resulted in a new model of networked learning for TPD (Ostashewski & Reid, 2010b; 2012). The final segment of this literature review presents that research and a revised version of the nTPD courselet model, which is the subject of this research study.

The initiation, design, and development processes for these technology courselets are described in previous work (Ostashewski, 2010, Ostashewski & Reid, 2010a, Ostashewski & Reid, 2010c). Figure 2 outlines the practicalities of the instructional design process utilized to develop the first iteration of the oTPD implementation.

Figure 2. Courselet Design Process. (Ostashewski, 2010)

Other work (Reid & Ostashewski, 2010; Ostashewski & Reid, 2010c) shares the

challenges and successes that have been found during the ongoing research and

delivery of the oTPD technology courselets. Figure 3 presents the evolved first

iteration and the second iteration of development of the oTPD technology courselet.
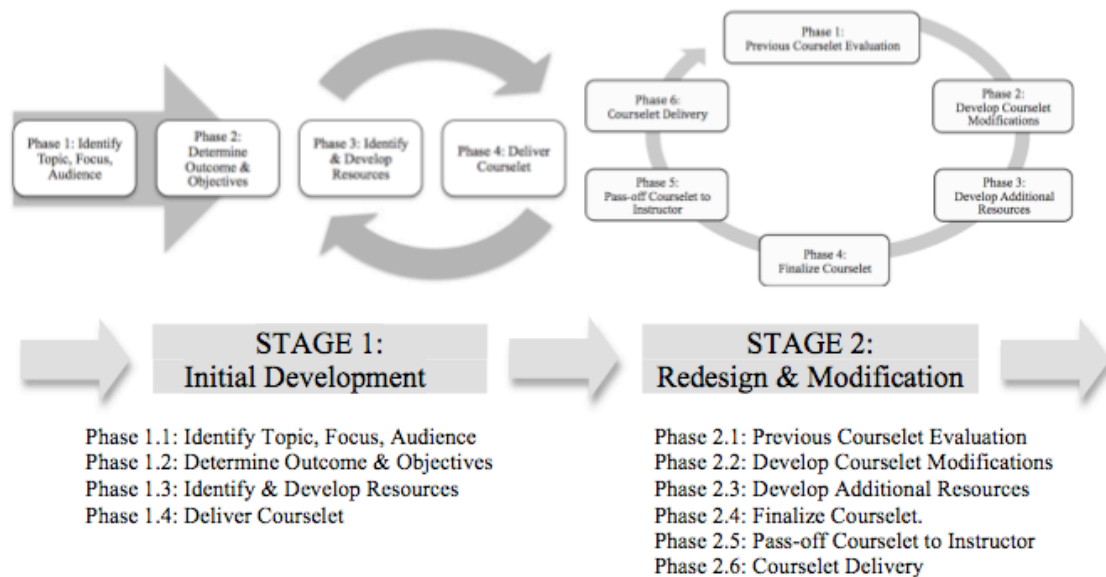
The instructional design processes and decisions that informed these first two

iterations of the DBR program resulted in new understandings about the oTPD

process (Ostashewski & Reid, 2010b, 2010c). The authors (Ostashewski, Moisey, &

Reid, 2010; 2011) also report on the implementation of a Lego robotics Courselet and

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the potentials identified with regards to supporting a more open networked group for the purpose of long-term oTPD activities. Ostashewski and Reid (2012) present the nTPD model descriptors and characteristics as well as preliminary findings from 2nd DBR iteration. As a whole these publications present the emerging model, design principles, and findings that guided the design of the 3rd iteration version of the nTPD courselet.

Evolution of the oTPD Courselet

Online resource identification and sharing, the building of educator networks, as well as an opportunity to gain confidence with Web 2.0 tools are similar activities that may have value for educators. Whitehouse (2011) states that social networking tools can "provide new ways of developing and collaborating on projects, and of making teaching and learning visible in ways that were never before possible" (p. 143). The goal of the oTPD evaluated by this study is to provide teachers with authentic opportunities to be engaged in online learning activities using the affordances of a social network site.

The courselet delivers an oTPD module using content-focused instructional packages, and it involves about 10 hours of teacher interaction time which is delivered within a social networking site (Ostashewski, 2010; Ostashewski & Reid, 2010a). Utilizing a social networking site as a delivery platform for teacher professional development has several potential benefits. One key benefit, particularly with regards to technology TPD, is that this delivery platform allows for increased teacher exposure to social networking tools. Authentic technology-mediated online learning experiences come from the use of forums, blogs, video, and other social media tools

embedded in the courselets. A second benefit is the potential of the group and network to support teacher learning on a continuing basis after the oTPD learning event has concluded.

Another thread of oTPD research focuses on the supportive role that online teacher learning communities play in effective TPD programs (Oliver & Brook, 2002; Haverlock, 2004; Sinha, et al., 2010). Virtual or online learning communities (Gan & Zhu, 2007) are online groups of learners who come together with similar interests and learning goals. These types of communities provide a model for informing educational practice, professional development, and the transformation of schooling to support the development of students' knowledge and skills for the future (Dede, 2004). Haverlock (2004) confirms the importance of communication in these types of communities when he states that:

> Teachers who regularly engage in social and professional ways with other educators beyond their classrooms are much more likely to display the professional hallmarks of continuous inquiry and effective teaching than their colleagues who operate in isolation behind their classroom doors. (Havelock, 2004, p. 56)

Of particular note is the broader potential of the social networking site in providing networked learning supports to a specific online learning community. Collaborative discussions, peer-support, and file-sharing are key affordances of these online communities that move the traditional TPD and cooperative planning into online collaborative environments (Sinha, et al., 2010). The potential of these kinds of online learning communities, existing within a social networking site, as a more formalized

system for supporting TPD activities is one reason for researching them. This concurs with what Dron and Anderson (2009) claim may be the potential of harnessing the group, network, or collective for supporting online learning.

nTPD Technology Courselets: DBR Iteration 3

The nTPD Technology Courselet is the first refined implementation of the Networked Learning Framework. The online environment for NLF is a social networking site environment such as Ning, Facebook, Dolphin, or other ELGG environments. In the case of the nTPD Technology Courselet, the social networking site is a customized Dolphin implementation for the Alberta educational community called 2Learn2Gether.ca (2Learn Education Society, n.d.). Currently the one other example of a teacher professional development in a social networking site is the TDEL model presented by Whitehouse (2011) as discussed above. As Whitehouse (2011) states, the networked learning environment blurs the meaning of "present" as teachers work across time and location bringing *new experiences of learning* in social networking sites. This is one potential that the research continues to strive for - to create opportunities for new online learning experiences for teachers. This relates to the present study in that the nTPD opportunities being evaluated are new types of online experiences being delivered in new ways.

The nTPD Technology Courselet was designed to make use of several social media technologies that are part of the social networking structure. Within the courselet structure the following elements were available to teacher participants at the start of the Courselet:

- Group blog.

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- Courselet overview.

- Courselet activity guide.

- Embedded and internal videos.

- Discussion forum.

- Event calendar.

- External social bookmarking site.

- File sharing folder.

- List of courselet members.

The activity guides present links and participant expectations for each week of

Courselet activities. Instructions and links to external articles and websites, as well as

internal courselet videos, are described in each of the weekly activity guides.

Courselet videos include instructional segments on tools found within the courselet,

such as "how to post a group blog" as well as external content exemplars found on

YouTube. The discussion forums are used to initiate discussions to support the TPD

activities that comprise the courselet experiences. The file-sharing folder allow

documents, such as step-by-step "how to" guides, to be available for participants as

well as making it possible for participants to upload images that demonstrate

completed activities. The group blog and threaded comments tools are used by

participants to track their own professional growth and challenges during the nTPD

activities. Participant feedback from the iteration 1 and 2 courselets indicate that the

value of both the discussions and the blog postings revolved around the sharing of

resources and teaching strategies using these resources (Ostashewski, 2010;

Ostashewski, Moisey & Reid, 2011; Ostashewski & Reid, 2012). The social

networking site in which the courselet was delivered lent itself to the sharing of information, contributing to the overall value to teachers of this type of nTPD delivery.

Design of nTPD Courselets

One feature that distinguishes design-based research from other kinds of educational research (Herrington, 2012) is the iterative cycle of develop-design-deliver-evaluate that allows researchers to refine an implementation. This has been occurring, starting with the pilot study (DBR iteration 1) and then moving through the redesign and delivery of several technology courselets (DBR iteration 2). The second DBR iteration also led to the development of a scalable internal learning management system (LMS) and content management system (CMS) being built within the social networking site. The third DBR cycle, iteration 3, was redesigned based on the findings of the previous iterations about networked learning instructional designs (Ostashewski & Reid, 2010b) and in numerous collaborations with the 2Learn Education Society facilitators. The key findings of the first two DBR iterations that are consistent with the literature (Borko, 2004; Desimone, 2009; Haverlock, 2004, Herrington, et al., 2009; Norris, 2008; Sessums, 2009) and have been considered in the redesign (DBR iteration 3) are:

1. Provide a focused topic of implementation: Interactive Whiteboards (IWB) in the classroom (Iteration 1), IWB in the Secondary Classroom (Iteration 2), IWB in Secondary Biology Subjects (Iteration 3).

2. Support materials must be provided in multiple formats (PDF, text, video).

3. Learning materials should be scaffolded to provide for a variety of participant

experience levels.

4. Online delivery structure must allow for flexibility (asynchronous access) to accommodate the needs of busy teachers.

5. Teacher PD activities must be designed to be relevant and authentic.

6. Design opportunities for teacher collaboration and discussions to foster and encourage teacher discourse.

7. Ensure the product of the courselet is relevant and can be shared.

8. Provide orientation (of SNS tool) opportunities for participants prior to their first nTPD courselet experience.

These findings provide one set of data that informs the revised nTPD Technology Courselet model utilized in DBR iteration 3.

A second set of data that informs the nTPD courselet model originates from the literature on effective TPD. A distinct set of characteristics of effective TPD has been identified in the literature (Desimone, 2009; Schwille et al., 2007). Schwille et al., (2007) identify two key dimensions of effective professional development: core features and core structures. The core features are a focus on content, active learning, and coherence. The core structures are duration, form, and participation. Desimone (2009) affirms that recent research reflects a consensus about some of the characteristics critical to effective TPD that increases student achievement: content focus, active learning, coherence, duration, and collective participation.

Building from these TPD design principles, and in consideration of the lessons learned from the oTPD delivery iterations, an nTPD courselet model has evolved. A series of seven design principles have been developed based on theoretical,

pedagogical, and practical considerations of nTPD delivery. The seven design principles are presented below with a description of the corresponding nTPD courselet learning activities. These principles intersect with three environmental factors of the networked learning environment: the group, the social networking site, and the collective. The design principles are:

1. Design learning relevant to teacher professional practice.

    a. Ensure that the resources and the learning experiences are relevant to the learner.

    b. Situate learning in current teaching challenges.

    c. Design the learning activities so that they lead to an outcome that can be applied in teacher professional practice.

2. Provide for easy teacher access designing for flexibility and ongoing support.

    a. Provide short focused courselets addressing specific technology issues.

    b. Design activities to allow for flexibility and teacher choice in activities

3. Provide theoretically and pedagogically sound activities.

    a. Provide a rich array of resources to support the learners' individual needs (exploration and scaffolding).

    b. Support the teacher in linking conceptual understanding and practical application (critical thinking).

    c. Provide activities that engage teachers with the content area using technology tools (active-learning).

4. Provide support for learners with varied experience levels.

    a. Provide a scaffolded educational experience that supports learning and

reflection for a variety of learners.

    b. Scaffold teacher opportunities for inquiry, engagement, and reflection.

    c. Make available pre-courselet materials (in a variety of formats) to support tool use for new social networking site users.

5. Provide authentic opportunities for networked learning skill development.

    a. Provide external resources as primary content.

    b. Design activities to utilize blog and forum contributions.

    c. Provide online lesson plan tools.

6. Support sharing and discourse between learners.

    a. Design activities that focus on reflective practice.

    b. Design activities that lead to meaningful learner discourse.

    c. Provide opportunities for teacher collaboration and sharing.

7. Support learning connections to the broader networked community.

    a. Utilize information sources external to the group.

    b. Identify and share other potential sources of content information.

The final component of the nTPD courselet that is crucial is the facilitator. The facilitator role provides an external system of support and guidance for the teacher learners. Initializing the events and activities of the courselet, and supporting the choices, collaborations, and discourse occurring in the courselet are the key roles the facilitator plays. Without a facilitator experienced in online-discussions and SNS technology use to provide a pathway and connections to the content and activities, there is a risk that the nTPD courselet activities will stall and become ineffective.

Summary

The review of current and past research on teacher professional development with respect to restructuring TPD and identifying successful TPD characteristics provides a substructure for framing models of TPD and identifying effective TPD activities. Teacher collaborations and professional learning communities are key to effective TPD implementations despite their current absence in many TPD programs around the world. However, the importance of effective and meaningful TPD programs at the school, system, and national levels to bring about the reforms for education that policy makers and educational systems are looking is well reported. As well, online technologies are believed to have significant potential to realize the needs for TPD in effective and authentic ways. The gap in the literature, with respect to oTPD practice, is the lack of development, evaluation, and dissemination of online models of teacher PD. In closing, a specific type of technology TPD, networked teacher professional development (nTPD), has the potential to provide for new kinds of teacher learning and sharing. The provision of a researched model and supporting design principles for nTPD implementations is the gap in the literature that this study addresses.

CHAPTER 3: METHODOLOGY

Description of Research Methodology

A clear description of design-based research (DBR), as a methodology for educational research, is required to adequately understand its value. There are different views about exactly what design-based research methodology is (Bereiter, 2002). The Design-based Research Collective (2003) describes DBR as a model of research defined by purpose as opposed to method. This is significantly different from other traditional educational research methodologies whose purpose is often descriptive or evaluative in nature. Brown (1992) describes the purpose of design experiments (another term for DBR) as allowing for the transformation of classrooms from academic work factories to learning environments that encourage reflective practice among students, teachers, and researchers. Brown describes the position taken in this study: "[a]s a design scientist in my field, I attempt to engineer innovative educational environments and simultaneously conduct experimental studies of those innovations" (1992, p. 141). A global view of the design-based research methodology can be summarized as one which provides complementary approaches and perspectives that over the research process inform theory and practice in valuable ways (Wang & Hannafin, 2005).

Design-based research (DBR) can be differentiated from predictive research in that the goal of DBR research is to develop, evaluate, implement, and disseminate a solution to a complex educational problem (Herrington, McKenney, Reeves, & Oliver, 2007). Design-based research blends empirical educational research with theory-driven design of educational environments. It is an important research

methodology for detailing when, why, and how innovative educational solutions work in practice (Design-based Research Collective, 2003). The resulting innovations of this type of research process are what Reeves (2006) argues will help educators to understand the relationships among theory, designed innovation, and practice. Amiel and Reeves (2008) present DBR as the only possible methodology where educational research and practice become entwined. This provided a good argument for using the DBR approach in that this study evaluated an active educational technology implementation.

For the purpose of this study of nTPD, the working definition of design-based research is one that has been applied and reported in the literature by Reeves, Herrington, & Oliver (2005) as having these six characteristics:

1. A focus on complex problems critical in education.

2. An integration of design principles with technological affordances as potential solutions to complex problems.

3. Extensive and reflective inquiry to evaluate and refine the innovative solution and expose new design principles.

4. Long-term engagement and continuous refinement of research method.

5. Intensive collaboration between researchers, practitioners, and developers.

6. A strong commitment to theory construction while real-world problem solving.

The goal of Design-based research is to develop models of successful innovative solutions whereas the goal of predictive research is the development of theory (see Figure 4).

Predictive research

| Hypotheses based upon observations and/or existing theories | → | Experiments designed to test hypotheses | → | Theory refinement based on test results | ⇒ → | Application of theory by practitioners |

Specification of new hypotheses

Design-based research

| Analysis of practical problems by researchers and practitioners in collaboration | → | Development of solutions informed by existing design principles and technological innovations | → | Iterative cycles of testing and refinement of solutions in practice | → | Reflection to produce "design principles" and enhance solution implementation |

Refinement of problems, solutions, methods, and design principles

Figure 4. Predictive and Design-based approaches in educational technology research. (Reeves, 2006)

Reeves (2006) further outlines his DBR research framework, described in Figure 4 above, with three guiding principles:

> … addressing complex problems in real contexts in collaboration with
> practitioners; integrating known and hypothetical design principles with
> technological advances to render plausible solutions to complex problems; and
> conducting rigorous and reflective inquiry to test and refine innovative learning
> environments as well as to define new design principles. (p. 58)

An understanding of the outcomes of design-based research can be found by exploring a key component of the methodology. This key component is an iterative *development - delivery - evaluate - redesign* cycle. The cyclical process is the approach by which a design-based methodology is able to broadly explore the nature of a learning innovation and the complex system in which occurs. Reeves (2006) describes this process as the refining of problems, solutions, methods, and design

principles to enhance a particular implementation. Once a cycle iteration of a DBR

methodology occurs, the lessons learned are incorporated into the next design cycle

iteration of the DBR research program (Herrington, 2012). In this type of research,

the Design-based Research Collective (2003) identified the goal of evaluation as one

tool with which an educational intervention is analyzed and then further refined.

However the similarity of design-based research with evaluation research ends

there. A design-based research program goes beyond perfecting a specific product or

artifact to generate a model of a successful innovation (Design-based Research

Collective, 2003) supported by design and implementation principles.

Action research is another methodology that shares common characteristics with

DBR. Action research is similar to DBR in that it "lays claim to the professional

development of teachers" (Cohen, Manion & Morrison, 2007, p. 299). Action

research is about situated learning; learning that occurs in the workplace that is

directly related to the workplace. However, where action research is a scientific study

conducted by practitioners with the purpose of exploring the effects of a functioning

intervention, DBR presents a more external approach. One key characteristic that

differentiates DBR from action research is the intentional design of the intervention,

with subsequent redesigns and refinements of a functioning intervention. Other

aspects of DBR include the unique role of the researcher and the theory formation and

refinement process.

Two advantages of the design-based approach provided an argument for the use

of DBR for this doctoral study. The first of these advantages is that the DBR

approach, more than predictive research, intends to produce a solution and add to the

foundation of educational technology theory.

A second advantage of DBR is that the iterative cycles of testing and designs within the field of educational practice make DBR relevant and applicable to current practice. In this research study, the constructive activity of building a model of nTPD within a specific environment, and explicitly describing the structure and processes needed to deliver the model is both grounded in the literature and the ongoing evaluations that occur as part of the study.

Why choose Design-based Method for Educational Research?

Design-based research (DBR) as a model for educational research is a relatively recent research approach. Anderson (2009a) claims that there are two specific characteristics of educational research that explain the general lack of DBR use in education: a) compared to other research fields, there simply is not much educational research being conducted, and b) education has traditionally not been a context for innovation. With regards to educational technology as a field of research, Wang & Hannafin (2003) state that design-based research is a constructive activity that allows researchers to build and add to its theory foundation and as a result will contribute more to the field than other types of research. Amiel and Reeves (2008) go farther and state that DBR is a socially responsible research methodology that provides educational researchers with alternatives to the "short-term objectives of their individual projects" (p. 37). Furthermore, Amiel and Reeves argue that research must consider the value to education of a technologically supported implementation:

A primary responsibility of researchers in the field should be to limit their

investigation of means and contemplate educational ends or aims, making them explicit in the process of the investigation. Design-based research provides a cycle that promotes the reflective and long-term foundation upon which such research can be undertaken. Educational technology researchers should be concerned with examining the technological process as it unfolds in schools and universities and its relationship to larger society. (2008, p 37)

Therefore, despite the fact that DBR is a relatively new research approach it is clear that the DBR approach is a socially responsible, constructive research methodology (Amiel & Reeves, 2008) that has value for the educational technology research field.

<p style="text-align:center">DBR as a Methodology for this Study</p>

A DBR approach, more than other educational research approaches, fits the goal of this study: that is, to evaluate, refine, and disseminate a successful model of networked teacher professional development (nTPD).

According to recent literature regarding educational research and oTPD as discussed in the previous chapter, there are good grounds for utilizing a design-based research approach in meeting the intended outcomes of this study (Amiel & Reeves, 2008; Dede, et al., 2009; Herrington, McKenney, Reeves, & Oliver, 2007; Reeves, 2006). Dede, et al. (2009) argue that research of successful models of oTPD is best served by a DBR approach due to the complex nature of oTPD and the need for the researcher to connect with practitioners during the process. Wang and Hannafin (2003) argue that one advantage of this approach is the constructive activity that is part of the design-based research methodology that can meet the needs of developing

solutions to complex problems.

The rationale for utilizing a design-based research approach in this particular study is supported by two key arguments. The first of these arguments is that there exists a need for a productive alternative to the traditional quantitative comparative research that is most often conducted in the field of educational technology. As Reeves, Herrington, and Oliver (2005) point out, traditional research may in fact fail in this field. This failure is due to the fact that research cannot create generalizations fast enough for treatment methods to be adjusted to the countless variables that are part of any given learning environment. Education is an extremely complex process and the addition of evolving technologies makes narrowing down intervention strategies much more difficult. Implementing newly-described interventions into real-life educational settings is always frustrating and usually a futile endeavor because of this complexity (Brown, 1992).

The complex issues with implementation present a challenge for evaluative research methodologies as well. In evaluative research, interventions are measured against a set of standards and the results reported to provide evidence. However the evidence is for a particular implementation context upon which rational decisions about the intervention were made (Cohen, Manion, & Morrison, 2007). The transference of evaluative research findings is arguably weak, as there is no productive implementation model intended.

The first argument supporting the rationale of employing DBR as a methodology for this study, therefore, can be summarized as an understanding of DBR as a productive implementation methodology. DBR is a productive alternative to

traditional educational technology research (Amiel & Reeves, 2008; Bannan-Ritland, 2003; Design-based Research Collective, 2003; Reeves, Herrington, & Oliver, 2005; Wang & Hannafin, 2003). With specific reference to online teacher professional development, DBR represents the best research approach for oTPD (Dede, et al., 2009). The complexity of the technology-enabled implementation strategies coupled with TPD challenges point to DBR as a productive alternative guiding this research.

A second key argument for the design-based research approach is that DBR is a highly constructive activity that allows researchers to both build and add to educational technology theory foundation (Hoven & Palalas, 2011; Wang & Hannafin, 2005). The constructive research activity utilizes numerous iterations of design and formative evaluation within a highly collaborative research process to develop a working model. It is innovations of this kind of research process that help educators understand the relationships among educational theory, designed artifact, and practice. Design-based research blends empirical educational research with theory-driven design of educational environment and as such is an important research methodology for detailing when, why, and how innovative educational solutions work in practice (Design-based Research Collective, 2003). Accordingly, design-based researchers strive to cultivate learning, create usable knowledge, and advance theories of education in complex settings. Models of successful innovative solutions are the goal of this type of research, as opposed to particular artifacts or programs as described by other research. This model development is, in part, the reason that Dede et al. (2009) argue that the DBR methodology will best serve the type of processes embedded in the research of online teacher professional development.

In this study, the development of an nTPD model, complete with design principles, that is transferable to other online professional learning implementations is a highly constructive activity. The constructive processes that are employed in the design and development of the nTPD implementations in this study are best served by the DBR approach that leads to the development of a refined, theory-based model. This second argument supporting the rationale of employing the DBR methodology can be summarized as an understanding of the highly constructive nature of DBR.

One issue with the selection of the DBR methodology for this study is that it takes considerable time to engage in this type of study, far longer than most doctoral research programs permit. Herrington, McKenney, Reeves, & Oliver (2007) state that despite the length of time DBR takes, it is a workable model for doctoral studies, if started early in the doctoral program. In the case of this study, the process of researching, designing, and developing the nTPD implementation began some six months into the author's doctoral program. In summary, the selection of DBR methodology for this study is well supported in the literature (Dede et al. 2009; Design-based Research Collective, 2003; Reeves, Herrington, & Oliver, 2005; Wang & Hannafin, 2003), is a productive alternative to traditional research, and is able to support the construction of an nTPD implementation model.

One condition of DBR methodology, required to meet the accepted rigor of social science research, is that the product or designed innovation is transportable (Kelley, Lesh, & Baek, 2008). The generation of a researched implementation that is transportable to other contexts is a critical component for DBR:

Transportation, as we are defining it, relates to the physical or applicational

movement of a thing, a design, to a new applicational context (even if the

details of the design have to be altered somewhat to fit the parameters of the

new context). (Kelley, Lesh, & Baek, 2008, p. 24)

The parameters of this nTPD study result in a model of nTPD that is transportable to

other contexts. Some of the anticipated contexts are other social networking sites,

alternate nTPD content applications (such as Mathematics or Science), or potentially

contexts in higher education.

Challenges and Limitations of Design Based Research

Some of the potential limitations of the design-based research methodology can

make it difficult to carry out. Reliability and validity of findings, length of time, and

maintaining collaborative partnerships are some of the limitations that present

challenges. In order to meet the requirements of defensible research, limitations and

the challenges they present need to be addressed. The networked teacher professional

development model, as the educational context of this study, is a complex problem

with numerous multifaceted solutions being provided during the research process. The

following describes one unique challenge with DBR:

A single, complex intervention (e.g., a 4-week curriculum sequence) might

involve hundreds, if not thousands, of discrete designer, researcher, and teacher

decisions—hopefully working in concert—in an attempt to promote innovative

practice. In these situations, causality can be difficult to decipher and

disambiguate; all possible factors cannot logistically be equally pursued; precise

replication of an intervention is largely impossible; and emergent phenomena

regularly lead to new lines of inquiry informed by current theories or models of

the phenomena. (Design-based Research Collective, 2003, p. 7)

In this study the reliability of the findings were strengthened through triangulation

from the several qualitative and quantitative data sources, as well as data was

collected across several versions of courselet design and delivery. Validity of findings

is addressed by collaborative design and numerous iterations of the implemented

solution. The intended result is an increasing alignment of theory, design, and practice

throughout the process (Design-based Research Collective, 2003) resulting in a

outcome that addresses the research-practice gap (Ormel, Pareja Roblin, McKenney,

Voogt, & Pieters, 2012).

Another challenge inherent in design-based research involves maintaining a

productive collaborative partnership with the sponsor in the research context. DBR

often occurs in live implementation environments that are owned and managed by

educational organizations. Working with these organizations over time can present

challenges as administrators and employees change over time. Design-based research

typically investigates numerous cycles of design, delivery, and evaluation that can

span years. Commitments of the researcher, sponsor, and teachers to a single

organizational setting over a long period of time can be difficult to manage. To

address this challenge in this DBR study, a detailed memorandum of agreement,

clearly outlining the responsibilities and expectations between the researcher and the

educational organization, was signed and subsequently extended to accommodate the

second delivery of the courselets during the fall of 2011.

At the same time DBR, as a longer-term type of research, is also one of the

strengths of DBR that that contributes to its recognized value (Design-based Research

Collective, 2003). The longer-term type presents a problem with this methodology as

an option for graduate research as many programs last only four years. In addition,

this study was delineated by the third DBR iteration of the oTPD/nTPD

implementation that was designed and delivered in the third and fourth years of a

four-year doctoral program, allowing time for completion of one iteration of the DBR

research.

Research Data Collection Context

The context of this study of online teacher professional development, as

described in Chapter 1, is within a technology TPD provider organization in Alberta,

Canada. The specific online delivery framework is an Alberta educator social

networking site (known as 2Learn2Gether.ca) developed and managed by the

2Learn.ca Education Society (2Learn.ca). The target population being studied is

Alberta teachers who engage in online teacher professional development in the

2Learn2Gether.ca social networking site. The current nTPD activities in this social

networking site, represent the third DBR iteration of oTPD development and delivery.

The oTPD courselet development process from redesign, through delivery, to

analysis of impact and subsequent redesign of oTPD courselets for future offerings,

formed the basis for this design-based research. The research process employed in this

study involves applying two of the DBR stages identified in Figure 4. These two

stages are: a) stage 2, the development of solutions informed by existing design

principles and technological innovations, and b) stage 3, the iterative cycles of testing

and refinement of solutions in practice. The data available for collection during these two stages included both design and delivery data that was analyzed to reliably answer the research questions posed. One aspect of the DBR approach includes the refinement using theory and practice. The iteration 3 design process began in September 2010 with the engagement of the researcher with the research community, the new oTPD model and the constructionist framework (Ostashewski, Moisey, Reid, 2010; Ostashewski & Reid, 2010b).

The oTPD and nTPD courselets included in this study comprised the third iterative cycle of development and delivery of courselets within the 2Learn2Gether.ca social networking site. As illustrated in Table 2 below, in the first iteration of the DBR courselet program, the IWB (Interactive Whiteboard) in the Classroom Courselet was designed and delivered. The second iteration of the DBR program of research saw a redesign of the oTPD courselet resulting in two oTPD courselets being delivered: IWB in the Secondary Classroom, and Robotics and Hands-on Activities in Your Classroom. As outlined in Table 2, the third iteration of the DBR program involved three courselets being delivered. Two of the Courselets are refined versions of the oTPD courselet framework: IWB in the Secondary Biology Classroom, and a second delivery of the Robotics and Hands-on Activities in Your Classroom Courselet. As well the design and delivery of an nTPD Courselet: Collaboration Tools in the Secondary Classroom was undertaken. The three courselets that are part of the third DBR program iteration form the data collection context for this study.

Table 2

Courselet DBR Program Iterations & Delivery

DBR Iteration 1	DBR Iteration 2	DBR Iteration 3
2008-2009 School Year	2009-2010 School Year	2010-2011 School Year
1. IWB in the Classroom (oTPD)	1. IWB in the Secondary Classroom (oTPD)	1. IWB in the Secondary Biology Classroom (oTPD)
	2. Robotics and Hands-on Activities in Your Classroom (oTPD)	2. Robotics and Hands-on Activities in Your Classroom (oTPD)
		3. Collaboration Tools in the Secondary Classroom (nTPD)

Method

While this study employs a DBR methodology, the collection of empirical data in this study utilized both qualitative and quantitative methods of data collection. In order to be explicit about the process of the scientific enquiry being conducted in this study, the DBR methodology has been detailed in the previous section. The following description of the research method refers specifically to the range of approaches that were used "to gather data which are to be used as a basis for inference and interpretation, for explanation and prediction" (Cohen, Manion, & Morrison, 2007, p. 47). In this study the mixed methods approach incorporating both quantitative and qualitative components was employed. The data was then analyzed in order to provide sufficient measures that represent valid findings to the three primary research

questions posed.

The educational implementation being studied is an online and technology based delivery that generated considerable amounts of quantitative data. However the granularity and reliability of data collected utilizing a purely quantitative manner was not sufficient to answer the research questions. Cohen, Manion, and Morrison (2007) state that in order to examine less overt aspects of a subject of study, "it is important to combine quantitative and qualitative methodologies for data collection" (p. 96).

In order to meet the needs of reporting valid and reliable research findings several instruments were utilized for the data collection component of this study. First, a survey questionnaire (See Appendix A) was used to collect data on participant demographics and the oTPD aspects identified in the research questions. The online survey collected both quantitative and qualitative data. According to Gall, Borg, and Gall (1996), surveys: "collect data from participants in a sample about their characteristics, experiences, and opinions in order to generalize the findings to a population that the sample is intended to represent." (p. 289) Some of the quantitative data collected allows for generalizations, however, although acceptable for quantitative studies, "generalizations" are not characteristic of qualitative research. Transferability is a characteristic of quantitative research required to meet the accepted rigor of social science research. Furthermore, according to Kelley, Lesh, and Baek (2008) the product or designed innovation must be transportable to be considered an acceptable design research outcome:

> Transportation, as we are defining it, relates to the physical or applicational movement of a thing, a design, to a new applicational context (even if the

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details of the design have to be altered somewhat to fit the parameters of the

new context). (p. 24)

The goals of this nTPD study are to result in a model of nTPD that is transportable to

other contexts. In order to better understand and represent the data from the target

population and effectively answer the questions posed in this study, a qualitative

component to the online survey was included. Five open-ended questions were

included at the end of the online survey that asked participants to describe their

courselet participation. Teacher responses to these open-ended questions provided

details that were used in the selection of potential teachers for the semi-structured

interviews.

The qualitative data collection in this study intended to gather information

contextualizing the personal experiences of courselet participants. While the open-

ended questions in the survey provided one opportunity for teachers to describe, in

general, their courselet experience, further elaboration was needed. The semi-

structured interviews were carried out to elaborate on the responses to the survey

particularly responses that were divergent or polarized. An interviewee selection

process and a predetermined agenda and open-ended questions guided the interview

collection. The interview protocol is aligned with the oTPD/nTPD design principles

described in Chapter 2 and was crafted to explore the teacher experience through the

lens of the research questions guiding this study. This instrument was intended to

gather additional qualitative data in order to verify survey questionnaire data and to

gather additional data on more personal aspects of the oTPD/nTPD experience.

The third instrument utilized in this study was a qualitative document and

record analysis. Gall, Borg, and Gall (1996) describe documents as "written communications that are prepared for personal rather than official reasons" (p.361) while records are written communications with an official purpose (Gall, Borg, & Gall, 1996). The documents and records that were collected for analysis in this study included: group blogs, discussion forums, teacher-created documents, and instructional materials in the oTPD/nTPD courselets. This qualitative document and record analysis provided for triangulation of the survey and interview data. As well, the document and record analysis further informed the oTPD/nTPD design principles utilized in the design phase of the third DBR iteration of this TPD implementation in a social networking site.

<center>Study Population and Participants</center>

The sample of teachers available to participate in this study was a convenience sample because it could only include those Alberta teachers who participated in online teacher professional development activities within the 2Learn2Gether.ca (2learn.ca, 2010) website. Since this was a non-probability sample, the findings of the study are not applicable to the wider population of all Alberta teachers. A convenience sample will, however allow for a detailed description of the subgroup of teachers who do choose to participate in oTPD activities in 2Learn2Gether.ca. Cohen, Manion, and Morrison (2007, p. 114) point out that it is important when using convenience sampling to state that the sample does not represent any group but itself. It should be noted that this study does not represent the wider population of teachers and findings are not quantitatively generalizable to that group.

One of the research challenges in this study, with regards to the sample of teachers available to participate, was the recruitment of teachers who completed oTPD/nTPD courselets. Despite the promotion of the courselets to Alberta teachers via 2Learn.ca Education Society newsletters and messages in their provincial education technology listserve, fewer than 30 teachers were recruited for the study. A sample size of 30 study participants was expected based on previous iteration deliveries of the courselets. Thirty participants were deemed a large enough sample to be able to analyze the sample and provide statistically significant analyses. As insufficient numbers of teachers who completed the nTPD iteration 3 courselets as originally scheduled in the spring of 2011, additional recruitment measures were needed. The recruitment of additional teachers who could be eligible to participate in the study was undertaken as part of the process to increase the reliability of the results of this study.

The third iteration of courselets began being delivered on March 1st, 2011 and after several attempts to promote the courselets to Alberta teachers, a total of twenty-two teachers completed the courselets. This represents 38.6% of the teachers who enrolled in those courselets (n=57). These twenty-two teachers were invited to participate in the study by email sent by the courselet facilitator upon completion of the courselets on May 31st, 2011. Between June 2 and June 14, 2012 the invitations to participate in the nTPD study were sent out to these iteration 3 courselet participants and this resulted in eighteen completed surveys.

The recruitment of additional of eligible study participants was addressed in two ways: by promoting the iteration courselets over the summer of 2011 to include a

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second round of nTPD iteration 3 delivery, and by expanding the sample to include iteration 2 courselet participants. Iteration 2 of the courselets consisted of very similar materials to iteration 3 versions except for the addition of pre-courselet activities focusing on social networking in education. Upon reviewing the iteration 2 courselets a total of nine teachers, who completed the activities, were identified as potential study participants. These nine teachers were invited to participate in the study and the result was an additional four completed online surveys bringing the total survey participants to 22. At the same time the delivery of the iteration 3 courselets was extended to a second call for participants with courselet activities starting on September 15, 2012. This call was promoted in the same manner as the first nTPD courselet round with the addition of a business card sized advertisement in the Alberta Teachers Association monthly newspaper for September. As a consequence of this second call, four teachers participated and completed the courselets by October 27, 2011. The final series of online survey invitations were sent out October 27 and this resulted in an additional four online survey completions. The online survey was closed on November 15th, with a total of 26 teachers completing the survey instrument and becoming the participants in this study.

The sample of teachers who completed oTPD/nTPD courselets that were selected for participation in the second data collection process, the semi-structured interviews, were from those survey respondents who indicated they were willing to participate in the interviews. Twenty-three of the twenty-six (88.5%) research participants indicated they would be willing to participate in the short interview. The selection of survey respondents to interview was based on responses to survey

instrument questions and was made in order to represent apparent groupings, demographics, and polarizations of reported experience in the open-ended survey question responses. Interviews were conducted until the interviewer recognized data saturation and in total eighteen teacher interviews were collected.

The interviews with survey respondents were conducted between September 14 and November 20, 2012. The interviews were conducted by telephone and were recorded with the permission of the interviewees. Subsequently interviews were transcribed by the researcher and coded into themes in order to understand the responses to each of the three guiding questions in this study.

Measures

The primary goal of this study was to evaluate a model of networked teacher professional development activity delivered within a social networking site framework and further refine a model of nTPD. The choice of data collection instruments that utilized in this study were directly related to the three research questions that inform the study. Table 3: Summary of Research Instruments presents an overview linking the research questions and data collection instruments.

Table 3

Summary of Research Instruments

Research Question	Data Collection Instrument
1. What kinds of profession-centered technology learning do teachers who participate in networked professional development activities engage in?	Survey questionnaire
2. What components (discourse or activities) of professional development delivered in an online social networking site do teachers identify have as having professional value?	Semi-structured Interview
3. What design elements of the networked teacher professional development experience affect teacher practice?	Semi-structured Interview Document & Record Analysis

The first research question "What kinds of profession-centered technology learning do teachers who participate in nTPD activities engage in?" is global in scope and level of granularity. The collection of data for the purposes of answering this question required a process that allowed for the description of the teacher learning occurring during nTPD activities. A forty-question survey questionnaire, available online, that included demographic, descriptive, and open-ended questions was utilized.

The online survey instrument to be used for this data collection component originates from previous work in the oTPD field. The complete survey is included in Appendix A. This particular instrument is a modified version of the survey questionnaire utilized in the pilot study (Ostashewski, 2010) that was used to collect courselet participant self-reported information at the completion of the pilot. The survey was revised based on other related research and the revised version includes

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additional and alternate social media usage questions. The intention of the questionnaire revisions was to provide more precision with regards to social media usage.

Surveys typically are able to collect data with the intent of describing the nature of an activity (Cohen, Manion, & Morrison, 2007). A further intent of the survey data collection as an instrument in this study was to provide a method of identifying the interview participants for the second data collection component of the study. In this study the participants who provided detailed and rich information of an activity, or were representative of a polarity in the survey responses, were identified with a preliminary survey analysis. Identifications of themes and types of learning activities that oTPD/nTPD participants reported were important or frustrating to them guided the semi-structured interview selection process. The analysis of the qualitative and quantitative survey data as presented in chapter 4 provided an overall global view of the teachers participating in the nTPD activities. These qualitative and quantitative data analyses provided the answers to the first research question guiding this study.

The second question posed in this study is "What oTPD components delivered in an online social networking site do teachers identify as having professional value?" The second data collection instrument, the semi-structured interview, was be used to gather data for analysis in order to answer this second research question. The interview process, in this study, provided for follow up and validation of the survey results (Cohen, Manion, & Morrison, 2007). These interviews allowed for qualitative data collection that provided an increased level of granularity and richer descriptions of the nTPD activities that teachers found to be valuable. As a data collection tool, the

interview allows the research to "go deeper into the motivations of respondents and their reasons for responding the way they do" (Cohen, Manion, & Morrison, 2007, p. 351).

Several teacher participants of interest to the study, identified by preliminary analysis of the online survey data, were asked to participate in the interview process. The initial online survey data examination determined the participant cases that composed a purposive sample of teachers participating in 2Learn2Gether.ca oTPD/nTPD activities. A purposive sample allows the researcher to handpick cases that are typical or possess a particular characteristic being sought (Cohen, Manion, & Morrison, 2007, p.115). Data that is suggestive of teacher growth or experiences that provide representative or typical samples guided the interview selection of several potential teachers that represented the typical participation cases. In addition, the selection of additional interview participants who represented particular characteristics of oTPD/nTPD activities rounded out the semi-structured interviews. In total, eighteen interview participants comprised the purposive sample of teachers that informed the study and support the identification of answers to the second question guiding the study.

The rich and detailed data that can be collected in the interview process is directly connected to the interviewer's ability to conduct interviews (Cohen, Manion, & Morrison, 2007). As described earlier, the researcher recorded the interviews using a digital recording device. This recording allowed the interviewer opportunities for detailed analysis of the interview transcripts, and where necessary, to be able to review the actual interviews where needed. Although the semi-structured interviews

were a primary source of data collection leading to identification of oTPD

components teachers found valuable, the interview data also serves as a source of data

to help answer the third research question.

The third question posed in this study is "What design elements of the

networked teacher professional development experience affect teacher practice?" In

order to adequately answer this third question, two sources of data were examined.

The first source was the coded and analyzed interviews with teacher participants

discussed above, and the second source is from the analysis of reports and documents

created during the design and delivery of the oTPD/nTPD courselets. The report and

document data was the third qualitative data collection method employed in this

study. The intent of collecting these artifacts was to provide data that can be used to

identify and corroborate interview findings with regards to the design elements of the

oTPD activities that affect teacher practice.

The initial step in qualitative research using documents and records is the

identification of the documents and records that are part of the situation being studied

(Gall, Borg, & Gall, 1996, p.362). The reports and documents that were available for

analysis included:

- Courselet materials created by the design team: videos, documents, course
  outline and instructional materials.

- Participant postings in the online forum discussions and group blogs.

- Participant documents posted to the online Courselet group.

- Courselet facilitator postings on asynchronous discussion forums and blogs.

The analysis of the courselet records and documents provided the study with findings

that supported and validated the findings of the first two questions guiding the study, as well as providing information regarding the instructional design principles, a secondary component of the nTPD model being explored.

In summary, a DBR approach, consistent with the literature, was utilized to expand the overall understandings of teacher experiences, transfer of skills, and social networking site factors that contribute to the nTPD activities teachers participate in. The outcomes of a refined nTPD Technology Courselet model and design principles supported by analysis of the research data that was available for collection, is the outcome of the study.

<center>Data Analysis Procedures</center>

Three types of data were collected in this study: survey, interview, and record & document data.

The first data analysis was of the survey data. The data collected included quantitative ordinal data representing participant demographics and choices based on participant responses to the Likert-type survey questions. This quantitative data was rendered into numerical form and entered into SPSS data analysis software, where statistical analysis of the data was conducted. First, descriptive and non-parametric statistics were obtained from the data gathered from the online surveys. Descriptive analysis does not make any predictions or inferences, but instead describes and synthesizes the data to provide organization and provide meaning (Cohen et al., 2007). Descriptive statistics such as means, medians, standard deviations and frequency distributions were calculated for both the demographics and Likert ratings questions. Inferential statistical analysis was performed on the non-parametric or

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distribution-free nominal and ordinal data collected in the online surveys. Cross Tabulations, were conducted to assess the differences between groups, for example by gender, age, technology generation, career stage, and teacher role. The statistical significance of the differences between groups was conducted using Independent T-tests. As a result a detailed demographic profile, as well as comparative grouping reports, of the research participants was developed and is reported in Chapter 4.

The second data analysis was of the qualitative responses to the open-ended questions in the survey were collected from study participants. As data collected in these questions describes personal experiences of teachers, an interpretational data analysis (Cohen, Manion, & Morrison, 2007) was applied. Responses were coded into representative themes emerging from the analysis and then grouped to include all of the responses to a survey question. For each of these five open-ended questions, the themes are presented in Chapter 4 as categories of responses, with frequencies for each theme presented in tables and lists of exemplar quotes for each theme. Where teachers' responses covered more than one of the common themes identified, they were added in to the frequency counts for both (or more) themes. As a result, the data analysis of the open-ended survey questions provided an overview of answers about the kinds of technology learning teachers were engaging in. These answers aided the selection of the initial interview participants.

The third data analysis conducted was the qualitative analysis of the semi-structured interview data. Audio recordings of the interviews were transcribed into text and were loaded into AtlasTi, a qualitative analysis program, for coding and analysis. The supporting audio recordings were linked to the transcriptions allowing

for review and clarification of language where necessary. The interview data was analyzed using a combined, sequential top-down and bottom-up approach. The top-down approach was structured from the nTPD model and design principles, and the bottom-up approach emerged from several readings and coding sessions. These coding sessions used a comparative coding process derived from the constant comparative model developed by Glaser and Strauss (Gall, Borg, & Gall, 1996; Cohen, Manion, Morrison, 2007) and continued until theoretical saturation occurred.

A top-down approach was initially used to code the transcripts using the design principles and elements of the nTPD model. Codes were created to represent aspects of the nTPD principles, components, and elements. Examples of some of the top-down codes used are: video, discussion, file-sharing, experiential, and flexible. The transcribed interviews were then read and re-read by the researcher and the top-down codes were used to code the transcripts. When a phrase, sentence, or section represented one of these identified codes, it was coded accordingly. If text represented more than one code, two or more codes were applied to the transcript section.

A bottom-up approach then was used to recode the interview transcripts. The codes that were used for the bottom-up approach used phrases and themes that emerged from numerous readings and coding sessions. This bottom-up approach was utilized to make sure that pre-determined codes used in the top-down approach did not exclude teacher comments that were relevant to the research questions.

After the coding process was complete, all of the codes generated were organized into themes. This organization was done visually using the network view in Atlas.Ti. The identification of major and minor themes (Creswell, 2012) was used to

further categorize and consolidate the codes into representative trends. Organization of these code themes yielded coherent trends in the data that provided answers to the second research question regarding components of the nTPD that teachers found valuable.

The third type of data analysis used was the record and documents artifacts analysis. These artifacts were analyzed using a qualitative content analysis approach that presents results in the form of interpretation and hypothesis. The process of content analysis in this study is based on what has been described as a "qualitative data reduction and sense-making effort that takes a volume of qualitative material and attempts to identify core consistencies and meanings" (Patton, 2002, p.453). The goal of this process for study is to identify and validate important themes or categories within the documents and records collected in order to provide a rich description of the themes or categories (Zhang & Wildemuth, 2009) as they are presented in the nTPD courselet setting. The approach to the content analysis is described as a directed content analysis (Hsieh & Shannon, 2005) that aims to validate and extend a conceptual framework, in this case the nTPD Courselet model. Further, a content analysis of the documents and records in the nTPD courselets provides the opportunity for a "reality check" (Harris, 2001) of the nTPD design principles as well as triangulation of the data analyzed and reported in this study.

A six-step content analysis process was used in this study. The process is based on Krippendorff (1980; 2004) and Stemler (2001) descriptions of the approach for making replicable and valid inferences from texts to the meanings of their usage. The six steps are: a) identify research questions and constructs, b) identify the materials to

be analyzed, c) specify the unit of analysis, d) determine the categories to be used, e) generate the coding scheme, and e) analyze documents and records. The application of these steps to the documents and records are described in detail in Chapter 4. The record and document analysis was used to corroborate other data analysis conducted in this study, as well as provide an answer to the third research question.

Research Timelines

The timeline outlined in Table 4: Design Research Timeline guided the research process and provided a framework to follow and report from. One meta-analysis (Ormel, et al., 2012) of DBR study calls for increased reporting of DBR processes and strategies employed by design-research practitioners. The practicality of this research timeline was based on two previous courselet development iterations at 2learn.ca. and evolved as research challenges and solutions emerged. Table 4: Design Research Timeline presents the timeline of research activities in this dissertation study. This timeline presents information that contextualizes one complete iteration of the DBR process and provides an understanding of the length of time DBR projects take to conduct.

Table 4

Design Research Timeline

Time	Process	Activities
Phase 1: 8 Months (July 2010 - February 2011)	NTPD Courselet Design	• Review nTPD design notes & publications • Publish review and new understandings (Ostashewski & Reid, 2010c) • Attend EDGE 2010 Conference • Collaborate with 2Learn.ca about redesign, delivery schedule, outcomes. • Review theoretical framework - nTPD Constructionism publication (Ostashewski, Moisey, & Reid, 2010) • Attend Ascilite 2010 Conference, engage with current design literature • Make courselet redesign decisions and implement
Phase 2: 8 Months (March to October 2011)	2 Rounds of Courselet Delivery	• Complete ethics review • Collaborate with courselet facilitator and administrator during delivery • Support nTPD Courselet activities during deliveries in collaboration with courselet facilitator supporting activities in: blogs, forum postings, shared-file spaces • Develop and promote and support materials for both deliveries of courselets
Phase 3: 6 months (March Nov. 2011)	Data Collection	• Online participant survey • Participant Telephone interviews • Collection of courselet documents and records • Document and record analysis
Phase 4: 10 months (Dec 2011 – Sept. 2012)	Data Analysis & Reporting	• Review and analyze online survey data • Transcribe, code, recode and identify themes and trends in interview data • Analyse courselet documents and records including content and courselet participant access data. • Writing of dissertation findings, conclusions • Generation of refined nTPD Technology Courselet model and design principles
Phase 5: Four Months (Sept 2012 – Dec. 2012)	Revisions& defense of findings	• Revisions of dissertation • Publications to research community (AUFGS 2012 conference, journal articles, oral presentations) • Sharing of findings and model with host organization including recommendations for further 2Learn.ca Education Society's courselet implementations • Orally Defend dissertation study

Ethical Issues and Considerations

Whenever human subjects are part of a research study, ethics considerations

need to be addressed and approval granted before research can begin. The ethics committee that this study falls under is the Athabasca University Ethics Board, and the study was granted approval from the board to collect data and conduct the research specified. As with any research involving human subjects, there are ethical issues with the sponsor organization and participants that were considered and addressed.

The nature of the data collected in this study presented minimal risk to the participants and minimal data privacy issues that needed to be addressed. With respect to the sponsor organization, a memorandum of agreement to conduct research and collect data during nTPD Technology Courselet deliveries was signed. A second ethical issue surrounds the type and storage of data collected during the study. In order to address this issue a secure Athabasca University server, password encoded computers, and locked cabinets were used to store participant data. A third issue involves the process for recruitment and obtaining informed consent of participants. Recruitment involved the courselet facilitator contacting, via email, the participant teachers and briefly explaining the study, and making an initial request by email to the participants to consider participating in the study. The researcher was then contacted by teachers who indicated they were willing to be participants by email. Informed consent was obtained globally at the beginning of the study for all components as described in information letter and informed consent letter study. Teachers were given the choice on the survey form to complete only the online survey or to also agree to participate in an interview. The informed consent letter briefly described the survey and the interview process with the opportunity for participants to acquire more information.

Summary

In summary, Chapter 3 has detailed the design-based research methodology and details of DBR model that was applied as the research framework for this study. Emerging from the design-based research, this chapter has outlined the research pathway towards the goal of an nTPD model development. Methods, data collection, ethics considerations, and recruitment have all been discussed in this chapter as a prelude to the data analysis in Chapter 4. A key understanding developed in the discussion of the methodology is the consideration of using a formative-like evaluation process to guide the study. Data collection and analysis followed a described timeline through an iteration of nTPD design – delivery – evaluation – redesign in 2Learn2Gether.ca. As anticipated, a refined model of nTPD resulted from utilizing the data collected and analyzed during this research process, grounded in the literature, and utilizing the findings of this study. Chapter 4 will describe in detail the data analysis and provide a basis for the Chapter 5 discussions of the findings and conclusions that result in an evolution and newly refined model of nTPD Technology Courselets.

CHAPTER 4: RESULTS

Overview of Statistical Procedures

This chapter provides the analyses of the quantitative and qualitative data collected within this study. A synthesis of the quantitative and qualitative analysis results is presented in Chapter 5. The first section of this chapter details the data collection and response rates and teacher respondents who participated in the online survey. Demographics, teaching environment statistics, and groupings used in the analysis of the survey respondents compose the second segment of this chapter. The third section presents group analysis of technology and social networking use of survey respondents. The fourth section of this chapter presents frequencies and percentage distributions of the responses of teachers based on their nTPD experience. The fifth section presents the themes identified in the open-ended survey questions. The final section of this chapter presents the analysis of the semi-structured teacher interviews, and the nTPD courselet documents. Throughout the chapter, descriptions of quantitative and qualitative data analysis processes, that provide underlying detail about the source of presented data, is presented.

Survey Instrument Response Rates

As detailed in Chapter 3, a convenience sample of Alberta teachers who were participating in online teacher professional development activities within the 2Learn2Gether.ca (2learn.ca, 2011) website composed the population for this study. Table 5 presents the numbers of courselet completions and participants who became part of this nTPD study.

Table 5

Numbers of Courselet Completions and Participants

Courselet Participants	Completed Iteration 2	Completed Iteration 3	Completed Courselet	Participated in Study
Lego Robotics in the Classroom	4	8	12	10
IWB in the Secondary Biology Class	5	5	10	9
Online Collaborations in the Classroom		9	9	7*
Total of all Courselets	9	22	31	26

Note: * indicates that two participants who completed a second courselet were removed from this number since they took two courselets and are counted in the Lego Robotics courselet number.

Of the teachers who completed courselet activities, a total of 83.87% (26 of 31) responded to the online survey. Of these survey respondents, 80.76% (21 of 26) completed iteration 3 courselets and 19.23% (5 of 26) completed iteration 2 courselets.

Teacher Demographics and Teaching Environment

Question 1 of the survey instrument asked teachers what was the total number of years of teaching experience they had. Descriptive statistics for experience by gender are presented in Table 6. Question 2 of the survey asked participants their gender. Of the 26 study participants, 15 (58%) were female and 11 (42%) were male.

Table 6

Years Teaching Experience by Gender

	N	%	Mean	Median	Std. Dev.	Min.	Max.	Skewness
Female	15	57.69	10.22	6.00	10.196	0	32	0.851
Male	11	42.31	10.18	5.00	9.631	1	29	0.788
Total	26	100	10.2	5.50	9.763	0	32	0.778

Note: Min. = Minimum. Max. = Maximum

The difference between mean years of teaching experience by gender was tested at the p ≤ 0.05 level using an independent samples t-test for equality of means. This test revealed no significant difference (t=0.009, df=24, p=0.993, two-tailed) between male and female teachers with respect to years of teaching experience.

Question 3 asked teachers to provide their age. Descriptive statistics for age by gender are presented in Table 7. The difference between mean age by gender was tested at the p ≤ 0.05 level using an independent samples t-test for equality of means. This test revealed no significant difference (t=0.715, df=24, p=0.481,two-tailed) between male and female teachers with respect to age.

Table 7

Age by Gender

	N	%	Mean	Median	Std. Dev.	Min.	Max.	Skewness
Female	15	57.69	34.87	33.00	9.456	20	54	0.562
Male	11	42.31	37.45	39.00	8.618	27	51	0.209
Total	26	100	35.96	35.50	9.027	20	54	0.359

Question 4 asked teachers what kind of school setting they currently teach in – rural, urban, online, or other. Teachers were asked to only pick one response that best described that setting. Frequencies and percentages are presented in Table 8.

Table 8

Location of Teachers' Schools

	Urban	Rural	Online	Other*	N
Freq.	14	9	0	3	26
%	53.85	34.62	0.00	11.53	100

Note. Freq. = Frequency. Other* = No Current School (2), Alternative (1)

None of the teacher respondents indicated that they were teaching in an online school; however, two teachers indicated they were not currently teaching and one teacher identified an "Alternative" school setting. In the Alberta school context the alternative school can be further described as an off-campus sites with alternative delivery methods, such as drop in or storefront locations found in shopping malls.

Question 5 asked teachers what kind of teaching role they were currently performing. Teachers could select more than one role. Frequencies and percentages are presented in Table 9.

Table 9

Current Teaching Situation (Teacher Role)

	N	Pre-service Teacher	Teacher	Administrator*	Division Support Teacher
Freq.	26	3	15	3	5
%	100	11.54	57.69	11.54	19.23

Note. Freq. = Frequency. Administrator* = Administrator + Teacher (2), Administrator only (1).

Eleven and a half percent of teachers reported they were in an administrative role with two teachers indicating they were performing both an administrative and teaching role in their current position. Fifty eight percent of survey respondents indicated they were currently in a teaching only role.

Questions 6 and 7 asked teachers about their current and past teaching experience with regards to grade assignments. The current teaching assignments reported by teachers ranged from kindergarten to post-secondary and teacher inservice. Twenty-seven percent (27%) of teachers indicated they currently taught at post-secondary and teacher inservices. Frequencies and percentages of current

teaching assignments in total and by gender are presented in Table 10.

Table 10

Current Teaching Assignments

Assignment	Female		Male		Total	
	N	%	N	%	N	%
Not Teaching	3	21.43	0	0.00	3	11.54
Primary Grades	4	28.57	2	18.18	6	23.08
Secondary Grades	6	42.86	4	36.36	11	38.46
PS/Teacher Inserv.	2	13.33	2	45.45	6	26.92

Note: PS/Teacher Inserv. = Post-secondary and Teacher Inservices

Questions 8 and 9 asked teachers about their current and previous teaching by curriculum or subject areas. The curricular areas of language arts, mathematics, social studies, science, fine arts, physical education and Career Technology Studies (CTS) were those most reported by teachers in both their current and previous teaching assignments. Figure 4 presents a bar graph of the frequency of teachers' curriculum or subject areas they are currently teaching.
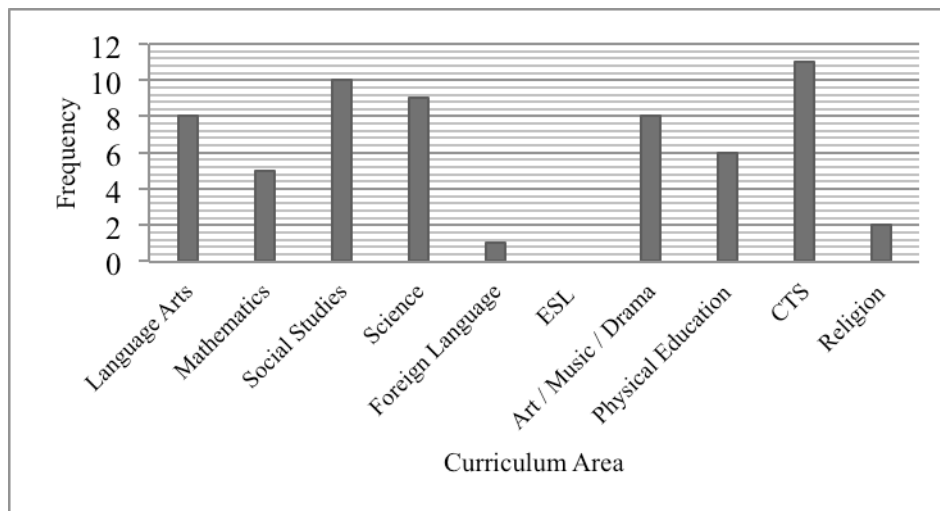
Figure 5. Frequency of teachers' curriculum or subject areas currently teaching.

Figure 6 presents a bar graph of the frequency of teachers' grade levels

they are currently teaching.
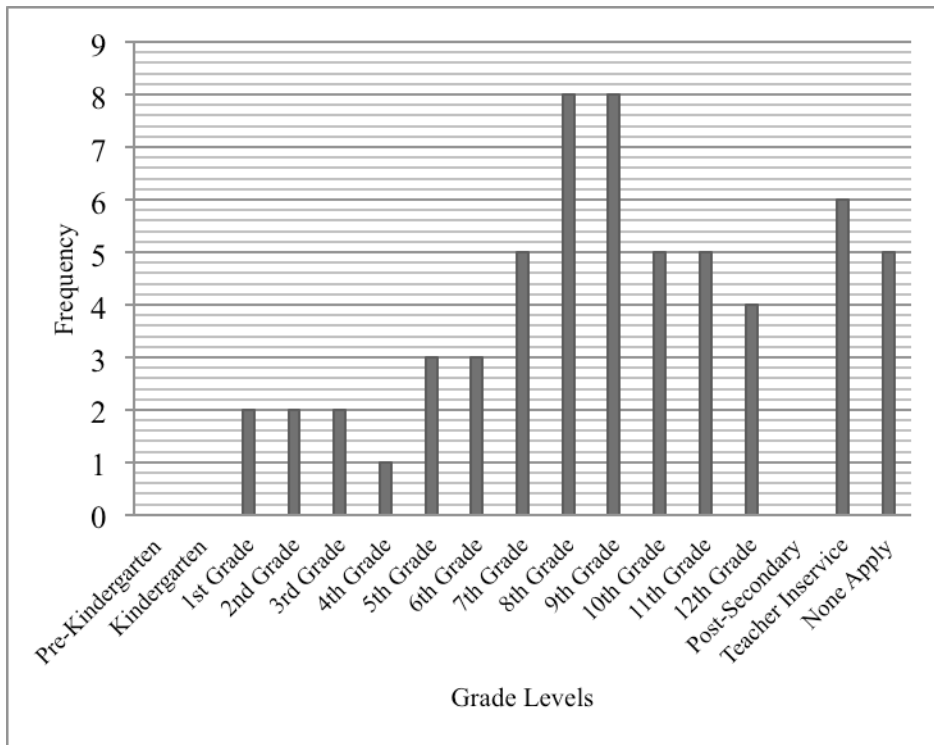
Figure 6. Frequency of teachers' grade levels currently teaching.

Teacher Respondent Groupings

As a primary component of this nTPD study is to describe and interpret teacher participation in nTPD courselets, it is helpful to present some of the responses to the questions of the survey instrument using particular groupings of the teacher respondents. In past research (Bilz, 2008; Eros, 2011; Fuller, 1969; Wilson, Hall, Davidson, & Lewin, 2006), numerous groupings have been used when describing teacher characteristics and experiences. For this study, groupings based on gender, teacher role (current teaching position), and school location have already been described. Two additional groupings, based on Oblinger and Oblinger's (2005) technology use generations and Fuller's (1969) career stages, are described at this point of the data presentation and analysis.

Since computer and online technology use is inherent in the participation in nTPD activities, Oblinger and Oblinger's (2005) concept of technology generations, while it does not allow for precise generalizations about age groupings and technology use, does highlight trends. Furthermore, other research (Oblinger, 2004; Kennedy et al., 2009) describes attributes and attitudinal differences that impact on technology based learning for these technology generations which will be useful in considering for the design principles evaluated as part of this study. Oblinger and Oblinger's (2005) categories of technology generations include: *matures* (born 1900-1946), *baby boomers* (born 1946-1964), *generation X (GenX)* (born 1965-1982), and *net generation (NetGen)* (born 1982-1991). Based on the reported teacher ages from survey question 3, there are no teachers who fall into the matures category, and teachers in this age group would be likely retired. Table 11 presents frequencies and percentages of the teacher respondents, by gender as well as in total, who participated in the study categorized according to technology generation. Of the teachers who

Table 11

Generational Groupings using Teacher Age in 2011

Generation	Range	Female		Male		Total	
		Freq.	%	Freq.	%	Freq.	%
NetGen	20-29	4	26.70	3	27.30	7	26.90
GenX	30-46	9	60.00	6	54.50	15	57.70
BBoomers	47+	2	13.30	2	18.20	4	15.40
Total	Total	15	100.00	11	100.0	26	100.00

Note: Range = Age Range. Freq. = Frequency. BBoomers = Baby Boomers

completed the online survey, 27% belong to the NetGen group, 58% belong to the GenX group, and 15% belong to the Baby Boomers group.

The fifth grouping relates to teacher career groupings. Fuller (1969) argued

that teachers progress through three stages over their teaching career and his research has been the starting point of considerable exploration about TPD (Wilson, et al., 2006). Other research about teacher careers supports (Pigge & Marso, 1997) and extends (Conway & Clark, 2003) Fuller's 1969 model, or presents other models (Miles & Huberman, 1984; Podsen, 2002) that directly attempt to make generalizations about teacher career groupings. Other studies (Bilz, 2008; Eros, 2011) have used teacher career stages as a way of understanding the different needs of teachers in various stages of their careers, including research that contextualizes what this means for teacher PD (Christensen, Burke, Fessler, & Hagstrom, 1983; Hanushek, Kain, O'Brien, & Rivkin, 2005). For this study, the groupings described are informed by Fuller's (1969) and Podsen's (2002) models and include the following career stages: *novice* (0-4 years), *experienced* (5-14 years), and *master* (15+ years). Table 12 presents frequencies and percentages of the teacher respondents, by gender as well as in total, who participated in the study categorized according to teacher

Table 12

Teacher Career Stages

Stage	Years	Female	Male	Total	Stage	Years	Female
		Freq.	%	Freq.	%	Freq.	%
Novice	0-4	6	40.00	4	36.40	10	38.50
Experienced	5-14	3	20.00	3	27.30	6	23.00
Master	15+	6	40.00	4	36.40	10	38.50
Total	Total	15	100.00	11	100.00	26	100.00

Note: Years = Number of years teaching. Freq. = Frequency.

career stages. Of the teachers who completed the online survey, 39% belong to the novice group, 23% belong to the experienced group, and 38% belong to the master

teacher career group.

Teacher Views and Experience with Computing

Question 10 asked teachers to describe their level of comfort with the use of computers in general. Frequencies and percentages are presented in Table 13. None of

Table 13

Teachers' Comfort with the Use Computers by Gender

	F	%	Female	Male
Somewhat Comfortable	5	19.2	4	1
Very Comfortable	21	80.8	11	10

Note: F = Frequency.

the teachers who completed the survey identified themselves as neutral, somewhat uncomfortable, or very uncomfortable with computer use. Nineteen percent (19%) of teachers reported they were somewhat comfortable with computer use in general and 81% of teachers indicated they were very comfortable with computer use. As nTPD activities are based on computer use for delivery and interaction, understanding teacher's comfort with computers is inherent to the goals of this study. Frequencies and percentages analyzed using the five categories previously described in this chapter are presented in Table 14.

Table 14

Comparisons for Computer Use

		Comfort level with computer use		
Teachers		Somewhat	Very	% of Total
Grouping	Category	Freq.	Freq.	N=26
Age	NetGen	2	5	26.92
Group	GenX	2	13	57.69
	Boomer	1	3	15.38
Gender	Female	4	11	57.69
	Male	1	10	42.31
Role of	Admin	0	3	11.54
Teacher	Practicing	3	12	57.69
	Pre-service	2	1	11.54
	Support	0	5	19.23
Teacher's	Urban	2	12	53.85
School	Rural	2	7	34.62
Location	Other	1	2	11.54
Teacher	Novice	3	7	38.46
Career	Experienced	1	5	23.08
Stage	Master	1	9	38.46

Note: Freq. = Frequency. Boomer = Baby Boomer.

Question 11 asked teachers about their agreement with the statement "I have a

lot of experience with online social network sites." Frequencies and percentages are

presented in Table 15. Seventy-seven percent (77%) of teachers reported agreement

Table 15

Teacher Responses Regarding Considerable Amount of SNS Experience

	Frequency	%	Cumulative %
Strongly Agree	4	15.4	15.4
Agree	16	61.5	76.9
Neutral	3	11.5	88.5
Disagree	2	7.7	96.2
Strongly Disagree	1	3.8	100.0

with this statement, while 23% responded that they were neutral or in disagreement

with the statement. As the nTPD activities are delivered inside a social network

environment, a detailed understanding of teacher's SNS experience is valuable for this

study. Frequencies and percentages analyzed using the five categories previously

described in this chapter are presented in Table 16.

Table 16

Group Comparisons for SNS Use

		Social Networking Site Experience		
Teachers		Low Use	High Use	% of Total
Group	Category	Frequency	Frequency	N=26
Age Group	NetGen	2	5	26.92
	GenX	2	13	57.69
	Boomer	2	2	15.38
Gender	Female	4	11	57.69
	Male	2	9	42.31
Role of Teacher	Admin	1	2	11.54
	Practicing	4	11	57.69
	Pre-service	0	3	11.54
	Support	1	4	19.23
Teacher's School	Urban	4	10	53.85
Location	Rural	2	7	34.62
	Other	0	3	11.54
Teacher Career	Novice	1	9	38.46
Stage	Experienced	2	4	23.08
	Master	3	7	38.46

Note: Freq. = Frequency. Boomer = Baby Boomer. Admin=Administrator

Questions 12 and 13 asked teachers about the kind of online communication

and educational technologies they used themselves and with their students.

Frequencies and percentages for this question are presented by gender grouping in

Table 17. No significant dependency between any of the groupings and technology

use is evident.

Table 17

Frequencies of Technology Use by Gender

Which of the following have you used by yourself?	Female (n=15)		Male (n=11)	
	Self	With Students	Self	With Students
Email	15	10	11	9
Social networking sites	11	0	10	2
Social media sites	15	11	10	8
Websites others created	15	12	11	9
Websites I/my students created	13	11	8	9
Realtime text or online chat	13	1	8	3
Mobile texting	15	3	10	3
Interactive whiteboards	14	11	11	11
Audio or video conferencing	12	8	10	8

Question 14 asked teachers where their participation in the courselet activities

primarily took place. Frequencies and percentages for question 14 are presented in

Table 18. Teacher's access to nTPD activities from home or school was about equal.

Table 18

Primary Access to Courselet Activities

	Frequency	%
From home	14	53.8
From school	12	46.2

Question 15 asked teachers to identify all of the locations where they had access

to high-speed internet for participation in the nTPD activities. Frequencies and

percentages for question 14 are presented in Table 19. There appears to be no overt

Table 19

Access to High-speed Internet for nTPD activities

Location	Female		Male		Total	
	Frequency	%	Frequency	%	Frequency	%
Home	15	100.0	9	81.82	24	92.31
School	11	73.33	10	90.90	21	80.77
Other	0	0.00	3	27.27	3	5.36

overall difference between teacher's access to high-speed internet from home or from

school.

Question 16 is the final teacher computer use type question included in the

survey instrument. Question 16 asked teachers to identify all of the types of teacher

professional development they have participated in. Frequencies and percentages for

question 16 are presented by gender grouping and totals in Table 20.

Table 20

Other TPD Teachers Participation

Generation	Female	Male	Total
	Frequency	Frequency	Frequency
One hour sessions	12	11	23
Half-day workshops	14	10	24
Full-day workshops	12	11	23
School-based PLCs	11	8	19
ATA Institutes	5	7	12
University Courses	10	4	14
Other*	12	7	19

Note. School-based PLCs = School-based Professional Learning Communities, ATA Institutes = Alberta Teachers' Association Institutes. University courses = University courses beyond Bachelor of Education degree requirements, Other* = AISI Innovative projects, conferences, international conferences, online webinars, week-long institutes.

Courselet Participation

Questions 17 through 34 in the survey instrument asked teachers a series of questions about their courselet participation. All twenty-six survey respondents completed these 17 questions.

Teachers' agreement with question 17, "My decision to participate in the 2Learn.ca courselet was because of the topic being presented*,"* was 96.2%, (73.1% strongly) as indicated in Figure 7.
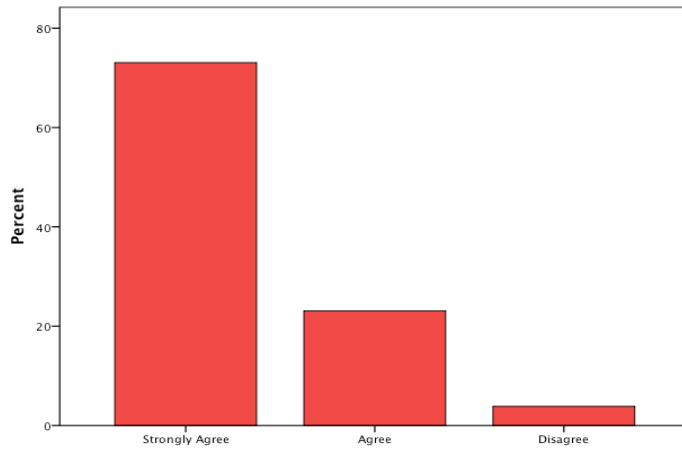
Figure 7. Percentage of teachers who responded their decision to participate in the 2Learn.ca courselet was because of the topic being presented.

Teachers' agreement with question 18, "My decision to participate in the

2Learn.ca courselet was because of the delivery method of the activity*,"* was 80.8%,

(46.2% strongly) as indicated in Figure 8.
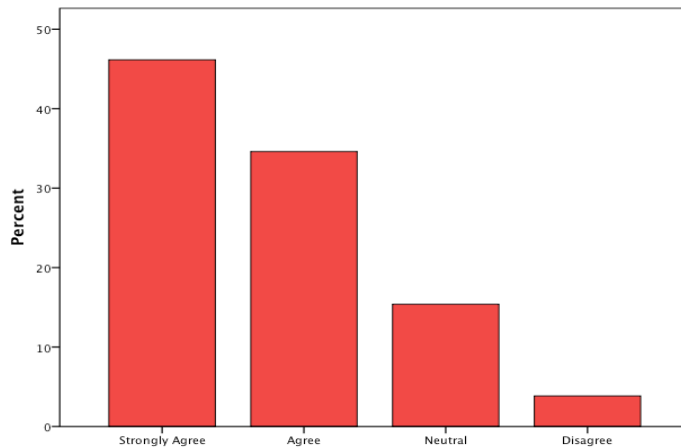
Figure 8. Percentage of teachers who responded their decision to participate in the
2Learn.ca courselet was because of the delivery method of the activity.

Teachers' agreement with question 19, "My participation in the 2Learn.ca

courselet has changed my teaching approaches or practices*,"* was 73.1%, (15.4%

strongly) as indicated in Figure 9.
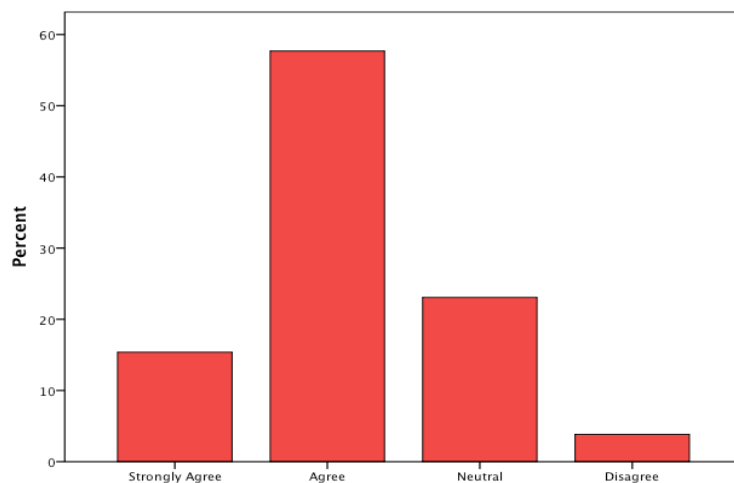
Figure 9. Percentage of teachers who responded that their participation in the
2Learn.ca courselet has changed their teaching approaches or practices.

Teachers' agreement with question 20, "I would encourage other teachers to participate in a 2Learn.ca courselet*,"* was 92.3%, (50.0% strongly) as indicated in Figure 10.
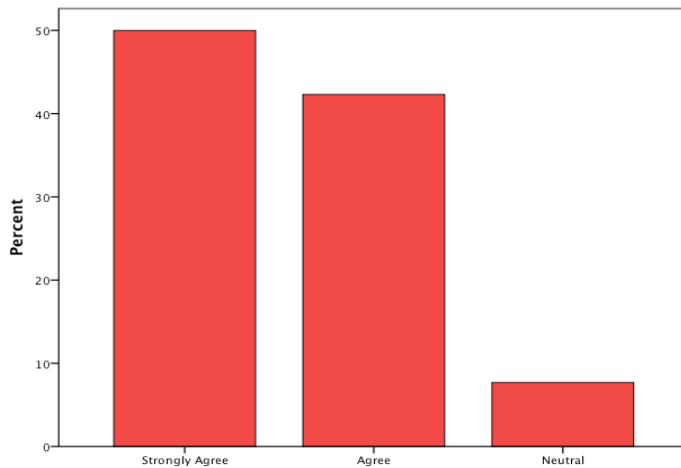
Figure 10. Percentage of teachers who responded they would encourage other teachers to participate in a 2Learn.ca courselet.

Teachers' agreement with question 21, "I am able to participate in this type of month long professional development activity only because it is delivered online*,"* was 80.8%, (50.0% strongly) as indicated in Figure 11.
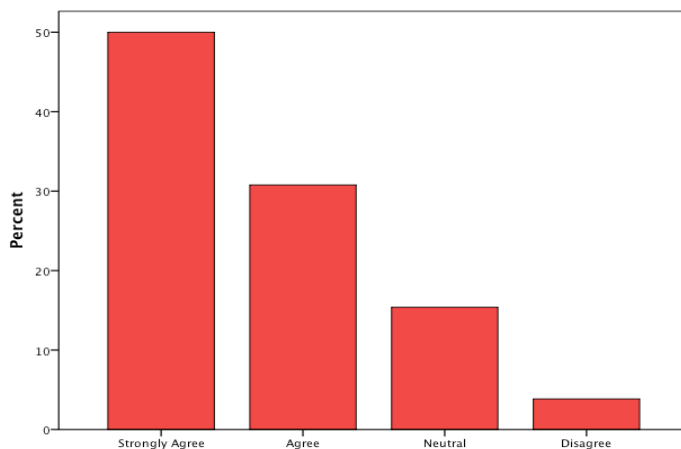
Figure 11. Percentage of teachers who responded they were able to participate in this type of month long professional development activity only because it is delivered

online.

Teachers' agreement with question 22, "I have improved my technology skills as a result of being involved with the 2Learn.ca courselet," was 73.1%, (30.8% strongly) as indicated in Figure 12.
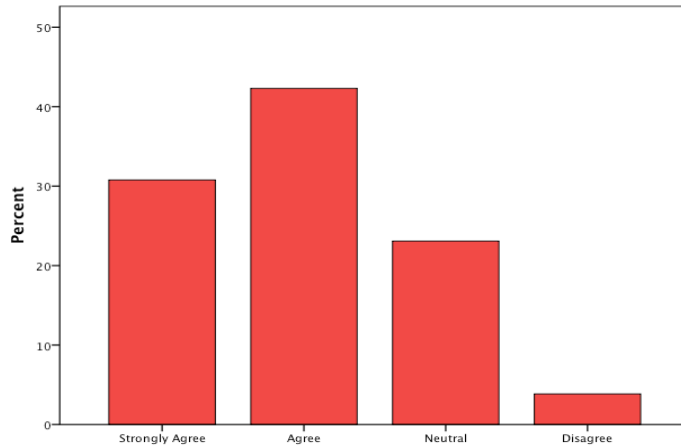
Figure 12. Percentage of teachers who responded that they improved their technology skills as a result of being involved with the 2Learn.ca courselet.

Teachers' agreement with question 23, "I am motivated to try new technology activities because of my participation in the 2Learn.ca courselet," was 92.3%, (46.2% strongly) as indicated in Figure 13.
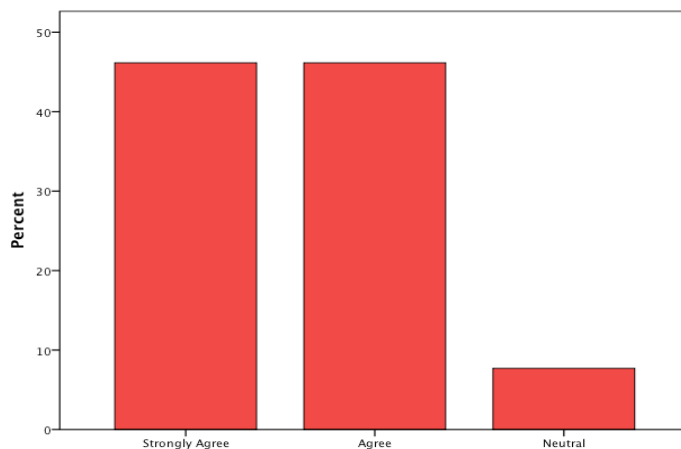
Figure 13. Percentage of teachers who responded they are motivated to try new

technology activities because of their participation in the 2Learn.ca courselet.

Teachers' agreement with question 24, "My participation in the 2Learn.ca courselet helped me to feel connected with other teachers," was 80.8%, (46.2% strongly) as indicated in Figure 14.
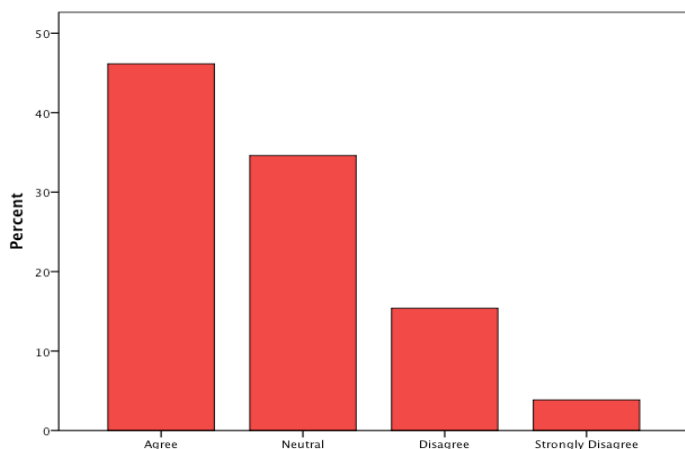
Figure 14. Percentage of teachers who responded their participation in the 2Learn.ca courselet helped them to feel connected with other teachers.

Usefulness of Course Activities and Resources

Teachers' agreement with question 25, "I found the conversations with other teachers in the 2Learn.ca courselet resulted in new educational strategies I can use in the classroom," was 65.4%, (11.5% strongly) as indicated in Figure 15.
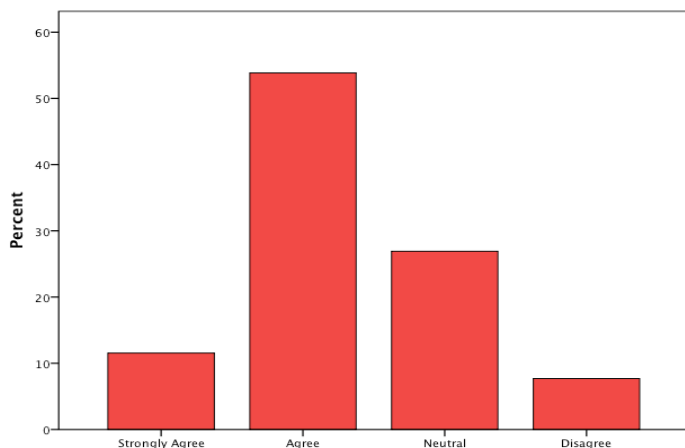
Figure 15. Percentage of teachers who responded that they found the conversations

with other teachers in the 2Learn.ca courselet resulted in new educational strategies they can use in the classroom.

Teachers' agreement with question 26, "I feel that the video examples of technology use provided or referenced in the 2Learn.ca courselet were important to my learning," was 76.9%, (30.8% strongly) as indicated in Figure 16.
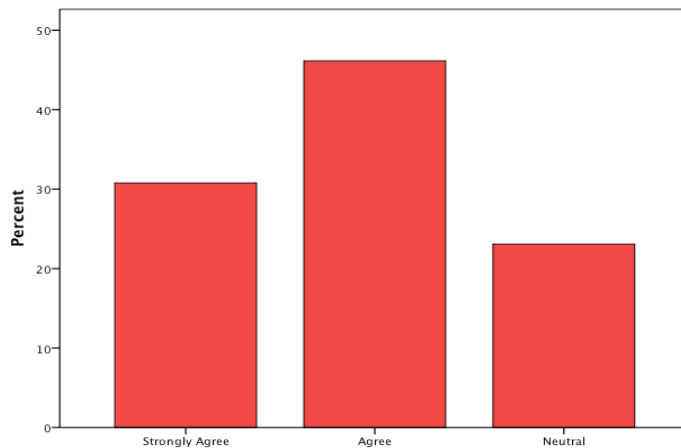
Figure 16. Percentage of teachers who responded that they felt that the video examples of technology use provided or referenced in the 2Learn.ca courselet were important to their learning.

Teachers' agreement with question 27, "I feel that the support videos provided in the 2Learn.ca courselet were important to my learning," was 80.8%, (30.8% strongly) as indicated in Figure 17.
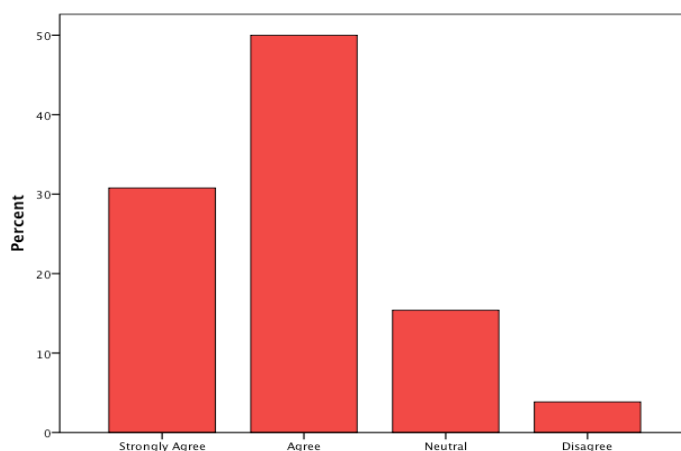
Figure 17. Percentage of teachers who responded that they felt that the support videos

provided in the 2Learn.ca courselet were important to their learning.

Teachers' agreement with question 28, "The online discussion forum postings were critical to my success in the 2Learn.ca courselet," was 61.5%, (11.5% strongly) as indicated in Figure 18.
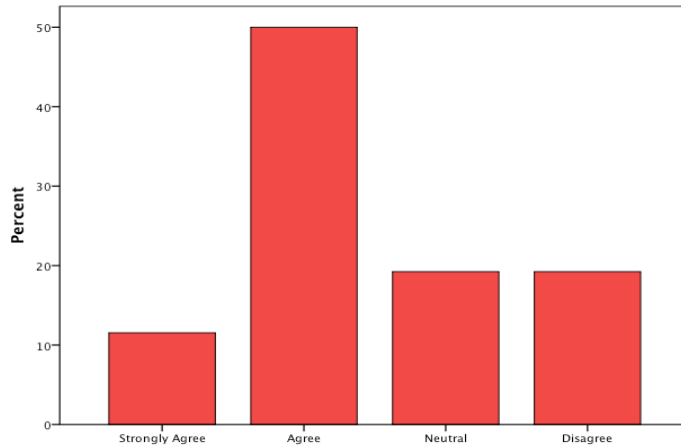
Figure 18. Percentage of teachers who responded that they felt the online discussion forum postings were critical to their success in the 2Learn.ca courselet.

Teachers' agreement with question 29, "The blog postings were critical to my success in the 2Learn.ca courselet," was 57.7%, (7.7% strongly) as indicated in Figure 19.
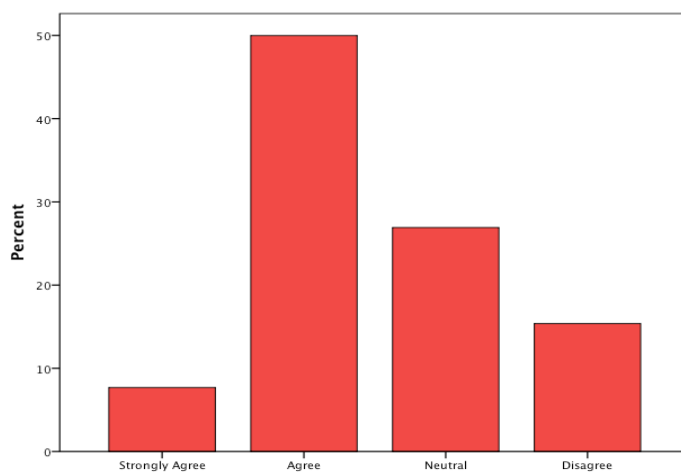
Figure 19. Percentage of teachers who responded that they felt that the blog postings

were critical to their success in the 2Learn.ca courselet.

Teachers' agreement with question 30, "The materials and resources were critical to my success in the 2Learn.ca courselet," was 92.3%, (38.5% strongly) as indicated in Figure 20.
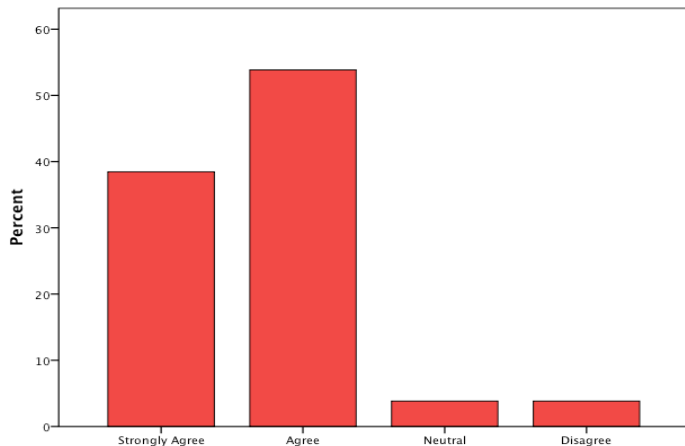
Figure 20. Percentage of teachers who responded that they the materials and resources were critical to their success in the 2Learn.ca courselet.

Teachers' agreement with question 31, "The lesson planning activity was critical to my success in the 2Learn.ca courselet," was 73.1%, (19.2% strongly) as indicated in Figure 21.
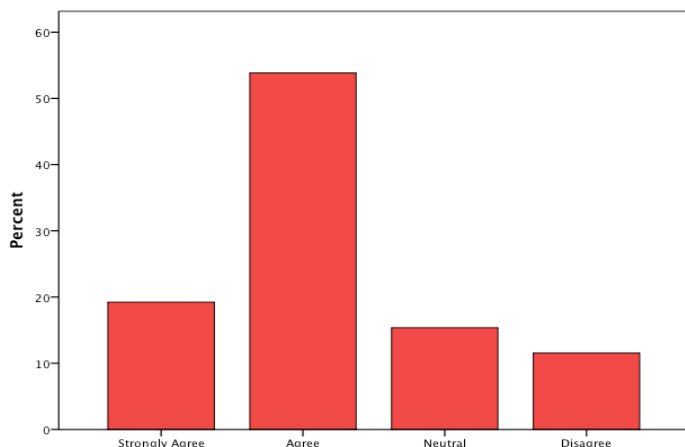
Figure 21. Percentage of teachers who responded that they felt that the lesson planning activity was critical to their success in the 2Learn.ca courselet.

Teachers' agreement with question 32, "My participation in the 2Learn.ca

courselet helped me to understand more about the processes for acquiring

knowledge and skills in an online-networked environment," was 80.8%, (30.8%

strongly) as indicated in Figure 22.
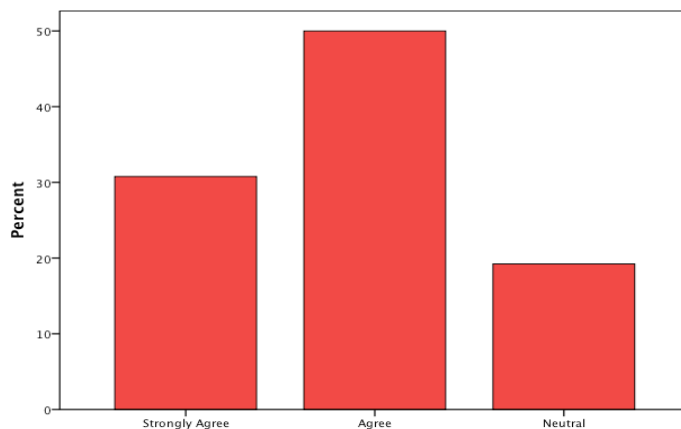
Figure 22. Percentage of teachers who responded that their participation in the 2Learn.ca courselet helped them to understand more about the processes for acquiring knowledge and skills in an online-networked environment.

Teachers' agreement with question 33, "Discussions that I participated in or

read in the 2Learn.ca courselet helped me to reflect on my own teaching practice,"

was 84.6%, (23.1% strongly) as indicated in Figure 23.
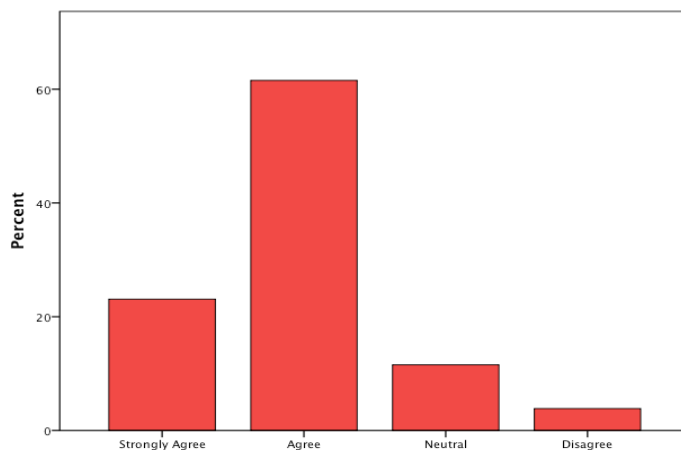
Figure 23. Percentage of teachers who responded that the discussions that they

participated in or read in the 2Learn.ca courselet helped them to reflect on my own teaching practice.

Teachers' agreement with question 34, "I feel that participation in 2Learn.ca courselet was an effective way in which to learn how to use online tools to support my professional learning," was 92.3%, (34.6% strongly) as indicated in Figure 24.
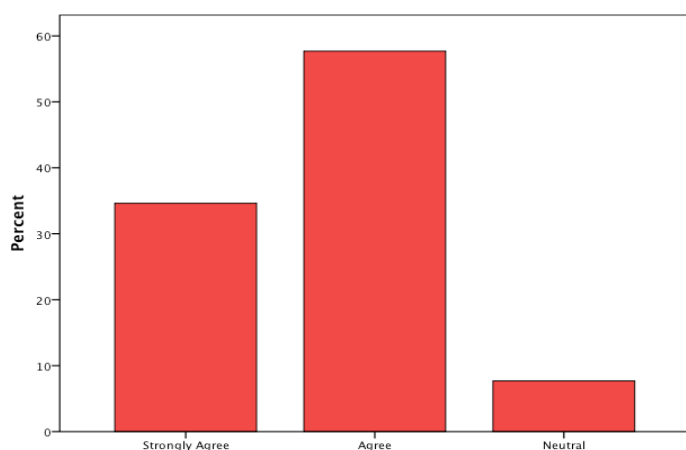
Figure 24. Percentage of teachers who responded that they felt that their participation in 2Learn.ca courselet was an effective way in which to learn how to use online tools to support their professional learning.

Means Comparisons Grouped by nTPD Research Question

The following section provides a means analysis of the descriptive statistics at the item level grouped by nTPD study research question and ranked in order of the lowest mean. Questions 17 through 34 of the online survey have been grouped related to the three research questions guiding this nTPD study. The data presented in Tables 23 through 26 have been ranked in order of the lowest to highest mean to identify high and low levels of agreement according to the Likert scale. Items that have a low mean, less than or equal to two, indicate agreement or strong agreement with the item. In contrast, items with a mean more than or equal to four indicate disagreement or strong disagreement with the item. In addition, items with a mean close to three indicate the teachers responded with uncertainty within the item.

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Several questions pertained to the first nTPD research question: *What kinds of profession-centered technology learning do teachers who participate in networked professional development activities engage in?* These questions asked teachers about changes in, or improvement in, their understanding of technology or of pedagogical strategies and best represent a macro view of teacher technology learning:

1. Question 32 - Networked = My participation in the 2Learn.ca courselet helped me to understand more about the processes for acquiring knowledge and skills in an online-networked environment.

2. Question 22 - Improved = I have improved my technology skills as a result of being involved with the 2Learn.ca courselet.

3. Questions 19 - Change = My participation in the 2Learn.ca courselet has changed my teaching approaches or practices.

4. Question 25 - Pedagogy = I found the conversations with other teachers in the 2Learn.ca courselet resulted in new educational strategies I can use in the classroom.

Table 21 shows the distribution of teacher responses for each question including mean and standard deviation.

Table 21

Profession-centered Technology Learning Rankings

	SA	A	N	D	SD		
Question	%	%	%	%	%	Mean	Std.D
Q32 Networked	30.77	50.00	19.23	0.00	0.00	1.88	0.711
Q22 Improved	30.77	42.31	23.08	3.85	0.00	2.00	0.849
Q19 Change	15.38	57.69	23.08	3.85	0.00	2.15	0.732
Q25 Pedagogy	11.54	53.85	26.92	7.69	0.00	2.31	0.788

The item with the lowest mean (1.88) indicates that (80.8%) teachers perceive their participation in nTPD helped them to understand more about the processes for knowledge and skill acquisition in online-networked environments.

Several questions pertained to the second nTPD research question: *What components (discourse or activities) of professional development delivered in an online social networking site do teachers identify as having professional value?* These questions asked teachers about activities or discussions (courselet components) that had value for their teaching practice and best represent a focused view of activities or discussions having professional value for teachers:

1. Question 23 - New activities = I am motivated to try new technology activities because of my participation in the 2Learn.ca courselet.

2. Question 34 - Use Tools = I feel that participation in 2Learn.ca courselet was an effective way in which to learn how to use online tools to support my professional learning.

3. Question 33 - Discussion = Discussions that I participated in or read in the 2Learn.ca courselet helped me to reflect on my own teaching practice.

4. Question 28 - Discussion = The online discussion forum postings were critical to my success in the courselet.

5. Question 24 - Connected = My participation in the 2Learn.ca courselet helped me to feel connected with other teachers.

Table 22 shows the distribution of teacher responses for each question including mean and standard deviation. The item with the lowest mean (1.62) indicates that (92.3%)

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teachers perceive their participation in nTPD activities motivated them to try new

technology activities. Similarly the second lowest mean (1.73) indicates that (92.3%)

teachers perceive their participation in nTPD activities was an effective way to learn

Table 22

nTPD Courselet Components

	SA	A	N	D	SD		
Question	%	%	%	%	%	Mean	Std.D
Q23 New activities	46.15	46.15	7.69	0.00	0.00	1.62	0.637
Q34 Use tools	34.62	57.69	7.69	0.00	0.00	1.73	0.604
Q33 Discussions	23.08	61.54	11.54	3.85	0.00	1.96	0.720
Q28 Discussions	11.54	50.00	19.23	19.23	0.00	2.46	0.720
Q24 Connected	0.00	46.15	34.62	15.38	3.85	2.77	0.863

Note. SA = strongly agree; A = agree; N = neutral; D = disagree; SD = strongly disagree; Std.D = standard deviation.

how to use online tools to support their professional learning. This means comparison

indicates that teachers report that the activities are more valuable than the discussions

in terms of supporting professional practice.

Several questions pertained to the third nTPD research question: *What design*

elements of the networked teacher professional development experience affect teacher

practice? These questions asked teachers about the design elements of the courselet

that had value for their teaching practice and best represent a micro view of the

courselet design elements that affected teacher practice:

1. Question 30 - Materials = The materials and resources were critical to my

   success in the courselet.

2. Question 26 - Video examples = I feel that the video examples of technology

   use provided or referenced in the courselet were important to my learning.

3. Question 27 - Support videos = I feel that the support videos provided in the

courselet were important to my learning.

4. Question 31 - Lesson planning = The lesson planning activity was critical to my success in the courselet.

5. Question 29 - Blog posts = The blog postings were critical to my success in the courselet.

Table 23 shows the distribution of teacher responses for each question including mean and standard deviation. The item with the lowest mean (1.73) indicates that (92.3%) teachers perceive the materials and resources were the most critical to their success in the nTPD. The highest mean (2.50) indicates that teacher respondents were least in agreement about their perception that blog postings were critical to their success in the nTPD courselet.

Table 23

nTPD Design Elements Rankings

	SA	A	N	D	SD		
Question	%	%	%	%	%	Mean	StDv
Q30 Materials	38.46	53.85	3.85	3.85	0.00	1.73	0.724
Q26 Video examples	30.77	46.15	23.08	0.00	0.00	1.92	0.744
Q27 Support videos	30.77	50.00	15.38	3.85	0.00	1.92	0.796
Q31 Lesson planning	19.23	53.85	15.38	11.54	0.00	2.19	0.895
Q29 Blog posts	7.69	50.00	26.92	15.38	0.00	2.50	0.860

Note. SA = strongly agree; A = agree; N = neutral; D = disagree; SD = strongly disagree; StDv = standard deviation.

Means Comparisons Grouped by Motivation for Courselet Participation

Several questions pertained to the teacher participation in the nTPD courselet and asked teachers about their motivations to participate in the courselet. These questions best represent teacher motivations which provides one layer of nTPD design principles evaluation:

1. Question 17 - Topic = My decision to participate was because of the topic

    being delivered.

2. Question 20 - Encourage = I would encourage other teachers to participate in a

    2Learn.ca courselet.

3. Question 21 - Online = I am able to participate in this type of month long PD

    activity only because it is delivered online.

4. Question 18 - Decision = My decision to participate was because of the

    delivery method of the activity.

Table 24 presents the distribution of teacher responses including mean and standard

deviation. The item with the lowest mean (1.35) indicates that (96.2%) teachers

Table 24

Motivation to Participate Rankings

	SA	A	N	D	SD		
Question	%	%	%	%	%	Mean	Std.D
Q17 Topic	73.08	23.08	0.00	3.85	0.00	1.35	0.689
Q20 Encourage	50.00	42.31	7.69	0.00	0.00	1.58	0.643
Q21 Online	50.00	30.77	15.38	3.85	0.00	1.73	0.874
Q18 Decision	46.15	34.62	15.38	3.85	0.00	1.77	0.863

Note. SA = strongly agree; A = agree; N = neutral; D = disagree; SD = strongly disagree; Std.D = standard deviation.

perceive their motivation to engage in 2learn.ca nTPD was directly linked to the topic

of the courselet. The second lowest mean (1.58) indicates that (92.3%) teachers

indicate that they would encourage other teachers to participate in 2Learn.ca nTPD

courselets. The final two motivational questions also have relatively low means

(below 2.00) that indicate teachers were in agreement or strong agreement that the

online delivery mode contributed considerably to their decision to participate in the

2Learn.ca nTPD courselet.

Qualitative Analysis of Open-ended Survey Questions

The final section of the survey instrument data analysis details the five open-ended questions presented to the respondents in survey questions thirty-seven through forty-one. As data collected in these questions describes personal experiences of teachers, an interpretational data analysis (Cohen, Manion, & Morrison, 2007) was applied. Responses were coded into representative themes emerging from the analysis and then grouped to include all of the responses to a survey question. For each of the five open-ended questions, these themes are presented as categories of responses, with frequencies for each theme presented in tables and lists of exemplar quotes for each theme. Where teachers' responses covered more than one of the common themes identified, they were added in to the frequency counts for both (or more) themes.

Advantages of the courselet over other TPD

Question 37 asked survey participants "What do you feel are the advantages that the 2Learn.ca courselet had over other types of teacher PD that you have participated in?" There were 2 blank responses (of a possible 26) for this question posed to the survey participants. Table 25 presents the emergent themes and the number of responses for each theme reported by teachers in question 37.

Table 25

Advantages of the Courselet Over Other Types of TPD

Themes	Responses (N=24)
Allowed for flexible participation	15
Flexible schedule for activities	11
Participate from anywhere	6
Participate from home	4
Networking with other teachers	4

Sharing of products	3
Discussions with other teachers	3
Ongoing	3

One major benefit of the courselet that was reported by teachers was the

flexibility of access to PD provided by the courselet. This included the ability for

flexible participation with regards to time and scheduling of activities and anywhere

access. This reported importance of the flexibility of courselet timelines and access is

well supported in distance education literature (Ally, 2008; Bullen, 1998; Tucker &

Morris, 2011) and is often referred to as flexibility of delivery. These comments by

courselet teachers typify comments represented in this theme: "I liked that I could

access the lessons when it was convenient for me" and "[It] didn't require a set

schedule, making it flexible to my teaching." Other teachers reported that the anyplace

(Tucker & Morris, 2011) flexibility was important in terms of their access to the PD

offered in the courselet. Some of the teachers commented on the convenience of

anyplace participation. For instance, one teacher commented that the "timing wasn't as

restricted, as I could complete the course at home", while another teacher stated that

"I can do it in my pjs! I don't have to waste gas. I am at home where I am

comfortable."

Another benefit reported by teachers of the courselet was the opportunity for

networking and sharing with other teachers. This included the development of a

dispersed collegial network focused on sharing and support of teaching practices with

other people interested in the same topic. Other comments that typify this theme

include:

It was great to be introduced to web tools that I have never heard of or used. I

think that it is difficult to find great resources as it takes time.... I was introduced to them instantly and I had a support network who I could come to to ask questions.

The next commonly cited theme of courselet advantages reported by teachers was the value of the discussions. Teachers stated that the discussions were valuable to their own leaning as it allowed for informal sharing as explained in the following excerpt from a division support teacher: "It also allows for the informal sharing through the discussion forums - so everyone contributes to the learning of everyone else."

The final theme described by teachers was the ongoing nature of the courselet activities. One teacher commented that the ability to participate, reflect, and then return to the courselet materials had real value in providing ongoing professional development.

Time to think about the task at my speed and in my own time. To be able to go away from the teaching delivery period and experience the work/learning and then return to the teaching/delivery experience of the course by the course directed work. ie same reason it is more effective to have students o their own computer working through a tutorial rather than have the whole class watching on the smartboard.

This theme was expanded upon in another teacher's comments on the additional value of the ongoing nature while participating in the courselet with another school colleague: "It was ongoing and by attending with a peer from the same school board, I had peer support and encouragement throughout the courselet and beyond."

Disadvantages of the courselet over other TPD

Question 38 asked survey participants "What do you feel are the disadvantages that the 2Learn.ca courselet had over other types of teacher PD that you have participated in?" There were 3 blank responses (of a possible 26) for this question posed to the survey participants. Table 26 presents the themes and frequencies of the responses to question 38.

Table 26

Courselet Disadvantages

Themes	Responses (N=23)
Lack of website navigation familiarity	8
Insufficient postings or discussion by other participants	6
Lack of personal connection or face-to-face interaction	6
Time management and self-motivation	4
No source of frustration	3

The most commonly reported disadvantage of courselet participation reported by teachers is the lack of website navigation familiarity. Initial familiarity with the website and navigation of the social networking site was reported by teachers to take significant time to learn to navigate and access the courselet materials. One teacher's comments elaborate on this disadvantage:

 I was frustrated by the lack of simplicity and intuitive navigation of the site... could be me, but i have been around these things a lot. It made for a too great percentage of my time trying to navigate postings etc compared to doing the work of the posting. I compare that to one on one or class instruction methods with a facilitator available. I did appreciate the video tutorials provided on the right hand side to help understand the navigation. HOWEVER if such a thing is

needed, we must ask why it is needed and that the initial interface with the user

is insufficiently obvious.

The second theme of courselet disadvantages reported by teachers was related to

insufficient numbers of and a general lack of participation in the courselet discussions.

One practicing teacher indicated that other participants did not follow the courselet

schedule so "we all missed out on the potential interactions." A division support

teacher reported that even the courselet postings that were made lacked discussion-

like qualities:

> I feel that, although I appreciated reading blogs, there was a lack of discussion
>
> between members. Instead it was more of everyone putting forth their own
>
> ideas, without bouncing these ideas off of each other.

The third theme reported by teachers regarding courselet disadvantages was the

lack of personal connection or face-to-face interaction as compared to other

professional development. Teachers reported that the PD was very impersonal and

that the flexible timeline meant the postings by others were not occurring at similar

times, as would occur in a face-to-face discussion. One teacher elaborates and

provides potential solutions to this challenge:

> I do miss meeting people face to face. I think we could spend some time
>
> getting to know one another...perhaps a meet and greet...introducing
>
> yourself...perhaps we needed to do a Voicethread video of all of us and we
>
> needed to watch them. I feel as though I didn't really connect with the others. (I
>
> could have done a better job at that and perhaps should have made an effort to
>
> get to know others) I think the most important thing about online courses is still

having that feeling on human presence. It would have been great to meet online

via elluminate in the beginning and the end of the courselet.

The last theme reported by teachers on disadvantages of the courselet related to
time management and self-motivation challenges. As reported by one teacher,
speeches given at live professional development activities can be very motivating, "
whereas online you need to be self-motivated." A practicing teacher who reported that
the courselet activities happened on personal time, as opposed to professional time,
elaborated on this theme of motivation and finding time to participate online:

Because it was on my own time, it was sometimes harder to find time to do...if

you go to a one day workshop, you fit everything in to that one day.

As all courselet activities occurred asynchronously in an online-networked
environment, the disadvantages reported by teachers represented those typical of
online learners (Ally, 2008).

Teachers most valued nTPD courselet learning experience

Question 39 asked survey participants "What was your most valuable learning
experience that was a result of your participation in the 2Learn.ca courselet?" There
were 6 blank responses (of a possible 26) for this question posed to the survey
participants. Table 27 presents the themes and frequencies of the responses to
question 39.

Table 27

Most Valuable Courselet Learning Experience

Themes	Responses (N=20)
Experiential technology learning that is useful in the classroom	20

Sharing of resources and lesson plans	8
Networking with other teachers	4
Pedagogical reflection	3

The most commonly reported theme emerging from teacher's descriptions of valuable courselet learning experiences centered on experiential technology learning relevant to classroom practice. Several teachers commented that their exposure to online tools or robotics and how to use these technologies in teaching was very valuable. One division support teacher reported learning new tools, such as Voicethread, to share with other teachers. Providing teachers with a place to experiment and gain confidence, as well as incentive to try these technologies in their classroom, was also noted as a valuable learning outcome of the courselet. This confidence with experimenting was described by one preservice teacher as "being able to see how other teachers would use the technology" which provided the needed confidence to implement the specific technology into the classroom. Another practicing teacher reported that in addition to learning about a technology, the courselet provided the incentive to implement the new technology:

> I followed through on pursuing the development of a wiki with my students - and loved what came of this. The course moved me from "thinking" I should do this (where I was before the course) to "doing". Thanks for this incentive.

The second most commonly reported theme of valued teacher learning in the nTPD courselets was the sharing of resources and lesson plans. This reported value of resource sharing is also supported by past research and the author's own studies (Ostashewski & Reid, 2010a; 2012a). These comments by teachers typify comments in this reported theme: "I really enjoyed accessing the resources that are course

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specific on the 2learn website, and I also appreciated that the materials presented were thought provoking, and encouraged me to be reflective of my own teaching practices," and "Really learning about 2Learn.ca I learnt that there are so many resources available for me and my students! As a new teacher, I am so excited to use everything that I have learnt in my classroom."

The third theme emerging from what teachers reported in relation to their learning in the courselet was about the power of networking with other teachers. One preservice teacher commented that it was the "power of networking with other teachers interested in same content" that stood out as a learning outcome. Other teachers commented that they enjoyed the blogging and networking and that they "enjoyed looking at the posts of others and trying to push myself a bit further. It was a good challenge."

The fourth theme that emerged from analysis of teacher responses to Question 39 of the survey was the value of the deep learning and pedagogical reflection resulting from participation in the courselet. Critical analysis opportunities afforded by the courselet were reported as valuable by one teacher who stated "[d]eeper thinking on how interactive white boards should be used... time to think about the purpose of them in lessons to use them more effectively" was important. This learning outcome is supported by deep learning research in online education (DeLottell, Millam, & Reinhardt, 2011). An extension of this theme is the pedagogical reflection that resulted from the courselet participation. A teacher reported that "[m]y most valuable experience was the professional reading, sharing of resources, and personal reflection on pedagogy."

Sources of frustration with of the nTPD courselet

Question 40 asked survey participants "What was a source of frustration (if any) that was a result of your participation in the 2Learn.ca courselet?" There were 5 blank responses (of a possible 26) for this question posed to the survey participants. Table 28 presents the themes and frequencies of the responses to question 40.

Table 28

Source of Courselet Frustrations

Themes	Responses (N=21)
Insufficient responses by other participants	6
Website navigation and use	5
Dates, timelines, time challenges	5
No frustrations at all, other	5

The most commonly reported theme relating to frustrations teachers had in courselet participation was that there were insufficient responses by other courselet participants. Teachers responded that the general "lack of actual discussion" affected what teachers perceived should have happened in the courselet, resulting in less than optimal support between teachers. As one teacher describes "others not participating until after the course was supposed to be over - this gave us no sense of community! We could not learn from each other."

The second most common theme relating to courselet frustration related to the lack of familiarity with the website navigation. Several teachers reported that the "navigating around the delivery platform did not seem intuitive" and it was at times challenging to find areas to post or upload files. One practicing teacher reported significant frustration with the site navigation relating to labeling and terminology in the courselet space.

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As stated earlier, the mismatch between terms, where Labels of things are on the 2Learn site, and trying to get through things quickly and effectively. Several times I left the site a bit frustrated because I was trying to complete a task (e.g. post required blogs) but these I initially put in the wrong spot...yet I THOUGHT I was in the right space. Perhaps COLOURED FONT would be an easy way to individualize a course for an instructor...e.g. "Look for the PURPLE BlOG label and post there for assignment 2 etc" and obviously use 4-5 colours for various labels to help people learn the site. Just an idea...:)"

Another common theme reported by teachers was about timelines, old dates, and time challenges for teachers participation. Teachers reported that they were "too busy with school to put in a full effort" or that they had challenges with staying on track. A division support teacher elaborates:

Staying on track. More reminders could have come on what lessons needed to be done. The content was great, but could have used a little more direction on some of the lessons.

Despite the time challenges, one teacher commented that courselet participation was worth the time burden:

My schedule is pretty packed with school work and extra curricular involvement. At times I felt burdened with getting the work done to complete the courselet. On the other hand, once it was all said and done, I was pleased with the course and what I had learned.

A final theme of teacher frustrations with courselets related to no frustrations with the courselet as "it was a great experience and I would actively look for more

opportunities like this." As well other teacher comments were categorized as other as they did not fit into a common theme. One example if this kind of comment is around a perception of teacher comments:

> At times I did find some of the comments of the participants judgemental, using blanket statements like "those teachers… who use, or don't use technology in a certain way… … I find it frustrating when people make assumptions and judgement statements like that.

Courselet component contributing most to teacher learning

Question 41 asked survey participants "What component of the 2Learn.ca courselet contributed most to your learning about the topic presented?" There were 6 blank responses (of a possible 26) for this question posed to the survey participants. Table 29 presents the themes and frequencies of the responses to question 41.

Table 29

Courselet Component Contributing Most to Learning

Themes	Responses (N=20)
Activities	8
Resources identified and shared	6
Lesson planning	5
Discussions	5
Videos	5
Articles	4

The components of the nTPD courselets that teachers reported contributed most to their learning were the activities in the courselet. Teachers reported that "being able to experiment with the material myself" and that the "practical activities that I had to do" contributed significantly to their courselet learning. One practicing teacher's comments detail this theme: "I loved that it was so hands-on. It was I that had to do

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everything.... I didn't just watch it.... I physically had to accomplish the activity."

The second most commonly reported theme about courselet components that contributed to teacher learning was the resources that were identified and shared in the courselet. Typical teacher comments representing this theme include statements describing the various websites as very helpful and that the new online tools were also beneficial.

Three of the remaining themes of lesson planning, discussions, and videos theme were reported equally by teachers as contributing most to teacher learning. Teachers stated that the sharing of pictures and lesson plans with each other and the lesson-planning activity itself forced the practical side. Other teachers stated the discussions with colleagues were important as detailed in this comment: "Having questions answered by my fellow colleagues. They shared what they had, which I could use in my class." Several teachers commented on the value of the video segments indicating "video tutorials were very helpful in learning new applications," and that "The videos made learning how to use and what the technology was used for much easier and more effective." A final viewpoint was detailed in a teacher comment that highlighted that two or more components used together were useful overall. The power of the combination of more than one component was discussed by several teachers as described in this statement: "The videos that were shown with the articles to read. That provided a good base for conversation and reflection."

Question 42 of the online survey asked respondents if they would be willing to participate in a short (up to 30 minute) interview with the researcher about their 2Learn.ca courselet experience. Twenty-three respondents (88.5%, n=26) indicated

that they would be willing to participate in a further interview with the researcher. These participants compose the group of teachers who were eligible to be contacted for the second phase of the data collection in this study which was the semi-structured interviews.

Semi-Structured Interview Profiling

This section presents the results of the detailed analysis of the qualitative data collected from teacher interviews conducted as part of the study. These data aim to expand, clarify, and verify the results obtained from the survey instrument data. Firstly interview selection, collection processes, and response rates are presented. Next participant profiles are explained in terms of their demographic and grouping contexts described previously in this chapter. The interview results are then presented through the three research questions guiding the study.

Profiles of the eighteen teachers who were interviewed, including groupings and basic demographics, are presented in Table 30. Of these eighteen teachers, one identified as a pre-service teacher, eleven as teachers, one as an administrator-teacher, and five were in the role of a division support teacher for the school division employing them. Six of the teachers (33.3%) were male and twelve were female (67.7%). Experience in the teaching profession ranged from zero to thirty two years. Twelve of the teachers (67.7%) belong to the GenX group, three (16.7%) belong to the Baby Boomer group, and three (16.7%) to the NetGen group. Five teachers belong to the novice career stage (27.8%), six belong to the experienced career stage (67.7%), and five teachers belong to the master career stage (27.8%).

Table 30

Participant Profiles of Teachers Participating in Interviews

Profile	Gender	Role	Age	Generation	Years Teaching	Career Stage
P1	F	Pre-service	30	GenX	0	Novice
T1	F	Teacher	44	GenX	22	Master
T2	F	Teacher	33	GenX	8	Experienced
T3	F	Teacher	40	GenX	6	Experienced
T4	F	Teacher	37	GenX	15	Experienced
T5	F	Teacher	30	GenX	1	Novice
T6	F	Teacher	50	BabyBoomer	25	Master
T7	M	Teacher	43	GenX	1	Novice
T8	F	Teacher	26	NetGen	4	Novice
T9	F	Teacher	54	BabyBoomer	32	Master
T10	F	Teacher	26	NetGen	3	Novice
T11	F	Teacher	31	GenX	5	Experienced
A1	M	Administrator	40	GenX	16	Master
D1	M	Division*	39	GenX	16	Master
D2	F	Division*	38	GenX	16	Master
D3	M	Division*	51	BabyBoomer	29	Master
D4	M	Division*	34	GenX	13	Experienced
D5	M	Division*	28	NetGen	5	Experienced

Note. Administrator = Administrator + Teacher. Division* = School Division Technology Support Role.

Interview Analysis Reporting on NTPD Profession-centered Technology Learning

Four themes of profession-centered technology learning emerged from the data reported by teachers who participated in nTPD courselets: learning how to use technology tools, learning about online learning, learning about the power of networking with other teachers, and learning new technology-integrated pedagogical approaches.

Learning how to use technology tools

Teachers who participated in the interviews consistently reported that the nTPD activities that were designed to have them participate using an experiential hands-on

approach was an effective way to learn about the technology. For instance, one teacher pointed out that: "Those courselets are well worth the time because they do change your teaching and you gain more expertise that you can develop those skills but you need to sit down and actually get into it." (D3) The teacher experience of participating in a blog, wiki, Voicethread, or robotics building activity resulted in teachers learning how to use the technology itself. For example, one teacher in the courselet on robotics discussed learning how to work with the Lego robots was: "… hands-on actually you have the physical manipulation whereas the other one you're actually going to cyberspace but yes yes you did get to manipulate with the technology."(D1)

Another teacher mentioned that the experimentation with the technology tool connecting to other teachers to explore how it worked was valuable:

> I need to try it and experiment with it cause I even find now, stuff that try with Google I have nobody to try it with - okay I am trying it at home with myself and hope it works in my classroom - an what was neat about this was that I got to try it and saw that it worked. (T1)

A third comment regarding the importance of the experiential learning provided by the courselet was elaborated on in detail by the following teacher:

> You are kind of aware that these things are out there but its not until to actually take the time to sit down and actually do it that it … you know you have to spend some time on it right so that you are not embarrassed and so what the courselet does is it gives you a bit of impetus to follow through on those and to go through that… (D3)

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For some teachers, the opportunity of learning how to use the technology itself in this hands-on manner was the primary motivation for their participation in the nTPD courselet.

> I hadn't done any wikis or blogs and I thought this would be a way to think through some of the possible pitfalls before introducing it to my students, so that was why I was attracted to that particular online collaboration course. (T6)

Other teachers reported that the learning about using the technology provided them with the support needed to use the technology with their students, even while they were participating in the nTPD courselet activities:

> I started using a wiki with my grade Twelves especially, actually, during the course that required one of the assignments but I used it after the course and found it very successful. I think students really enjoyed it and so I enjoyed having that as one of the things you do in a language arts classroom in an English high school classroom, you build a wiki. (T6)

Several teachers who participated in the interviews recounted similar stories of how they had implemented or tried the technology that they were exposed to in the courselet with their students.

Learning about online learning

The second theme of teacher responses regarding new technology-centered professional learning as a result of nTPD participation was about teachers learning about online learning. One administrator reported about the need to learn about online learning, even if a person has no interest in technology:

> I guess I just, umm, as much as I try to avoid it, at the beginning, I was very

much an anti-technology. Everyone I know is using it. And on Facebook and umm, now using twitter, I find that it's just happening so much around me that you're really out of the loop if you are not and especially now teaching like, umm, having students and students in high school you kind of have to keep on top of at least the bare minimum of what they are interacting with. (A1)

Teachers reported gaining online learning experience, which provided a perspective on what it is like to be an online student: *"For the most part it gave me a better perspective on what it's like to be a student in one of these systems."* (D4)

One teacher reported that concept of an online learning course was initially scary, but that the courselet provided an opportunity to overcome that fear:

Like I said I wasn't sure what this would all involve, it was robotics and I thought oh great, you know, I can do it online and everything else, like I'm really glad that I went through the process and after doing it I realize that it's not as scary as it is and I would definitely take another one. (T9)

Learning about the power of networking with other teachers

A third theme that emerged from the analysis of the teacher interviews was that teachers participating in nTPD reported that they were learning about the power of networking with other teachers. One teacher's comments about the leveraging of vetting resources appropriate for the classroom provided by being connected to other like-minded teachers:

One thing I really really liked is that I was instantly connected to teachers because I found that, like I was saying, that I spent a lot of time on the internet looking for ideas, looking for ways to modify for my kids and then I just spent

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so many hours going through garbage. Like its better now cause I have more

places that I like to look but the first time started looking for that you have to

really wade through a lot of trash and things that are for teachers but they are

not by teachers right so this is really good because right away connected to

people who are actually teaching, right and we are all kind of like-minded and

we want quality stuff and that was really good because that shortens that gap

and so now knowing that I can go back on there, that I can connect with people

and make a group, like that's great! (P1)

While this theme is similar to learning about online learning, a difference is that

teachers reported that other teachers acted like content filters, sharing valuable

resources amongst the group of courselet participants:

Well basically through the networking I couldn't have been able to find all of

that stuff on my own, so I mean through the networking to people that were part

of it they obviously, you know, when we get to share lesson plans and stuff

basically you have, I think there was what 8 of us or 10 of us that were

blogging, and then they would post you don't go to this site or go to this site - so

I would never found some of these sites if it hadn't been for those people. So

right away it opened the door - so I taught robotics in the 1st semester and I also

taught it in the 2nd semester so in the 2nd semester there was a significant

difference in the resources that I had at my disposal and I had it a lot more

differentiated so kids who were really really good. (A1)

Learning new technology-integrated pedagogical approaches

The fourth and final theme of new technology-centered professional learning

identified by teachers was that teachers reported learning new kinds of pedagogical approaches. Through the collaborations and discussions, teachers identified other contexts to use technology:

> It just kind of made me think about maybe like some of the discussions or watching that grade two class made me think about ok how could I use this tool more effectively in terms incorporating it into the concepts I was covering. (T4)

Teachers also reported that their nTPD courselet participation provided a student perspective, changing their approach to technology and that perhaps technology should be embraced in the classroom, rather than being turned off:

> It really changed the way I approach technology. I'll tell everyone in my classroom, in my calm class that I'm teaching, we are going to look this up, right and I'm not afraid of cell phones in the classroom right and we use it as a tool so they have a computer in front of their hands so we shouldn't tell them "you can't use that" well, they should. (T5)

In summary, thematic coding and analysis of teacher interviews resulted in four themes emerging from the profession-centered technology learning reported by teachers. The experiences recounted by teachers points to the value of nTPD learning, particularly with regards to technology and online networking, which are inherent in the nTPD design.

Interview Analysis Reporting on Components of nTPD Professional Development

The components of professional development delivered in nTPD that teachers reported during the interviews as having professional value were coded according to interaction types. This top-down coding approach originated from the nTPD design

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principles where courselet participation can be understood as designed interactions of one of three types: learner-learner, learner-content, and learner-instructor (Moore, 1989). Two of the interaction types, learner-learner, and learner-resource became evident as commonly reported interaction types. These two components are described in this study as teacher discourse (learner-learner interactions) and teacher activity (learner-resource interactions). All of the nTPD courselet design principles can also be described using these two components, which provide one lens for the evaluation of the design principles, presented later in Chapter 5.

While interaction types are well discussed in the literature (Moore, 1989) descriptions of the components of teacher discourse and teacher activity is needed. Teacher discourse describes the interactions that teachers had with other teachers, while teacher activities are interactions that teachers had with any of the courselet materials. Furthermore, the component of discourse refers to any forum discussions or group blogs posts where other teachers can read and reply if they so choose.

While the literature also reports learner-instructor interactions, teachers did not report this interaction type during the semi-structured interviews. Rather one teacher reported that the courselet facilitator in the nTPD courselet served an administrative role, providing software and scheduling support for the teacher. This is in line with the nTPD courselet design which focuses on the teacher-teacher (discourse) interaction and the teacher-resource (activities) interaction, as it assumes that teachers are less in need of instructor support when courselet content is well designed.

The first semi-structured interview analysis section reported on themes that emerged from the coding and analysis describing the professional-centered learning

for teachers. This second analysis relating to the second research question guiding this

study is based on a top-down coding approach using interaction types as described

above. The reason for this approach was that during the interviews teachers were

specifically asked to expand where possible on the teacher discourse and activities in

the courselet. As a result of this top-down approach, teachers' comments about nTPD

components were able to be organized into two sets of polarized themes. These

themes are: teacher discourse that is valuable, frustrations with teacher discourse,

teacher activities that are valuable, and frustrations with teacher activities.

Teacher discourse that is valuable

The theme of teacher discourse that is valuable reported by teachers during the

interviews indicates that some teachers found the discussions about common

educational topics to be very informative:

> I found them [the discussions] very valuable because you got to see how
>
> specific people were using it or thought that they could use it which is always
>
> good because it gives you new ideas, right. Like you only have what's in your
>
> own brain and so then if you're like, if I'm reading that someone was sees an
>
> application for language arts for example and I was only thinking about it in an
>
> art application, that just opened it up for me like two fold. (P1)

The discussions in the nTPD courselet contributed to the creation of new ideas and

perspectives through the discussion posts, which resulted in valued resources being

created and shared. One division support teacher commented that "When you are

collaborating with other people you are coming in and seeing their writings and that is

sparking ideas as well right. So it's that synergy of different people working together

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on something." (D3) Similarly a pre-service teacher identified that the "strength of the courselet is the people behind it. What they bring to the table. You know their knowledge and put some time into it then obviously we get a better resource for everyone at the table." (A1) Teachers also reported that they perceived nTPD courselet discussions enabled them to access support and clarifications from other teachers about lesson plans that were shared.

> … lesson plans going on there and seeing you know what people have created and everything so that would be worthwhile or any questions, you know like leaving a question on there saying hey I am really stuck on this you know I need ideas. (T9)

Frustrations with teacher discourse

The second theme reported by teachers with regards to discourse in the nTPD courselets was around frustrations about the discussions. Several teachers indicated that other teachers were not participating in discussions enough, and therefore potential support for each other was lost: "When we had signed up we had been told that there was going to be participation and reading discussion and like getting ideas from other people so I think that was what I was kind of hoping for." (T11) One challenge noted by teachers was around nTPD participants following the scheduled discussion timelines:

> When we were supposed to start the course - so they weren't going on the same schedule as everybody else so there was probably three or four of us that were actually following the course as it was set out. (T3)

Another teacher commented on the lack of timeliness in courselet discourse.

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Discussions hampered the completion of the courselet when a participant wanted to, as the courselet was designed around weekly discussions that did not support content –delivery models of course participation:

> We were supposed to get something by the next week but then we got an email saying oh more people need to participate and so you won't get the next stuff until more people participate - so it seemed to really drag on - so that was really a frustration… (D2)

This comment is described in another way by a second teacher who noted that discourse was not a prerequisite for success in online learning: "I am a very self-directed learner and so the discussions help but I wouldn't describe them as being critical to my success." (T6)

One teacher, who participated in an iteration 2 and iteration 3 courselet, commented on the differences between discussions that took place in these two courselets he participated in:

> It [a third iteration courselet] didn't have as much dialogue. It was kind of reading their postings after and it wasn't like, there was one now that I think about it was in the robotics one, where I actually had a couple exchanges go back and forth. But in this one [courselet] it was more like we all kind of posted independently and we didn't respond to each others blogs or blog postings. (D1)

This teacher further commented that because of the lack of depth in the courselet discussions where other courselet participants seemed to be posting their opinion and that rather than discussions was more like people completing their homework:

> I think that's really what it came down to is that I felt that we all were basically

responding to how we felt about the technology versus responding to what other people were saying and vice versa and it wasn't, we weren't engaged with the other members as much I think. Based on what I remember that people posted more independently and not necessarily responding so much to each other. (D1)

When asked to elaborate on how the first courselet (an iteration 2 robotics courselet) discussion experience was different, the teacher reported that those discussions were like what he perceived to be social networking:

Because I actually had ended up exchanging with somebody and he gave me some ideas, and so I think that's - I mean that's always the way it is with any of these – I won't call it social networking, but but that's more or less what it is then. (D1)

In summary, the value and potential value of discourse in the nTPD courselet can be described as having value to some teachers who were expecting discussions in the courselet, but other teachers expressed frustrations with timelines and participation rates in courselet discussions, lessening their value.

Teacher activities as valuable

The third theme identified in coding the teacher interviews was teacher activities as valuable. This theme relates to the design of the nTPD courselet and provides insight to what teachers found valuable to do as a learner in the courselet. The design of the nTPD courselets presented weekly activities to participants with detailed instructions. The instructions described what resources to access and review as well as which activities to complete over the following week. The design of the courselets, due to participation rates of teachers, was altered to extend this weekly

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timeline design to a bi-weekly one. Teachers reported that the activities were valuable in terms of providing structure and directions:

> I think that activities are crucial because if I just read about them, I'm really bad for like, oh, I'll try that later or oh, I think I know what something is about and you really don't until you try it and so, having read about them, you know, no matter how good the description is you really have no idea how something is going to be useful until you do it hands on so, yes, I thought the activities were important. (P1)

Other teachers reported that the activities had them spend time reviewing relevant resources, which they reported were very important to their learning. These two teacher statements are examples: "I think for me, just um, having time to go through some of the websites, like some of the 2Learn sites and things like that, now I know where things are, I really appreciated that." *(T9)* Another teacher reported that the activity of engaging with a specific technology tool, such as the Voicethread activity, was worthwhile in terms of spending time doing an TPD activity. This is consistent with other research on teacher learning (Desimone, 2009) that reports that effective TPD has teachers participating in relevant-to-practice activities. One teacher reported that the courselet activity was enough to encourage her to try the technology in her classroom: "Yeah, then Voicethread. Oh yeah I really liked that voicethread! Thats the one that I'm going to bring into my classroom I'm hoping and see if it works out. I'm just experimenting but I'm willing to try." (T2)

This theme of teacher activities as valuable also confirms findings reported in the previous section about new kinds of technology-centered learning as a learning

outcome reported by teachers. The distinction provided here is in regards to the "hands-on" nature of the activities providing some evidence for the value of the constructionist pedagogy used in the courselet design. In summary, teachers reported that the activities, selected for them to complete as part of their courselet participation, were a very valuable component of the courselet experience in part due to their hands-on nature.

Frustrations with teacher activities

Teachers interviewed also reported some frustration with the activities in the courselet. This fourth theme relating to the courselet components refers to the structure or design of the activities, rather than frustration with the activities themselves. As one support teacher explained, the structured release of learning materials over the weeks of the courselet did not allow for access to all of the materials at once, causing frustration:

I would rather have just sort of laid out at the beginning, this is what is expected, this is what we are looking for, this is where we need to get to. And I think this was one of my bigger revelations, participating in this, is that I think, its valuable for students to say "this is where we want you to get", "here are some things that will help you get there", um you know, "these are the outcomes that you need to meet." If you want to look at this research, if you want to have some context for it, if you want to read or watch videos or whatever, those are all the supports that are in place, but I think that just having a list of assignments and or outcomes at the very beginning as a framework I think that is valuable. (D4)

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A second support teacher reported that extending the use of the wiki tool highlighted in the online collaborations courselet to include actual use of the wiki would have been more useful than the short activity designed into the courselet:

> I think the wiki in order for to it to be a little more useful I would have spent more time developing a wiki and actually using it with people because I didn't get to do that with people I just got to kind of go in and play a little bit I didn't spend enough time using the tool. (D1)

In summary, practicing teachers who were interviewed report that the teacher activities had professional value, while teachers in support staff roles reported that the courselets could have been designed differently.

Interview Analysis Reporting on Design elements of nTPD Professional Development

As part of the semi-structured interviews teachers were asked to comment and elaborate on how design elements of the nTPD experience affected their teaching practice. As these were semi-structured interviews, teachers could choose to elaborate about any topic they wished in detail. This section reports on how teachers perceived the nTPD courselet design elements - articles, videos, reflective blog, and file-sharing - affected their practice. The themes reported in this analysis of design elements emerged as the data analysis progressed and was grouped according to design element for reporting.

The value of articles as an nTPD design element.

Teachers participating in the interviews perceived that articles, as a design element of the nTPD experience, were polarized (valuable or not valuable) in their

view regarding the value of articles to their teaching practice. One teacher commented that the courselet had good articles to read. Similarly two of the school division support teachers reported that the articles were useful as a form of professional reading:

> Resource sharing was very valuable and the professional reading, I really enjoyed that part of it and like I say, I got resources from both that I didn't know about before and that I will be able to use and share out. (D5)

However, one teacher administrator reported that the article was of little professional value, particularly when compared to the practical activities: "Well I would say that the first article was not, there was nothing to it. The first article for me was not beneficial. It was way too deep philosophically and I need hand-on stuff." (A1)

The value of videos as an nTPD design element.

The second nTPD design element of the courselet experience that teachers were asked to elaborate on during the interviews were the videos. Many of the teachers interviewed provided details of how the courselet videos provided value to them professionally, and two themes arose during data analysis of these coded interview comments: videos were very helpful to understand how to participate in the courselet, and videos were good for providing classroom technology exemplars. There was agreement among eight teachers with regards to the theme of videos being a good way to provide directions and information within the courselet. These teacher comments provide elaboration:

> The videos that we got to watch or whatever, it gave me a clear idea of what you know the direction of that particular activities were that week or whatever, and I

mean, that sort of gave me guidance for what was to be done and it was pretty

clear and I think that, in particular, like the tutorials, were good so that was

clearly laid out for the course. (T4)

The second theme relating to video reported by teachers was the value of the videos as

examples for how to use the technology in the classroom:

Like for some of them, I could pick it up right away and would make an instant

connection on that to use it in the classroom… … For example, the Voicethread

one, having that there and having the demo of how that would work in different

classrooms was huge so if I didn't have that I don't think I would have an

understanding of how it could work. (T1)

One teacher stated that even more of these video examples, perhaps demonstrating a

particular lesson plan could even provide more value:

In activity one there was a video that talks about Lego robotics and then, so that

was helpful because you could show that to students as well. If there was other

videos for the other activities, that might have been helpful as well - just maybe

someone showing what they did for their lesson plan. Maybe for an example. If

I am teaching something I like to give my students a visual about where we are

about to go with it. (T8)

The value of file-sharing as an nTPD design element.

File-sharing was the third nTPD design element of the courselet experience that

teachers elaborated on during the interviews. Themes emerging from the analysis of

the file-sharing codes were that teacher-shared files provided technology visualization

support, and that shared lesson plans provided pedagogical technology integration

support. Types of files that teachers shared were image files of courselet projects (as per the courselet activities in one robotics courselet) and lesson plans (a final courselet activity in all of the courselets). Teachers reported that the ability to share image files in the courselet supported their understanding of the courselet topic and even provided a sense of encouragement:

> Because I could actually see what other people were able to build - cause we were not at all limited by what we had to build so people could do different projects and so I could look at that and say, hey that's what they built, oh I yeah - I could try that. Whereas when I looked at it on paper I said oh, that doesn't look like something I'd be interested in. But actually seeing it - it makes it more appealing. So it's like that recipe that has the nice picture next to it and a recipe that doesn't have one - you are drawn to the one that - well has the pretty picture. (T3)

The ability to share lesson plans was also reported by teachers as affecting their teaching practice, contributing to their ability to create or understand lessons incorporating the specific technology being presented in the courselet:

> I like the fact that you are collaborating with other people and if you provide something then you can look at other peoples' work to kind of give you a better understanding of different lessons so I liked the collaborative aspect of it. *(T8)*

One of the support teachers reportedly downloaded and stored the courselet lesson plans for future access and use, even contemplating in what classes the lesson plans could be used in the future: "I will say I took all those lesson plans and copied them for future use, and so I even filed them and said okay I can use this in science, I can

do this in…" (D1)

The value of reflective blogs as an nTPD design element.

The reflective blog as a design element of the nTPD experience, is the final

design element that interviewed teachers were asked to elaborate on. Themes reported

by teachers relating to blogs were that the blog experience was very valuable for

teachers new to blogs, and that blogs that were old or forced were not very valuable to

teachers experienced with blogs.

One teacher reported that the blog was one of the most valuable experiences in

the nTPD courselet, despite of the challenges of participating in a blog for the first

time:

Well I have never done the blogging until this courselet so I have never done it

so I actually had to call, I keep thinking her name is Joslyn, you know I said run

me through this - did it post, did it not post - how come I can't - you know - I

was pretty green to the whole blogging part. so I am trying to make sure it

would post and did I do this properly, or am I looking at the right screen… (A1)

Another teachers reported that the blog allowed them to see another perspective on

topics in the courselet:

I think they were ya, because when people did, even though, a couple of the

times it was only the other teacher at the school that I taught at put things up, it

was good to see things that other people had to say or other people had to share

because it kind of gave you a different perspective on it. (T11)

The blog activity provided inspiration for one teacher to successfully set up a blog

outside of the courselet, providing a new method of communication with parents:

It inspired me - actually your course, and I think it was twofold because I was

also working on that Student Portal at the time, it just inspired me because I just

could see how blogs would be beneficial to get the information out to parents,

and especially if they do that RSS feed or whatever you call that onto their

emails… it absolutely inspired me! (T2)

One teacher interested and familiar with blogs commented on the motivational value of the ongoing courselet blog as compared to the general social networking site (2Learn2Gether.ca) blog:

… just to step onto that website [2Learn2Gether.ca], it doesn't excite me. The

courselet did, but if a person were just to log in there and just see general blogs,

it didn't inspire me because so many of them were old, they weren't ongoing,

and I thought why would I waste my time in there because somebody might

only look at it once a year and I just thought just forget it. I want something that

is current and that people are communicating regularly. Like I would love, I

have looked at some peoples blogs and twitters that are very current - and its

like that's what's happening in technology and I will check it out. (T2)

One teacher who had used blogging previously described the courselet blog as a forced blog. While the teacher reported that there was value to blogging and reflection in a courselet, when it is forced or requires waiting on others to post replies, the value begins to lessen:

I have taken a lot of courses through teacheronlinetraining.com and all of the

components are there - there is a you know place for you to do your forced blog,

but you are not waiting on other people and being forced to comment on other

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people's posts before you can be completed… you know I think when its my

choice to do that, when the option is there and I can use that to do so, yes

[blogging has value] - but when it is a mandatory part of participation, not as

much. (D2)

In summary, the reflective blog as an nTPD design element affecting teaching practice

appears to have value for teachers very new to blogging, and for teachers with

blogging experience the value and effect on teaching practice is less.

<div align="center">Overview of Document & Record Content Analysis</div>

The third type of data collection and analysis in this study was document and

record content analysis. The process followed for the content analysis applied in this

study is summarized in Table 31. This six step process is based on one described by

Krippendorff (1980; 2004) and Stemler (2001) who detail the particular steps in this

research technique for making replicable and valid inferences from texts to the

meanings of their usage.

Table 31

Content Analysis Procedure

Content Analysis Steps	nTPD Study
1. Identify research questions and constructs	What 5 factors of nTPD affected teacher learning
2. Identify the materials to be analyzed	Shared files, instructional materials, blogs, forums
3. Specify the unit of analysis	Words, phrases, images
4. Determine the categories to be used	Themes arising from interview analysis
5. Generate the coding scheme	Thematic-based 'Dictionary'
6. Analyze documents and records	Report findings by focus question

The first step of the content analysis method was to identify the specific

questions and constructs that could guide the content analysis process (Harris, 2001).

As described in Table 3 (in Chapter 3), the content analysis of nTPD courselet documents and records was to provide additional data to answer the third research question guiding this study *What design elements of the networked teacher professional development experience affect teacher practice?* The following four questions emerging from themes identified in the interview analysis were used to focus the directed content analysis (Hsieh & Shannon, 2005):

1) How did access to courselet files support teacher learning?

2) What kinds of instructional design elements were available to guide teacher learning?

3) What learning did the teacher discussions support?

4) What did teachers report they learned in their blog postings?

The second step in the content analysis method is to identify the materials available to be analyzed. As summarized in Table 31, the materials selected for analysis were shared files, instructional materials, discussion forums, and courselet group blogs. Other documents and records available to the researcher were deemed unsuitable for analysis as a substantial number of documents from the population were missing (Stemler, 2001). The content analyzed in this study is from a sample of 124 documents and records that included: 62 teacher-created documents, 25 courselet records, 23 discussion forum documents, and 14 teacher blogs. This content includes only materials for the Iteration 3 nTPD courselets, and as such is being reported using the 23 teachers (of the 26 who participated in this study) who participated in the Iteration 3 courselets.

The third through fifth steps in the content analysis is to identify the units,

categories and coding "dictionary". The documents and records to be analyzed include text, pictures, and videos. Table 32 presents the content analysis categories and dictionary used. The units of analysis selected were the word, phrase, and image using the following categories and dictionary of themes/terms originating from the interview analysis:

Table 32

Content Analysis Categories and Dictionary

Categories	Dictionary of themes/terms
File sharing	pedagogical integration, technology visualization
Blog	online, networking, technology, pedagogy
Discourse	discuss (pedagogy), valuable (potentials), frustrating (Q&A)
Activities	activities, valuable, frustrating
Article	article, resource, website
Video	video, video helpful, video support, exemplar video
PCTL	technology experiences, online learning, networking, integration.

Note: PCTL = Profession-centered teacher learning.

The final step in the content analysis process is the analysis which entails a frequency count of each of the category classifications previously identified (Gall, Borg, & gall, 1996) and reporting of findings which are reported on in order of the four content analysis focus questions.

<center>Teacher Access to Courselet Files</center>

The first focus question guiding the content analysis asked "*How did access to courselet files support teacher learning?*" Courselet files that were available to teachers were of two types: teacher-created files (documents) and courselet materials created by the design team (instructional records) to guide teacher learning. The documents and records relevant to this first question of the content analysis are 62

teacher-created shared files and 25 instructional records accessible to enrolled teachers. The first characteristic of these documents and records to be analyzed was the number of times these documents and records were downloaded. In addition, a second characteristic, the specific content contained in those teacher-created documents, was also analyzed.

Download counts of courselet teacher-created files

The number of times courselet the teacher-created files were downloaded by enrolled teachers provides a macro view of file-sharing that occurred in the nTPD courselets. An analysis of the teacher-created files (the courselet documents) determined that the 62 files were composed of: 23 lesson plans, 9 lesson plan support files, and 30 image files. The download counts for each of the shared files were tabulated. The 62 teacher-created files were downloaded a total of 155 times. Enrollments in the nTPD courselets, which identify the breakdown of the 57 nTPD teachers who would have had the ability to download the shared files, were as follows: IWB courselet - 12, OC courselet - 22, Robotics courselet – 23. On average *enrolled* nTPD teachers created 1.07 shared files and downloaded teacher-created shared files a total of 2.72 times. The numbers and percentages of shared files and download counts in each of the nTPD courselets are presented in table 33.

Table 33

Shared File Downloads in Each nTPD Courselet

		Courselet					
		IWB		OC		RC	
File Type		F	D	F	D	F	D
Lessons	#	4	3	10	48	9	34
	%	57.1	50.0	71.4	84.2	22.5	37.0
Support	#	3	3	4	9	2	1
Documents	%	42.9	50.0	28.6	15.8	5.0	1.1
Images	#	0	0	0	0	30	57
	%	0.0	0.0	0.0	0.0	72.5	62.0
Totals	#	7	6	14	57	41	92
	%	100.0	100.0	100.0	100.0	100.0	100.0

Note: IWB = Interactive whiteboards courselet. OC = Online collaborations courselet. RC – Lego Robotics in the classroom courselet. F = Files. D = downloads. Lessons = lesson plan files.

The numbers of teachers who had the ability to access the files in the courselet spaces were as follows: IWB – 12 teachers, OC – 22 teachers, RC – 23 teachers. Considering these enrollment numbers while reviewing Table 33 allows the following comparisons to be made regarding teacher file-sharing and document creation by teachers in the courselets:

1. Teachers in Robotics created 3 times as many shared files (41) as compared to teachers in the OC courselet (14) and the IWB courselet (7 actual, but 13 when adjusted for numbers of teachers=22).

2. Teachers in the online collaborations courselet downloaded teacher-created lesson plans 5 times more than teachers enrolled in the IWB courselet and 1.5 times more than teachers in the Robotics courselet.

3. Teachers who completed the Robotics courselet were the only ones to upload image files for sharing, and on average downloading two image

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files for every one that was created.

What is not known and unable to be determined from the download records are the numbers of teachers who were enrolled in the courselet and who downloaded the documents and records and chose to not participate in the courselet activities.

Download counts of courselet instructional records

The number of times the 25 instructional records were downloaded by enrolled teachers provides a macro view of teacher access to courselet information that occurred in the nTPD courselets. The courselet designer and/or facilitator uploaded the instructional records as the courselet schedule progressed through the initial delivery of the nTPD courselets from March through to May 2012. Figure 8 provides a screenshot of the courselet space showing the instructional records in text format on the courselet page.

Figure 25. nTPD Courselet Instructional Records.

These instructional records were added bi-weekly to the courselet space in the

courselet "outline" space (see Figure 25). As well printable PDF versions were

uploaded into the file sharing space of the courselet at the beginning of each activity

week. Figure 26 provides a screenshot of the instructional records and their

presentation to teachers as uploaded into each courselet file-sharing space.
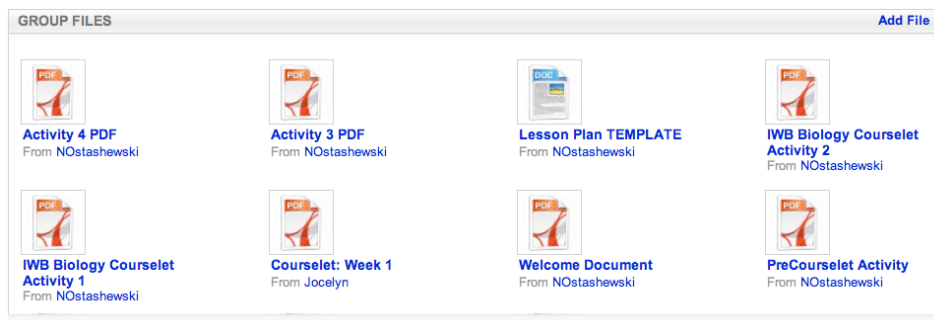
Figure 26. nTPD Courselet File Sharing Space

The instructional records that were available to teachers included: weekly courselet

activities in PDF format, lesson plan template documents, and lesson plan exemplar

documents (in the IWB courselet only). The lesson plan template document was the

only instructional record that teachers were required to download directly from the

shared-files space to use for the courselet activity. In summary, the instructional

records available for teachers to download in each courselet were: 9 in the IWB

courselet, 8 in the OC courselet, and 8 in the Robotics courselet.

The download counts for each of the instructional record files were tabulated.

Across the three courselets, the 25 instructional record files were downloaded a total

of 99 times. On average, each instructional record was downloaded 3.96 times. In

other words, the 57 teachers *enrolled* in nTPD courselets downloaded 1.73

instructional record files per teacher.

A comparison of the instructional records download counts provides one way to understand how access to designer-created courselet files in the nTPD courselets supported learning. Across Iteration 3 courselets, teachers on average created 1.07 shared files, downloaded 2.72 teacher-created shared files, and downloaded 1.73 instructional records. Table 34 presents an overall view of the average number of downloads for instructional records (IR) as well as teacher-created documents (TCD) by categories of teachers who had access to the files.

Table 34

Average Number of File Downloads

| | Courselet | | | | | | | | |
| | IWB | | | OC | | | RC | | |
Teachers who	N	IR	TCD	N	IR	TCD	N	IR	TCD
Enrolled	12	2.17	0.5	22	1.95	2.59	23	1.30	4.0
Participated	7	3.71	0.86	11	3.91	5.18	11	2.73	8.36
Completed	6	4.33	1.0	9	4.78	6.33	8	3.75	11.5
Total*		26	6		43	57		30	92

Note: IWB = Interactive whiteboards courselet. OC = Online collaborations courselet. RC = Lego Robotics in the classroom courselet. N = number of teachers in category. IR = average number of instructional record downloads. TCD = average number of teacher-created shared file downloads. Total* = total number of file downloads of that type (Instructional record or Teacher-created document).

Reviewing Table 34 allows the following comparisons to be made regarding teacher access to courselet instructional records:

1. Teachers in Robotics courselet downloaded instructional record files less than teachers in the OC or IWB courselets.

2. Teachers enrolled in the online collaborations courselet downloaded instructional records more than teachers in the other two courselets.

As well, other comparisons can be made regarding teacher-shared files and numbers

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of downloads:

1. Teachers who completed the Robotics courselet downloaded teacher-created files 2 times as often as teachers enrolled in the OC courselet and 11.5 times as often as teachers enrolled in the IWB courselet.

2. Teachers who completed the online collaborations courselet downloaded teacher-created files 6 times as often as teachers enrolled in the IWB courselet.

In summary, teachers' access to instructional records as well as their access or sharing of teacher-created documents is related to the kinds of activities that are designed into the nTPD courselets. Further discussion of what this means for designers and the evaluation of nTPD activities is continued in Chapter 5.

Content of courselet documents

A second characteristic of the teacher-created documents that was analyzed is the specific content of the files. Teachers perceived there was some type of value in these shared files as many teachers, particularly teachers in the Robotics courselet, downloaded several teacher-created files. During the semi-structured interviews teachers reported that looking at other teachers' lesson plans implementing the technology introduced in the courselet provided some measure of profession-centered technology learning. Similarly, teachers who participated in the Robotics courselet reported in the interviews that seeing images of Lego robots assisted with their learning. The following section of the analysis of the content contained in the teacher-created files provides a micro view of what specifically teachers were sharing that supported other teachers' learning.

In total 62 teacher-created files were composed of: 23 lesson plans, 9 lesson plan support files, and 30 image files. As previously reported in Chapter 4, two themes emerged from the interview data analysis with respect to courselet file-sharing: pedagogical integration of technology and technology visualization. Using these two themes as codes, the teacher-created file content was analyzed.

An analysis of the content in the 23 teacher-created lesson plans, based on the theme of "pedagogical integration of technology", identified that all of the lessons integrated the technology that was the topic of the courselet. An example of a lesson plan file can be found in Appendix H: Document and Record Examples. The content in the lesson plans revealed that some of the lesson plans included additional educational technologies that were also integrated into the lesson plans. The lesson plans by courselet contained the following technologies embedded:

1) Interactive whiteboard (IWB) courselet - all 4 lesson plans included Interactive whiteboard technology utilizing online resources.

2) Online collaborations (OC) courselet – all 10 lesson plans included online collaborations, 7 utilized Voicethread, 4 utilized a digital camera, 2 utilized Etherpad, and 1 utilized an interactive whiteboard.

3) Lego robotics (Robotics) courselet – all 9 lesson plans included Lego robotics, 5 utilized online resources, 4 utilized interactive whiteboards, and 3 utilized a digital camera.

An analysis of the 9 lesson plan support files shared by teachers revealed that all 9 files were IWB, definition, or marking guides that were provided as additional support for one of the teacher-created lesson plans. As reported by teachers in the semi-

structured interviews, the content of the lesson plans provided numerous divergent examples of how the technology introduced in the courselet could be implemented into a classroom.

One of the three nTPD courselets, the Robotics courselet, asked teachers to share images of the Lego robots they created as part of the courselet activities. Teachers in that courselet uploaded a total of 30 image files, 23 of which were unique images suitable for analysis. An analysis of the content of the 23 unique shared image files was based on the theme of "technology visualization." The analysis confirmed that all of the 23 images contained examples of Lego robots as part of the image. The image files shared by teachers included: 15 files of Activity 1 Lego robot creations (4 of which were duplicate files), 7 images of Lego robot creations supporting teacher lesson plans, 6 images of a Lego center setup in a classroom (3 of which were duplicate files), 1 image of a teacher and children creating Lego robots, and 1 image of a Lego robot image on a coffee cup. The 23 unique image files appear to be shared by teachers for three different reasons: to showcase the Lego robot they created as part of the courselet activity 1 as directed by the instructions (15), to support the lesson plan they created and shared in the courselet (6), or of general interest demonstrating Lego (2). An example of a Lego robot image file can be found in Appendix C: Document and Record Examples.

In summary, teachers accessed two kinds of files in the courselets: teacher-created files (documents) and instructional records. Instructional records were alternate versions of the courselet participation instructions or a lesson plan template, while teacher-created files were lesson plans of technology implementation in the

classroom or files that supported those lesson plans. Teachers in the Robotics

courselet participated the most in sharing and downloading the teacher-created files.

Two themes that emerged from the interview data analysis relating to shared files,

pedagogical integration of technology and technology visualization, are supported by

the macro and micro analyses of the shared courselet files. The topic of the next

section presents the findings of content analysis of the instructional elements that

guided teachers during their nTPD courselet learning.

Instructional Design Elements Available to Guide Teacher Learning

The second focus question guiding the content analysis asked "*What kinds of*

instructional design elements were available to guide teacher learning? Instructional

elements are defined as any resources or instructions to learners that were made

available to teachers as part of the instructional design of the nTPD courselets. The

download counts of the 25 instructional records provided one way to compare teacher

access to shared files in the courselets. As reported previously, teachers only

downloaded on average 1.74 instructional records per teacher that was enrolled in the

courselet. As there were at least 8 instructional record PDF files in courselet, it can be

concluded that teachers accessed most of the instructional design elements from the

courselet outline space as shown in Figure 24. An analysis of the content of these 25

instructional records can provide an understanding of the kind of instructional design

elements that were provided to teachers.

The content analysis of the 25 records was conducted using the content analysis

categories as described in Table 32. On average there were 24.3 instructional elements

in each nTPD courselets. Table 35 presents a summary of the categories and

themes identified in the instructional records across all of the three nTPD courselets.

Table 36, 37, and 38 present the categories and themes identified in the instructional

records for each one of the three nTPD courselets on a weekly basis.

Table 35

Categories of Instruction Elements

Category	Instructional Activities	IWB	OC	RC	Design Principle	AVG
Blog	Post in Blog	4	3	3	5, 6	3.3
Discuss	Post in Forum	5	5	5	5, 6	5.0
Article	Review Website	1	2	3	1, 2, 3	2.0
Article	Review Implement. Site	0	2	4	1, 2, 3	2.0
Article	View Slideshare	1	1	0	1, 2, 3	0.7
Article	Read Article	1	1	1	1, 2, 3	1.0
Article	View Wiki	0	2	0	1, 2, 3	0.7
Article	Follow Instructional PDF	0	0	1	1, 2, 3	0.3
Article	Extra: Implement. Article	0	2	0	1, 2, 3	0.7
Video	Support Video	2	2	2	1, 2, 3	2.0
Video	Exemplar Video	5	2	1	1, 2, 3	2.7
Video	Extra: Support Video	1	1	1	1, 2, 3	1.0
Activity	Use Technology Tool	1	2	2	5	1.7
File-S	Upload Document	1	1	1	7	1.0
File-S	Upload Image	0	0	1	7	0.3
Total		22	26	25	73	24.3

Note: IWB = Interactive whiteboard courselet. OC = Online collaborations courselet. RC = Lego Robotics in the classroom courselet. Design Principle: Based on Principles presented in AVG = Average

Table 36

Distribution of Instruction Elements in IWB Courselet

Category	Instructional Activities	PreC	Week1	Week2	Week3	Week4
Blog	Post in Blog	1	1	1		1
Discuss	Post in Forum	1	1	1	1	1
Video	Support Video	2				
Video	Exemplar Video		1	4		
Video	Extra: Support Video	1				
Article	Review Website			1		
Article	Review Implement. Site					
Article	View Slideshare				1	
Article	Read Article			1		
Article	View Wiki					
Activity	Use Technology Tool				1	
File-S	Upload Document					1
Total			5	4	7	3	3

Note: IWB = Interactive whiteboard courselet. PreC = Pre-courselet activity.

Table 37

Distribution of Instruction Elements in OC Courselet

Category	Instructional Activities	PreC	Week1	Week2	Week3	Week4
Blog	Post in Blog	1	1			1
Discuss	Post in Forum	1	1	1	1	1
Video	Support Video	2				
Video	Exemplar Video		2			
Video	Extra - Support Video	1				
Article	Review Website			1	1	
Article	Review Implement. Site			1	1	
Article	View Slideshare		1			
Article	Read Article		1			
Article	View Wiki			1	1	
Article	Extra - Article			1	1	
Activity	Use Technology Tool			1	1	
File-S	Upload Document					1
Total			5	6	6	6	3

Note: OC = Online collaborations courselet. PreC = Pre-courselet activity.

Table 38

Distribution of Instruction Elements in RC Courselet

Category	Instructional Activities	PreC	Week1	Week2	Week3	Week4
Blog	Post in Blog	1	1			1
Discuss	Post in Forum	1	1	1	1	1
Video	Support Video	2				
Video	Exemplar Video		1			
Video	Extra - Support Video	1				
Article	Review Website		1	1	1	
Article	Review Implement Site				4	
Article	View Slideshare					
Article	Read Article		1			
Article	View Wiki					
Article	Instructional PDF			1		
Activity	Use Technology Tool			1	1	
File-S	Upload Document					1
File-S	Upload Image			1		
Total		5	5	5	7	3

Note: RC = Lego Robotics in the classroom courselet. PreC = Pre-courselet activity.

In summary, the instructional design elements available to guide teacher learning included: blog and discussion posts, support and exemplar videos, review and practice resources and activities, and file sharing. On average, courselet teachers had 24.3 instructional elements - composed of blog posts, discussion posts, videos, articles, activities, and files sharing – to guide their learning. The overall instructional design pattern consisted of a) practice and research articles and websites, b) tutorials and exemplars provided via video segments, c) followed by discussion and blog posts, d) culminating in shared lesson plans and supporting documents.

Discussion Forum Support for Teacher Learning

The third focus question guiding the content analysis asked "*What learning did the teacher discussions support?*" Twenty-four discussion forums from the three

nTPD courselets were available for analysis. Of these 23 forums, the courselet facilitator created 21 forums, and teachers created 2 forums. Both of the teacher-created forums were excluded from the forum content analysis. One was excluded because it only contained a single post by a teacher and was outside the directed activities of the courselet. The other teacher-created forum was titled "Closing group blog comment" and is included in the content analysis of the courselet blogs. Of the 21 courselet facilitator forums 3 (1 in each courselet) contained a single FAQs post detailing the facilitator's contact information and these forums have also been excluded from the forum content analysis. In total the content in 18 discussion forums were analyzed.

The content in the 18 discussion forums was analyzed and included a total of 166 forum posts. Of these 166 posts, courselet participants posted 140 times and the courselet facilitator made 26 posts.

An analysis of the courselet facilitator posts revealed that they were all postings related to scheduling, contact information, and administrative details that needed to be provided to the courselet participants over the timeline of the courselet. This supports earlier reported analyses (from the semi-structured interviews) that indicate the role of the courselet facilitator was more administrative than instructional.

An analysis of the forum posts made by teachers on a weekly basis revealed that a consistent amount of posts were made in each of the courselets per week. Table 40 presents the numbers of total numbers of posts by courselet per activity week.

Table 40

Discussion Posts per Activity

Courselet	PreC	Week1	Week2	Week3	Week4	Totals
IWB	4	4	5	7	5	25
Quotes	1	0	1	0	1	3
Facilitator	2	2	2	1	1	8
OC	7	16	19	14	10	66
Quotes	0	3	2	4	0	9
Facilitator	2	2	2	2	1	9
RC	7	11	13	10	8	49
Quotes	0	0	1	0	1	2
Facilitator	2	2	2	2	1	9

Note: IWB = Interactive whiteboard courselet. Quotes = Posting using "Quote" button in the forum. Facilitator = Post by courselet facilitator. OC = Online collaborations courselet. RC = Lego Robotics in the classroom courselet. PreC = Pre-courselet forum.

Teachers who completed the activities in the iteration 3 nTPD courselets, as reported earlier in this chapter, were as follows: IWB courselet - 5, OC courselet - 9, Robotics courselet – 8. The total the number of teacher posts per courselet were :IWB – 25, OC – 66, and RC – 49. Based on these totals, the average posts per teacher who completed an Iteration 3 courselet was: IWB – 5.0, OC – 7.3, and RC – 6.1 posts per teacher. As reported in the previous content analysis section regarding instructional design elements, each courselet had 5 discussion post elements. Therefore it can be concluded that teachers who completed each courselet participated in at least one post per week of the courselet.

Each of the 140 forum posts by teachers was further analyzed for content and was assigned to only one of the three themes identified in the discourse category of the content analysis dictionary. Table 41 presents the tallies and percentage of posts in

Table 41

Tally of Discussion Posts by Discourse Theme

Courselet	Pedagogy	Potentials	Q&A	Totals
IWB	12	7	6	25
OC	16	43	7	66
RC	17	26	6	49
Total N	45	76	19	140
Total %	32.1	54.3	13.6	100

each courselet by discourse theme. The content in 54.3% of teachers' posts to the

discussion forum focused on discussing potentials for the technology introduced in the

courselet through teacher sharing of ideas, perspectives, and resources relating the to

the technology topic of the courselet. Instructional pedagogies and related concepts

were shared by teachers 32.1% of the time. Question and answer type posts were

made by teachers 13.6% of the time. The detailed coding scheme used to categorize

the forum posts is provided in Appendix H.

In summary, the forum post content analysis validates and extends the analysis

of the semi-structured interviews regarding to the theme of discourse.

Teacher Reports of Learning in Reflective Blogs

The fourth focus question guiding the content analysis asked "*What did teachers*

report they learned in their blog postings?" Thirteen of a potential 22 teacher blogs

from the Iteration 3 nTPD courselets were available for analysis. One of the final

activities in week 4 of the courselets asked teachers to make a final blog posting, of

which 14 of them choose to do so. In that final post teachers were asked to comment

on how their understanding of the technology (IWB, OC, or RC) in the classroom

evolved as a result of the courselet. The content that is contained in these final posts

was deemed suitable to validate the themes from the semi-structured interviews and extend the details provided by teachers regarding what kinds of profession-centered technology learning they experienced in the courselets. As there are not a full representative set of teacher blogs (one for each teacher who completed the iteration 3 courselets) this content analysis is not able to be used to represent the entire population of nTPD teachers. A coding process that allowed for only one code to be assigned to the overall theme in each teacher blog was used. A total of 14 blogs were analyzed and 14 codes assigned. Table 42 presents the tallies of profession-centered technology learning themes for the content analysis of the 14 teacher blogs.

Table 42

Content Analysis of the Iteration 3 Blogs

Profession-centered technology learning themes	Frequency (N=14)
Pedagogy: learning new technology-integrated approaches	7
Technology: learning how to use technology tools	4
Networking: learning about power of teacher networking	2
Online: learning about online learning	1

In summary, as a result of the analysis of the 14 final blog posts there is evidence to support the four themes relating to profession-centered technology learning emerging from the semi-structured interview analysis. A majority of the teachers who posted in the final blog reported learning about how to integrate the technology topic of the courselet or learning about the technology topic itself.

Summary

Chapter 4 has provided a detailed analysis of the data collected via the online survey, semi-structured interviews, and document and record analysis process using quantitative and qualitative analysis processes. Demographics of study participants

relating to their gender, age, teaching experience, and overall computer use were analyzed and participants groupings related to these demographics were described. These groupings included age, gender, teacher role, teacher location, and career stage and were used to compare computing and social media use among groups. The qualitative analysis of the open-ended survey questions were analyzed and reported individually as themes describing teacher's personal experiences in the nTPD courselets. The Likert scale questions were analyzed and reported individually and also as grouped rankings relating to the three research questions in the study. Interview analysis further describing the personal nuances of nTPD experiences and reporting more precise themes were reported. These interview analyses present teachers' own micro view of the learning experiences in the nTPD courselets. The final analysis of research data in Chapter 4 was a content analysis of documents and records available from the nTPD courselet delivery. Teacher-created documents, instructional records, blogs, and discussion board postings were analyzed aligned to the themes emerging from the earlier analyses in Chapter 4. The content analysis provided triangulation and verification of the survey and interview analyses. Conceptualizing these analyses in relation to the three research questions and discussions of the findings reported will be presented in Chapter 5. Implications and conclusions for nTPD implementations as well as a presentation of a revised model of nTPD courselets, including design principles, are also presented in Chapter 6.

CHAPTER 5: INTEGRATED RESULTS AND DISCUSSION

Introduction

The goal of this study was to evaluate and refine the model and design principles of an online teacher professional development implementation identified as the nTPD courselet. In order to achieve this goal, a study was conducted which resulted in detailed findings about the outcomes of nTPD participation for teachers. Guiding the study were three research questions related to the teacher experiences and outcomes from their participation in an nTPD courselet, specifically:

1. What kinds of profession-centered technology learning do teachers who participate in networked professional development activities engage in?

2. What components (discourse or activities) of professional development delivered in an online social networking site do teachers identify as having professional value?

3. What design elements of the networked teacher professional development experience affect teacher practice?

Answers to these three guiding questions provide information that can be used to validate and revise the nTPD courselet model, achieving the goal of this study.

Chapter 5 is organized into three sections, each of which discusses the study findings one research question at a time, based on the third iteration of the nTPD design and delivery. These sections, relating to each of the three research questions, integrate the quantitative and qualitative results to present an answer for each research question. This answer includes both macro and micro views of what teachers report

are the outcomes of their participation in nTPD courselets.

The first part of each section presents the answer at a macro level, providing an overall description of the findings. The second part of each section provides micro level details about the answer to the research question. Discussions of these answers are framed and contextualized in relation to the current literature in online learning and networked teacher professional development. The last part of each section presents the application of the findings to the nTPD courselet design as an evaluative component of the discussion. The validation of, or revisions to the nTPD courselet model description, design components, or design elements are elaborated on where applicable during the discussions in each of the three sections of the chapter.

<p style="text-align:center">The nTPD Courselet as an Instructional System</p>

Viewing the "nTPD courselet" as a system aids in understanding the relationship of the nTPD model, design components, design elements, and design principles referred to throughout Chapter 5 and 6. In previous chapters, the nTPD model and design principles have been referred to individually. However the first revision to the nTPD model identified in this study is the need for a nomenclature and organization that presents the components of the nTPD model as a transferable model. Originating from the instruction design literature (Reigeluth, 2009) is the concept of an instructional system. An instructional system view of the nTPD model and the seven design principles allows for the articulation of the complexity of the evaluated model.

An instructional system details the teaching agent (teacher, resources, tools)

requirements needed to facilitate the learning experience (Reigeluth, 2009). In the

case of the nTPD courselet, the instructional system is composed of three parts: the

nTPD model, design principles, and the learning design. The nTPD model provides

the "interaction and delivery attributes" of the nTPD courselet. The design principles

provide the context or "content considerations" for an nTPD implementation. The

nTPD learning design provides the specific instructional design aspects of the system:

the design framework (the NLF), the SNS environment, design components (activity

and discourse), and the design elements. These three parts provide an overview of the

complete nTPD courselet instructional system (Reigeluth, 2009) needed to design an

nTPD implementation. As discussed at the beginning of this chapter, the nTPD model

and design principles, two of the three parts of the instructional system, are the parts

evaluated in study. Figure 25 presents the nTPD courselet instructional system:
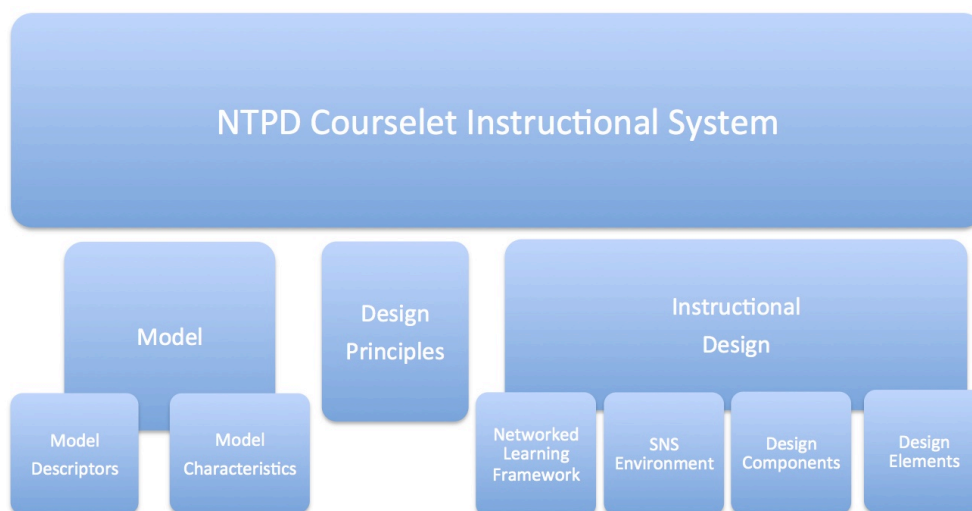
Figure 27. nTPD Courselet Instructional System

    A concise description of the nTPD courselet instructional system provides a key

to understanding what characterizes the implementation in practice (Barab & Squire,

2004). The development of a refined nTPD model and design principles are the stated

outcomes of this DBR study. In order to achieve a transportable instructional system that is suitable to "share as a legitimate product of the design research undertaken" (Herrington, 2012), careful evaluation of the model and principles must be undertaken. This study presents the findings of the third iteration of the implementation of the nTPD courselet, and as such provides precise validation and refinements of the instructional system. The revised and complete nTPD courselet instructional system is presented in Chapter 6.

Validation as a DBR Outcome

The design-based research methodology guiding this study was employed to "generate and advance a particular set of theoretical constructs that transcends the environmental particulars of the contexts in which they were generated, selected, or refined" (Barab & Squire, 2004). Evaluation of the nTPD courselet *in context* is an outcome of this study, where the evaluation can be understood as formative, with the intention of shedding light on a problem of action (Cohen, Manion, & Morrison, 2007).

Validation and revision of the nTPD model, as already described above, is presented in each of the sections of this chapter. However, the nTPD design principles are context-based and the presentation of the conclusions of the study are better suited as a basis for any revisions to them. As such, the presentation of the revised design principles is provided in Chapter 6.

In order to frame the evaluation of the nTPD courselet presented in each of the following sections of Chapter 5, a clear description of the nTPD model is needed at the start. The nTPD model has both descriptors and characteristics. The descriptors of

the nTPD model are:

> *nTPD consists of* online-delivered teacher professional development activities
> utilizing a social networking environment that supports and promotes teachers
> making connections while learning together, both formally and informally, and
> allows teachers to retain control over their time, space, presence, activity level,
> identity, and relationships.

The characteristics of the nTPD model are:

1. nTPD allows teachers a technology-facilitated opportunity to develop a
   network of relationships which they can access to support their classroom
   teaching practices beyond the more formal oTPD activities.

2. nTPD provides teachers with firsthand experiential learning about online
   social media tools such as blogs, forums, video and file sharing that afford
   teachers an authentic experience of how online tools can be used in their own
   classrooms.

3. nTPD allows teachers to participate in professional learning that is just-in-
   time, accessible, and that is potentially self-guided. (Ostashewski & Reid,
   2012)

These descriptors and characteristics of the nTPD model encompass all of the delivery
environment attributes (the SNS website), design components (discourse and
activities), and design elements (instructional design tools) that are used to deliver an
nTPD implementation. As the three research questions guiding the study resulted in
detailed findings related to the nTPD model, this is the focus of the validation and
revision presented in each section of this chapter.

The second part of the nTPD courselet consists of the seven nTPD design principles which contextualize the content of an nTPD implementation. Until this study was conducted, these seven design principles and an activity workflow based on the Networked Learning Framework (Ostashewski & Reid, 2010b; 2011; 2012b) were the instructional design tools used for designing nTPD courselets. Based on the validation of the nTPD model description and the analysis of the instructional records, a revised version of the seven nTPD design principles and the new nTPD instructional system are presented in Chapter 6.

The Study Results Relating to Research Question 1

Chapter 4 provided quantitative and qualitative data analysis and the resulting findings that answer research question one. Research question 1 asked: *What kinds of profession-centered technology learning do teachers who participate in networked professional development activities engage in?* These findings present an overall description of the kinds of profession-centered learning that teachers reported were a consequence of nTPD participation. These results provide a basis for the evaluation of the nTPD model at the descriptor and characteristic level. An overall theme emerging from the quantitative data was that teachers engaged in *technology-pedagogy learning*, that is, learning about technology and the associated relevant pedagogical implementation resources and considerations.

Technology-pedagogy learning

A summary of the findings relating to research question 1 is presented in Table 43.

Table 43

Teacher Technology-Pedagogical Learning

Primary characteristic	Secondary characteristic	Types of learning
Experiential learning that is useful for the classroom	• sharing of resources and lesson plans • utilizes networking with other teachers • provides opportunities for pedagogical reflection	• new technology-integrated pedagogical approaches (7) • how to use the technology tools (4) • about the power of online networking with other teachers (2) • about online learning (1)

Note: ( ) = the number of reflective blog posts matching this type of learning in the reflective blog posts of the courselets.

The quantitative results of the online survey show that 81% of the teachers who participated in the nTPD study perceived that their participation helped them to understand more about the processes for acquiring knowledge and skills in an online-networked learning environment. As well 73% of the teachers reported their courselet experience improved their technology skills.

Characteristics of teacher learning in nTPD

The qualitative results of the online survey revealed that teachers participating in this study primarily characterized the technology-pedagogy learning by reporting that *experiential technology learning that is useful for the classroom* was their most valuable learning experience. This experiential learning provided them with the exposure to the technology, as well as an opportunity to experiment and try out the specific technology, building confidence and experience to implement the technology in their classroom through the process. Some teachers reported that this experience provided them with the needed incentive to experiment with the technology, and recounted how the nTPD courselet experience resulted in a new classroom

implementation:

> I followed through on pursuing the development of a wiki with my students -
> and loved what came of this. The course moved me from "thinking" I should do
> this (where I was before the course) to "doing". Thanks for this incentive.

This finding, that teachers are implementing a new technology in their classroom as a result of nTPD courselet participation, is significant as it supports the intent of TPD (Villegas-Reimers, 2003) and the goal of the nTPD courselet. One large study confirms this finding reporting that a series of focused oTPD activities can result in positive changes in teacher knowledge and instructional practices (O'Dwyer et al., 2010).

The qualitative results of the online survey also revealed secondary characteristics of the technology-pedagogy learning that teachers reported were related to profession-centered practices. Teachers characterized their technology-pedagogy learning as including the *sharing of resources and lesson plans* which is further supported by previously reported findings (Ostashewski & Reid, 2010a, 2011). Another secondary characteristic of the technology-pedagogy learning was that it mimicked other kinds of TPD activities by groups of teachers teaching the same content but in an online space *utilizing networking with other teachers* who were interested in the same content. A final secondary characteristic of the technology-pedagogy learning was that it *provided opportunities for pedagogical reflection.*

In summary, the online survey data revealed that the teacher technology-pedagogy learning was the profession-centered learning they experienced in the nTPD courselet. Furthermore that this technology-pedagogy learning was primarily

characterized as experiential technology learning that is useful for the classroom, and secondarily characterized by sharing of resources and lesson plans, networking with other teachers, and pedagogical reflection. This initial description of the teacher learning (resulting from the online survey data) validates the first characteristic of the nTPD model, namely that "nTPD allows teachers a technology-facilitated opportunity to develop a network of relationships, " and the second characteristic which states "firsthand experiential learning."

Types of teacher learning resulting in nTPD courselets

While the online survey provided an overview of the type of the teacher learning occurring in the nTPD courselets, this was confirmed and described by teachers in the semi-structured interviews. The qualitative interview analysis provided rich descriptions about the types of teacher technology-pedagogy learning detailing specific kinds of learning teachers experienced. Four themes representing specific types of teacher learning emerged. These four types were further utilized as codes for the content analysis of the reflective blog posts. As a result the content analysis provided triangulation and a measure of how many teachers experienced each type of learning as represented in the teacher reflections in the blog posts.

The first and most commonly identified type of technology-pedagogy learning identified in the teacher interviews was that teacher learning was about *learning new technology-integrated pedagogical approaches*. Some teachers reported that the nTPD courselet made them consider the contexts in which they might implement the technology. Teachers also reported that reading other teachers' discussion posts helped them to understand how they could use the tool more effectively in terms of

incorporating it into the concepts they were presenting in class. Other outcomes of participation in the courselets related to new technology-integrated pedagogical approaches reported were: being able to empathize with students, exploring inquiry learning, using technology tools more effectively, and understanding how to utilize online resources to support learning. This finding further supports the second characteristic of the nTPD definition which states that nTPD "affords teachers an authentic experience of how online tools can be used in their own classrooms."

The second most commonly described type of the technology-pedagogy learning, emerging for the teacher interviews and confirmed by the content analysis, was teachers' *learning how to use the technology tools* that were presented in the particular courselet. In the Robotics courselet teachers learned about Lego robots and how to build and program them and reported that the hands-on nature of the robotics activities were valuable. Teachers in the online collaborations courselet noted that the hands-on manipulation, as well as being provided with a chance "to think through some of the possible pitfalls before introducing it to my students" was key to the value of the learning provided in the courselet. Overall teachers reported that the opportunity and incentive to be exposed to the technology tools, both in the social networking site as well as to support the content in the courselet resulted in valuable new learning experiences. This second kind of learning described by teachers further supports the second nTPD characteristic which states that nTPD provides teachers with firsthand experiential learning about online social media tools such as blogs, forums, video and file sharing.

Learning about the power of networking with other teachers was a third

description that emerged from teacher interviews about the type of technology-

pedagogy learning teachers experienced in the courselet. Teachers reported that being

instantly networked with other teachers who were reviewing and sharing resources

relating to the same curricular topic was a very powerful use of the SNS group. Part of

the understanding about networking included sharing lesson plans and implementation

stories – the sharing of resources – and as one teacher succinctly states "I would never

found some of these sites if it hadn't been for those people" in the courselet group.

This finding validates the first nTPD characteristic that states nTPD allows teachers a

technology-facilitated opportunity to develop a network of relationships which they

can access to support their classroom teaching practices beyond the more formal

oTPD activities.

The fourth type of technology-pedagogy learning that emerged from the teacher

interviews, and was confirmed through the content analysis, was teacher *learning*

about online learning. One administrator teacher reported that despite a person's

interest in online technologies, it is a professional responsibility to be knowledgeable

about these technologies and this was one kind of learning experience the courselet

experience provided. Other teachers explained that the online learning experience,

which was the first for many of the teachers, provided them with an understanding of

the online student experience. For one teacher, this online learning experience

eliminated the fear of online learning. This finding support the second characteristic

of the nTPD model which states that nTPD provides teachers with firsthand

experiential learning about online social media tools such as blogs, forums, video and

file sharing.

In summary, the first two characteristics of the nTPD model are supported in their current form based on the evidence acquired in this study. The triangulated findings of this study indicate that teachers are provided with a technology-facilitated opportunity (via the SNS) to network in support of their classroom teaching practices, and are also provided with an authentic experiential learning about online social media tools that relates to their classroom. The results also indicate that the nTPD activities are resulting in teachers adding technology-embedded teaching practices to their pedagogical repertoire.

Validation of other nTPD model descriptors and characteristics

A comparison of the descriptors and the third characteristic in the nTPD model with the findings of this study will complete an evaluation of the nTPD model started in the previous section. The first descriptor of the model states that nTPD utilizes a SNS environment "that supports and promotes teacher connections while learning together, both formally and informally." The teacher connections and opportunities for learning together have already been partly described, however as these concepts form the basis of the "networked" TPD as a distinct form of oTPD and as such requires further review.

Prior research has reported that networked learning environments (Whitehouse, 2011) and networks using information technology (Vrieling, Bastiaens, & Stijnen, 2012) can support and enable new kinds of teacher profession-centered learning. From this study it seems likely that teachers' perceptions of what "connectedness" with other teachers would be like using online social networking is still new and

evolving. In this study 91% of the male teachers and 73% of the female teachers reported that they utilize social networking sites for personal reasons and that overall the study participants rated their comfort with computer use was very high. Almost none of these teachers (2 of 26) indicated they use social networking sites with their students. The results indicated that the highest users of social networking sites were in the GenX (87%) teacher grouping (NetGen being second highest at 71%). However, while most teachers reported considerable computer skills and awareness of SNS environments, only half (46%) reported that the nTPD courselet made them feel connected to other teachers. Teachers reported one major disadvantages of nTPD over other types of TPD was the lack of personal connection or face-to-face interactions. This suggests that while some teachers understand how SNS supports and promotes connections, other teachers may not. Online-networked connections are presented differently than the manner in which personal connections made in face-to-face situations are. The implication for nTPD design arising from this points to further explicit support being needed for optimizing teacher-networking potentials using online tools. In sum, this study supports previous findings in the research literature (Whitehouse, 2011; Vrieling, Bastiaens, & Stijnen, 2012) and provides evidence that nTPD supports and promotes teacher connections.

The second nTPD model descriptor states that nTPD provides learning activities while allowing teachers to retain control over their time, space, presence, activity level, identity, and relationships. The majority of teachers in this study described the greatest advantage of the nTPD courselet to be the *anytime, anywhere* nature of their participation. The flexible nature of the courselet activity design, allowing anytime

participation that was flexible to accommodate the busy schedules of teachers was evident in all of the data sources of the study. Teachers reported their participation in courselet activities at times that were convenient for them was a significant benefit. Similarly, the ability of teachers to participate from anywhere, whether it was from primarily from school (46%) or in the comfort of their home (54%), anywhere access was reported by teachers to be as important as the time flexibility. This flexibility of delivery, or time-independence nature of online learning, has been previously reported by the author (Ostashewski & Reid, 2010) and is further supported by other research (Ally, 2008; Bullen, 1998; Tucker & Morris, 2011).

Teachers were also in control of the other aspects of their participation in the courselet selecting how they choose to participate. This teacher control is evident in comparing the teachers who enrolled in the nTPD courselets with the teachers who completed the courselets. While there were 57 teachers enrolled in the iteration 3 courselets, 22 teachers completed all of the courselet activities. Many of the teachers who enrolled but did not complete all of the courselet activities participated in some manner, such as making discussion or blog posts. Teacher control of their courselet participation is, by the nature of the design, inherently part of a nTPD courselet. The teacher, or the learner, is driving their engagement with the materials and other participants during the learning activities. This student-centric nature of the nTPD courselet design is described in the second model descriptor, and the study's findings provide confirmation. Research describing the *flexible, anytime, anywhere student-centric nature* of nTPD learning both in the online literature and in this study's findings support this second descriptor of the nTPD model as a valid description.

The third characteristic of the model states that nTPD allows teachers to participate in professional learning that is just-in-time, accessible, and that is potentially self-guided. The findings of this study both confirm and extend this descriptor and third characteristic in several ways. The just-in-time nature of nTPD is evident from findings in the study, such as 96% of teachers reporting that they chose to participate in the courselet because of the content topic being presented. The *content-focused* description of oTPD is evident in other research (O'Dwyer et al., 2010; Reeves & Li, 2011) and provides an added description for nTPD.

The study also provides evidence of another description of the nTPD courselet as being "ongoing," which is also reported as valuable oTPD in comparison to other TPD activities (Doherty, 2011; Reeves & Pedulla, 2011). Accessibility of the courselet activities are confirmed by this study whereby over 92% of teachers reported they had access to high-speed internet access at school and 81% reported high-speed internet access at home. While this access to high-speed internet may not be possible in all parts of the world, increasingly broadband high-speed access is becoming the norm (Jakopin & Klein, 2011) and is being reportedly linked to increased job skills (Mesch & Talmud, 2011). Accessibility is a design consideration of nTPD courselets, particularly due to the social network environment and the multimedia in the form of video, documents, and images which are part of the activity design. These same multimedia elements of the courselets are reported by teachers to enable the student-centric and self-guided nature of the courselet activities. Teachers in this study reported that the tutorial videos had value, both for guiding their activity in the courselet as well as exemplars of technological-pedagogical use for teachers'

own practice. The instructional record download records and teacher interviews provided other evidence that PDF documents were utilized to guide teacher activity in the courselets. Three teachers who participated in the study specifically noted the self-directed nature of the courselet describing it as one of their expectations in courselet participation. In sum, there is confirmation of the *accessible and self-guided nature* of nTPD, however *ongoing and content-focused* are additional descriptions of the type of learning occurring.

A final evaluation in the nTPD model is to consider the evidence for the networked or connected potential. The concept of connectedness forms the basis of the "networked" TPD as a distinct form of oTPD and is important for understanding implications of the nTPD study results in relation to networked learning. Descriptions from the literature describe rich networked learning designs as those that "involve interaction with on-line materials *and* with other people" (Jones, Asensio, & Goodyear, 2000) and as collaborative and co-operative connections (Latt, Lally, Lipponen, Simons, 2007). Eighty-one percent of teachers reported that their participation helped them feel connected with other teachers. However this connectedness was felt strongly by only half of the teacher participants. While interaction with the online courselet materials is evident in findings reported in Chapter 4, the other half of the teachers who participated in the nTPD study did not perceive their courselet experience connected them to the other teachers. The apparent disparity in these two results (81% and 50%) appears to be based on what teachers attributed to their feeling of connectedness. Teachers reported their lack of connectedness to *insufficient discussion participation by other participants.* Similarly,

the most commonly reported frustration teachers reported with the nTPD courselet was the lack of sufficient or timely responses in the discussion forum stating that "others not participating until after the course was supposed to be over - this gave us no sense of community." Similarly teachers reported that one significant disadvantage of nTPD over other types of TPD was the lack of discussion by other teachers. While teachers had clear understandings of the online and SNS environment for the TPD, they had expectations for more discussion than occurred in the courselets. These finding supports the networked learning description (Jones, Asensio, & Goodyear, 2000) and clearly identifies that for 30 - 50% of teachers, significant online discussion with other teachers is related to their feeling of connectedness. There is considerable evidence in this study of teacher interaction with online materials (file-downloads), collaboration (teacher-created and shared files) and co-operative connections (forum discussions and teacher critiques and sharing of resources) to support the networked descriptor of the nTPD model.

Other evidence supporting the uniqueness of the networked TPD model originates from related SNS concepts described in the literature that were also found in this study. Literature reporting on other oTPD activities describes email discussion lists (Riding, 2001) and resource sharing sites or learning communities (Sinha, et al., 2010) as having professional value for teachers. These other oTPD examples of professional learning (Mayer & Lloyd, 2011) are only similar to professional development; they do not explicitly try to take advantage of the SNS and group capabilities to deliver TPD. Similarly, Whitehouse (2011) reported that one of the "new" types of learning that the networked environment supports is "learning by

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stealth" which is enhanced by the nTPD courselet structure. Descriptions of "lurking" in online learning environments has been documented as a valuable type of learning (Beaudoin, 2002). In this study "lurker" teachers, ones who enrolled and did not actively participate, composed over two-thirds of the enrolled teachers. The findings of this study support the learning by stealth concept, as many teachers who did not participate visibly accessed learning materials and have access to the shared discussions and files. Teachers in the study reported that they found professional value in looking at other courselet participant blogs and lessons in an effort to understand how a specific technology could be implemented in the classroom. Based on the reports of the teachers who did complete the courselets, it can be assumed that lurker teachers experienced some level of technological or pedagogical learning without making a recorded interaction with the SNS group. In summary, the networked nature of the nTPD courselet, by the delivery of the TPD within a SNS group environment, is further supported by the findings of this study to be a unique type of oTPD. The next section the evaluation and discussion of the findings of the study in relation to the design components and elements of the nTPD model.

<center>Components of nTPD Having Professional Value</center>

The second research question in this study asked teachers to identify *What components (discourse or activities) of professional development delivered in an online social networking site do teachers identify as having professional value?* Several of the online survey question analyses presented in Chapter 4 reported the results of the study with respect to the two components of the nTPD experience,

<center>220</center>

discourse or activities. Overall, the component that teachers most often reported as having professional value were the experiential learning activities they engaged in, described further as active use of the technology tools, review and sharing of relevant resources, and lesson plan creation. Furthermore, while teacher discourse supported courselet learning outcomes, some teachers had an unmet expectation of a significant amount of discussion with other teachers about the courselet content, as described in the previous section of this chapter.

Teacher activities are valuable for professional learning

The quantitative data collected in the online survey relating to nTPD courselet components identified activity as valuable theme. Ninety-two percent (92%) of teachers in the study indicated that they perceived their participation in the courselet was an effective way in which to learn how to use online tools to support their professional learning. Similarly, 92% of teachers also responded that their participation motivated them to try new technology activities as a result of their nTPD participation. Teachers overall reported that nTPD activity component was more valuable than the discourse component.

The qualitative section of the online survey and the semi-structured interviews elaborated on the specific activities and discourse teachers reported were valuable or frustrating during their courselet participation. The content analysis of the instructional records provided confirmatory details about the teacher activities and discourse that were part of the courselet design. Together these data outline a complete picture of teachers' activities and discourse components. A detailed overview of the highly valued teacher activity component of the nTPD courselets is

presented in Table 44.

Table 44

Teacher Activities in nTPD Courselets

Primary characteristic	Secondary characteristics	Activities
Active use of the technology tools	• Hands-on, practical • Opportunity to experiment • Using SNS tools: to network, for deep reflection	• Use Tool (1.7 times) • Blog post (3.3 times) • Discuss post (5.0 times)
Review and sharing of resources	• Review of online resources • Sharing of websites & images • Reviewing other lessons	• Review Website (4.7 times) • Identify and critique resources • Upload image (0.3 times)
Creating lesson plans	• Creating lessons • Sharing of lessons	• Upload lesson (1.0 times) • Discuss post (5.0 times)

Note: ( ) = number of learning activities

Active use of the technology tools

Teachers overwhelmingly reported that active use of the technology tools learning activities relevant to their classroom practice that they participated in during nTPD courselets was the most valuable component of the TPD. As previously described in Chapter 4, courselet components are the interactions (Moore, 1989) that learners engage in, where learner-resource interactions are the activities component of the learning design. Teachers reported that their active use of the networked (SNS), online, IWB, or robotics tools in the courselet activities resulted in building confidence in using these technologies and providing them with some motivation to try and use them in their teaching practice. Having the courselet-supported TPD opportunity to try new technologies was a primary outcome for nTPD teachers. This

supports previous findings (Ostashewski, Reid, & Moisey, 2011) reporting on the dual nature, learning about the technology topic while at the same time learning about the SNS tools, of the technology learning that results from nTPD participation.

The secondary characteristics of the experiential technology learning activities were reported by teachers to be: hands-on and practical, providing opportunities to experiment, and supportive of networking and reflection. The experiential activities teachers were asked to participate in during the courselets, as described by the content analysis and mapped to these secondary characteristics, are: a) using the technology tool that was the subject of the courselet, b) creating discussion forum posts, and c) creating blog posts. Teachers reported that the physical hands-on nature of the activities that were practical as applications in their teaching was key. The constructionist nature of these learning activities is summed up in one teacher's comment that "you really don't understand until you try it," referring to the use of an online Web 2.0 tool activity in a courselet.

Teacher activities also led to new understandings about how SNS can support networking, through the posting and reading other teacher's comments. Many teachers in the study, even two of the pre-service teachers, reported that they had never participated in any type of online course before and that their participation allowed them to begin to understand online learning activity structure. Similarly teachers had opportunities to post blogs and participate in reflections on what they were learning in the courselet. The power of group blogging, in combination with file-sharing, as a form of teacher networking, was described by one teacher who reported that reading of other courselet blogs resulted in the teacher trying "to push myself a

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bit farther" and try to implement the technology into practice. This represents a "new" kind of profession-centered learning activity not previously reported in the research literature. This new activity supported by a SNS environment can be described as *peering over other teachers' shoulders*. This finding is supported by Whitehouse's claim (2011) that teachers who are using social networking tools are experiencing new kinds of teacher learning.

A final secondary characteristic of the experiential activity described by teachers can be described as deep reflection. It was succinctly described by one teacher as deep pedagogical thinking: "the courselet provided an opportunity for deeper thinking on how interactive white boards should be used," and "time to think about the purpose of them in lessons to use them more effectively." This ability of an asynchronous discussion activity to support deep learning online is well reported in the literature (Bullen, 1998; DeLottell, Millam, & Reinhardt, 2010; Akyol & Garrison, 2011) and several examples of this kind of deep pedagogical thinking are reported by teachers in this study. In summary, teachers described their active use of the SNS and other technology tools as key to the development of their understanding about the technologies and how to integrate them into their teaching repertoire.

Review and sharing of resources

Another primary characteristic of the experiential learning activities teachers engaged in and reported to be valuable outcomes of nTPD participation was the reviewing and sharing of resources. Teachers highly valued the opportunity to review and reflect on the online resources that were presented in the courselet as an engagement activity. This is another learner-resource interaction (activity component)

designed into the nTPD courselet.

In the courselets, teachers (learners) interacted with online multimedia of several types as reported in the Chapter 4 content analysis. Teachers interacted with websites presenting links to other online resources, informative wikis, online articles and presentations (PDFs, slideshows) and explanatory video clips and tutorials. Teacher review, critique, and discussion postings regarding these resources in the SNS courselet forum was important to their understanding of the topic being introduced in the courselet. As well teacher interactions with these resources were reported by teachers to provide examples of how multimedia resources can be implemented into their teaching practice.

Another key activity that the SNS environment supports is the sharing of teacher-created files. This group file sharing capability, reported by teachers to support their technological pedagogical understanding, is additional evidence of the teacher learning described in this study as peering over other teachers' shoulders. While this is a similar concept to Whitehouse's (2011) learning by stealth, the difference in the nTPD courselet is that these activities are intentional and supported by the learning design. This new type of teacher learning is described in full in Chapter 5. Teachers reported that the "sharing pictures/lesson plans with each other" were valuable to their learning. With regards to the robotics courselet, teachers reported that the sharing of images allowed them to visualize what other teachers were building or having students build in their lesson plans. Other teachers commented that this ability to view other teachers' lesson plans helped them to have a better understanding of how they could implement the lesson or technology. This file-

sharing activity is discussed further in the following section in relation to this study's findings to file-sharing as an instructional design element. In summary, the reviewing and sharing of resources, reported in previous research (Ostashewski & Reid, 2011; 2012a; Sinha, et al., 2010) is a valued teacher activity in nTPD courselets.

Creating lesson plans

The third primary characteristic of the experiential learning activities teachers engaged in and reported to be valuable outcomes of nTPD participation was the creation of lesson plans. The lesson plan creation activity, based on a constructionist learning strategy, employed in the nTPD courselet was designed to have teachers demonstrate their understanding and share an implementation of the courselet topic. This is the third example of a learner-resource interaction (activity component) designed into the nTPD courselet.

Of the teachers who participated in the study, 73% felt the lesson plan activity was critical to their success in the courselet. Teachers further reported that "the interactive sessions and the lesson-planning that forced the practical side" were valuable to their learning. On more than one occasion teachers also reported that they highly valued these shared lesson plans indicating that they downloaded all of them to their computer for future access. The content analysis of the shared files accessible to teachers in the courselet spaces confirmed these findings that teachers found value in the lessons. Download records and content analysis of the teacher-created lessons provided evidence that the lessons did represent courselet topic implementation strategies. As reported by teachers, the networked learning activity of creating and sharing lesson plan documents, was a critical component of the experiential activities

in the courselet.

In closing, those experiential activity components which nTPD teachers reported had professional value can be described as: using networked and other technology tools, included reviewing and sharing resources, and culminated in creating and sharing of lesson plans that were relevant to the topic. Discourse occurring in the courselets, which took place in the courselet discussion forum threads, is the topic of the next section relating to nTPD courselet components.

Characteristics of teacher discourse in nTPD courselets

The nTPD component of discourse is the second courselet component that was designed to support teacher PD learning during courselet participation. Teacher discourse describes the interactions that teachers had with other teachers (learner-learner interactions) and specifically refers to forum discussions or group blogs posts where other teachers can read and reply if they so choose. While many teachers reported that courselet discourse was valuable, it was also a source of frustration for others. Sixty-one percent (61%) of the teachers in this study reported that the discussions and conversations were critically important to their success in the courselet, while 65% reported that the conversations with other teachers resulted in new educational strategies. However with respect to reading and reflection as discourse components, 82% of teachers agreed that the discussions that they participated in or read helped them to reflect on their own teaching practice. In comparison to the theme of experiential activity as valuable, discourse overall was less valued.

The qualitative section of the online survey and the semi-structured interviews

elaborated on the specific characteristics of discourse that teachers reported were both frustrating and valued. The most commonly reported frustration reported by teachers was the insufficient numbers of postings or discussion by other participants. Teachers expected more weekly discussion than what occurred in the courselet. As well a commonly reported disadvantage of the courselet was that teachers felt they missed out on potential interactions with other teachers because of the courselet delivery or structure. Teachers were not posting in a timely manner, reportedly due to their other teaching commitments. One teacher, who was unique because she reported participating in several online TPD courses in the past, reported frustration that there was a schedule that required teachers to post and discuss courselet materials in a scheduled manner. This teacher described the courselet activities as dragging on and stated that it would have been better if she were able to do courselet activities without waiting on other teachers. Similarly, two other teachers reported that they were very self-directed and that providing the courselet materials without a need to participate in discussions were a preferred method of learning for them. In summary, frustrations with the discourse component arose primarily due to teacher expectations and learning preferences. These expectations and preferences were likely based on learning activities in face-to-face settings, as the majority of teachers interviewed reported that this was their first online learning experience.

While there were frustrations and challenges to teacher discourse in the courselets, many teachers did report value in the discourse that did occur. Some teachers reported having meaningful conversations with other teachers in the courselet. These conversations resulted in answers to questions about the lesson materials that were

shared in the courselet space. Other teachers reported that discourse resulted in new ideas and perspectives about technology and the related pedagogy or that courselet discourse enabled them to access support and clarifications from other teachers. Described by one teacher as the synergy of people working together on a common task, the sharing of links to online resources in the discussion posts was important. This finding is consistent with the literature that reported learning in networks provides a "rich web of information sources offering multiple perspectives and dialogues, responses to queries, and help from others" (Wenger, Trayner, de Laat, 2011, p. 11). Teacher understanding of this value of networking and the collaborative nature of the courselet space that results from discourse was evident in several teacher interviews. A pre-service teacher described this best stating: " The strength of the courselet is the people behind it. What they bring to the table. You know, their knowledge, and put some time into it then obviously we get a better resource for everyone at the table" (T1). In summary, teachers reported value in the discourse supported by the tools and design of the nTPD courselet experience and reported that more discourse would be beneficial.

Overall the opposing findings from this study about online courselet discourse as frustrating and discourse as valuable, is consistent with the oTPD literature. Reeves and Li's (2012) analysis of a large oTPD initiative in the US from 2006 through 2011 reports that teachers' technological readiness and their understanding of the value of online discussion and posts appears to be linked to learner expectations and preferences in online courses. As most of the nTPD participants had never participated in online learning of any sort prior to the courselet experience, it is

reasonable to expect that the nTPD teachers would experience challenges and make comparisons to face-to-face experiences in comparing their perceptions about discourse. In closing, overall teachers reported value for courselet discourse and wished for more.

<center>Design Elements of nTPD Affecting Teacher Practice</center>

The third research question in this study asked *What design elements of the networked teacher professional development experience affect teacher practice?* This study contributes evidence that oTPD models (Ostashewski, Reid, & Moisey, 2010) are able to affect teacher practice (de Kramer et al., 2012; O'Dwyer et al., 2010; Reeves & Li, 2011). As part of this evidence, a detailed review of the design elements of the nTPD courselets, which teachers reported affected their teaching practice, is presented. This discussion represents the outcome of the study relating to the third research question. The evaluation of the nTPD courselet is embedded in this discussion of each of the design elements. This is inherently so, as what teachers report affected their teaching practice already is an evaluation of effectiveness of these design elements.

The design elements of the nTPD courselet originate from the evaluation and revision of previous instructional designs (Ostashewski, 2010; Ostashewski & Reid, 2010a, 2010b) developed for implementation in iteration one and two of this DBR project. The design components (discussed in the first part of this Chapter 5), the design elements, and the design principles together compose the instructional system of the nTPD courselet. The elements, presented to teachers in the online survey, were

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ranked as being important to teacher learning in the following order: materials (92%),

support videos (81%), video examples (77%), lesson planning (73%), and blogs

(58%). Teachers' responses in the open-ended questions reported that the resources

identified and shared (materials & file-sharing) in the courselet were the design

elements that contributed most to their learning. Other design elements teachers

identified and weighted as all equal in importance were the lesson planning,

discussions, videos, and articles.

Emerging from the qualitative analysis of teacher interviews were teacher

evaluation themes relating to the nTPD design elements. Articles, videos, reflective

blogs, and file-sharing elements viewed as valuable learning elements. Based on these

themes a content analysis examining precise details of the design elements was

conducted. Together the data collected in the online survey, teacher interviews, and

content analysis provide triangulation of the reported results and a micro-view of the

elements that teachers reported affected their learning. The activity and discourse, or

learning activities, have already been evaluated in the previous section. This section

presents the study findings in relation to the four design elements themes that emerged

from the teacher interviews.

Examining the value of articles

The materials presented to teachers during the nTPD courselet included a

variety of open access, online-based resources over the course of the delivery. During

the interviews teachers clarified their descriptions of the term "articles" to include all

of the materials that were presented in the courselet, except for the videos. Another

term used to describe the courselet materials (or articles used by teachers) was

resources, particularly when describing the sharing of URLs between teachers. The design element described as *articles* therefore includes a wide range of informational materials presented to teachers in the courselets. A further detailing of the articles theme was conducted in the content analysis of the instructional records and resulted in the following kinds of articles being identified: research articles (PDF and website based), resource websites (text based, hyperlink lists), wikis, educational implementation websites (variety of media), and online learner-controlled Slideshare presentations. In summary, all of the open-access, online materials, excluding videos, that were used to present text or media based information to teachers about the topic of the courselet were described as articles by teachers.

Teachers reported that the articles (or materials) were overall the most important design element affecting their learning. This finding has been reported previously (Ostashewski & Reid, 2010b) and is confirmed in other oTPD research (Reeves & Li, 2011) as important. However, teachers also reported that the research articles were of value only if they were practical or practice-orientated in nature. Articles presenting too much of a "philosophical" focus as opposed to being practice-focused were reported by two teachers as less valuable. Teachers further reported that the resources that could be used with their own students were particularly valuable. For example, teacher exposure to some of the content-focused or curricular theme-focused hyperlink websites supporting the courselet topic were reported to be especially valuable. Similarly, teachers' sharing of the website URLs and shared descriptions of the particular value of those sites provided a "filtering" or "online or digital curation" of content for other teachers. Digital curation is about "maintaining and adding value

to, a trusted body of digital information for current and future use" (Beagrie, 2006, p. 3) Online or digital curation of content for education can be understood as the sharing and reviewing of online resources using websites (Good, 2012) and there is support in the literature of this kind of activity as being valuable as a designed activity for online learning (Ravitz & Hoadley, 2005). This resource sharing or *sharing and curation of online resource* is reported as a key online-networked learning outcome for TPD (Wenger, Trayner, de Laat, 2011; Ostashewski & Reid, 2011; 2012, Sinha, et al., 2010). In summary, teachers report that their exploration of curricular resources, initiated by the materials presented to them in the courselet, were key to the nTPD experience affecting their teaching practice in a positive manner.

Examining the value of file-sharing

Teachers reported that in addition to the materials presented to them in the courselet, file sharing as a design element, equally affected their learning in a positive manner. File-sharing as a design element can be described as having two parts. The first part is the provision of a shared digital-folder type space available for courselet participant access. The second part of the file-sharing design element is the teacher activity of file creation and uploading it to the courselet space. The instructional design of tasks directing teachers on what kinds of files to create, as well as when to upload the files to the SNS group, are considerations of the design. The file-sharing element results in the development of a persistent collection of topic-focused, teacher-created digital files accessible by all members of the courselet. The group space in the SNS enabled teachers to upload any type of digital file such as: text and PDF documents, images, IWB source files, and Microsoft Word documents.

As a design element, there is evidence that the kinds of teacher file-sharing, teacher practice with file-sharing, and purposes for the sharing affect the amount of file sharing resulting in a courselet. According to teachers, file-sharing in the Robotics courselet allowed for technology visualization. Participants in the Robotics courselet were asked to create and upload images of their Lego robots as part of the first activity in the courselet. Later in the courselet teachers were asked to create and share lesson plans implementing a Lego robotics activity. Many of the teachers in this courselet also choose to upload several images supporting their lesson plan activities, despite no instructions to do so. These teachers, familiar with image sharing, recognized that the implementation of the Lego robot lesson plans they created was supported by images. This finding suggests that the amount of file-sharing teachers engage in is related to the value or purpose of the file and that file sharing can support visualization of classroom implementation.

The second type of teacher-created files that was uploaded in the nTPD courselets were lesson plan files. Teachers were directed to create and upload digital lesson plan files in the form of Microsoft Word files, initially provided to teachers as a lesson plan template document in the shared file space. Teachers reported that the sharing of these lesson plan files resulted in pedagogical technology integration support. Teachers further identified this file-sharing of lesson plans as a collaborative activity and reported that the ability to see what other teachers created as a version of technology implementation was powerful as a learning process. This teacher value of the shared lesson plans as a collaborative activity is confirmed in the literature as a networked learning attribute (Wenger, Trayner, & de Laat, 2011) and supports the

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description of the new kind of networked teacher learning described previously in Chapter 5 as peering over other teachers' shoulders. In summary, teacher created and shared files in a common space does support teacher learning. It also supports teacher understandings of pedagogical implementations of content resulting in a powerful, networked learning outcome as a result of nTPD courselet participation. While files can and have been shared in other oTPD websites (Sinha, et al., 2010), the nTPD content-focused pedagogical discussions and collaborative sharing nature inherent in the SNS group structure supports teacher file-sharing in a new way.

Examining the value of videos

Video segments are the third design element of the nTPD model that teachers reported had value for their learning and affect their teaching practice. As described at the beginning of this section of Chapter 5, two kinds of video segments, support videos and exemplar videos, were provided to teachers over the course of the nTPD activities. In the nTPD courselets, video were presented to teachers as a URL link with background information or instructions on the intent and context of the video in the courselet activity. Some URLs were provided to SNS internal video segments while other URLs linked to YouTube hosted videos. During the nTPD courselets, teachers were instructed to view one or more support or exemplar videos on at least four occasions. Additionally teachers were provided video hyperlink lists as scaffolded tutorial-type support materials. As with the online articles and resources, all of the videos were open-access videos.

The videos teachers were instructed to view or access during activities were created either by the SNS host organization (how-to videos, exemplar videos) or by

other video producers (instructional support videos, exemplar videos). The host

organization created, and made openly available on the SNS site, tutorial video

segments featuring the specific SNS tools and instructions on how to use these tools.

The SNS software was able to host and present member-only or group-only access

video segments. The IWB courselet, for example, utilized SNS member-only video

segments created by the SNS host organization during other TPD activities. These

videos included presentation and exemplar videos of the specific topic being

presented in the courselet that were useful for courselet member access. The SNS

video access controls provided a way in which to allow access for courselet

participants to closed-access type videos, thus managing some of the copyright issues

regarding these custom video segments. Whether videos were hosted internally to the

SNS website or externally on other open-access websites, teachers reported that the

video segments did have value to their learning.

The topics of the video segments presented to teachers were how-to

descriptions, informational, or exemplars of courselet content implementations. The

topics of the how-to videos included basic SNS tutorials and tutorials that describe the

SNS "group" tools. A screenshot of the SNS website home page displaying the list of

open-access SNS specific tutorials is provided in Figure 27. These support videos

included
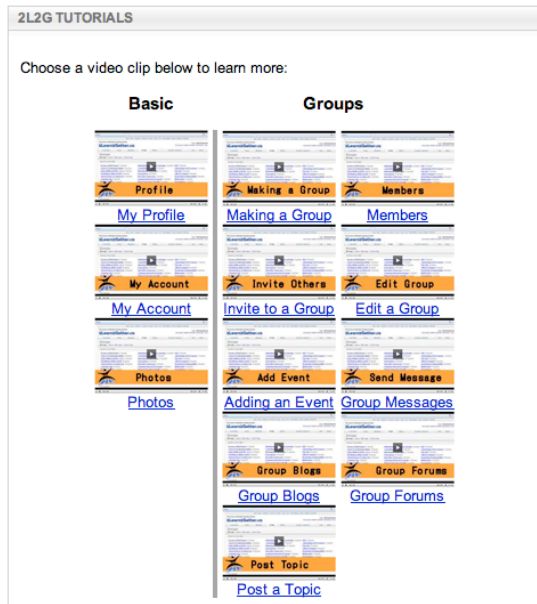
Figure 28. SNS-specific Tutorial Videos

topics such as: my profile, my account, photos, group forums, and group blogs.

Videos created by open-access producers were a source of informational videos and

were presented to teachers as content support videos. These videos were hosted

externally, on open access websites such as YouTube, and presented background

information regarding the topic of the courselet activity. For example, a video titled

"Blogs in Plain English" was presented to teachers in the online collaborations

courselet as a support video relating to the topic of educational blogs. The exemplar

videos were the third type of video topic presented and included examples of the

nTPD courselet content. These videos include ones such as a video presenting

examples of Lego robot creations (used in the robotics courselet), or demonstrations

on the use of IWBs in with students (used in the IWB courselet). In sum, the topics of

the videos utilized in the nTPD courselets presented both how-to, informational and

exemplar information.

Teachers reported that the use of video segments in the courselets provided both

instructional supports during the courselet delivery and *classroom technology*

supports to support the courselet content. The how-to tutorial videos provided

teachers with instructions that were helpful teachers for learning new software tools

utilized during the courselets. For instance, one teacher stated that the videos "made

learning how to use and what the technology was used for much easier and more

effective" (T7) As an instructional support tool, the information delivered using video

segments was liked and understood by teachers. Additionally, videos affected teacher

practice in that teachers further described that this visual learning element provided

good examples of how and when videos could be beneficial in their own teaching

practice. Teachers also reported that exemplar videos provided them with guidance

and clear examples of how the courselet content could be used in teaching practice.

Exemplar videos made explanations and implementations of the courselet content

explicit. The immediacy and effectiveness of information presented to teachers in

some of these exemplars resulted in teachers being able to understand the content

quickly and make "an instant connection on that to use it in the classroom" (T5). This

connecting of courselet experience to practical teaching application of the topic is

another way in which teachers reported the video design element affected their

teaching practice. In summary, video as a design element is an effective way of

presenting instructional support to guide teacher understand how to participate in the

courselet as well as to provide pedagogical implementation support.

Examining the value of reflective blogs

The final design element teachers reported had a positive effect on their

teaching practice was the reflective blog element. While not all teachers found

blogging to be a valuable activity, some teachers reported the teacher reflection to be one of the most useful learning activities. As with the file-sharing design element, the group blog element in the courselet was one of the elements that contributed directly to the "peering over other teachers' shoulders" type of teacher learning. Teachers reported that the reflective blogs affected their teaching practice in two ways; supporting their understanding of blogging as an online learning activity, and the reflection on teaching practice that was discussed in the nTPD courselet content.

Group blogging as a design element in the nTPD courselet was utilized at the beginning and end of the courselet activities. Group blogs differ from general member blogs in that the group blogs are only visible to the group members. As the nTPD courselet is delivered inside the SNS group space, the group blog was used to provide teachers with opportunities to be informed about what other teachers were contemplating with regards to the courselet content. In the initial group blog activity that teachers were asked to create they were instructed to introduce themselves, their teaching context, and what they hoped to get out of the courselet experience. A second group blog during the next activity directed teachers to post a group blog reflection on the content introduced in the courselet. An example of the instructions to teachers for the second group blog post is as follows:

> [P]ost a GROUP BLOG comment around the following questions: Which of the two technologies (blogs and wikis) do you think that you would consider using in your classroom? What are the challenges to its use in your particular classroom context? (2Learn.ca Education Society, 2011)

During the final courselet activity teachers were again asked to post to their group

blog reflecting further on the implementation of the courselet content and the value of the materials presented in the courselet. These group blog posts form the basis of the reflective blog as a design element.

Teachers reported two different effects on their professional practice as a result of their participation in the reflective blog courselet element. The first effect on teaching practice was that the blog element supported their understanding of blogging as an online activity. Teachers new to blogging reported that the group blog activity in the courselet provided them with an opportunity to try blogging as an educational activity. This supported teachers' understanding of what the process of blogging required from the learners perspective, as well as how blogging activities can support reflection and sharing in online environments. Two teachers reported starting school-based personal blogs externally to the courselet in order to provide general information to parents of students they teach. The effect of the blog design element on teaching practice described by teachers is to add a new online learning activity to their teaching repertoire, which is the goal of TPD delivery.

The second effect of courselet blog participation on teaching practice was to provide an opportunity for teachers to reflect on both their own and other teacher's teaching practices. Opportunities for reflection and critical analysis on pedagogy and implementations while engaged in TPD is important to foster as a valued TPD activity (Putnam & Borko, 2000). Providing meaningful reflective practice opportunities as an explicit component for teaching practice has also been identified in beginning teacher education literature (Harford & MacRuairc, 2008; Watts & Lawson, 2009). Teachers' reports about the reflective nature and value of the group blog element support what

the "teacher as reflective practitioner" literature (Adler, 1991; Harford & MacRuairc, 2008) identifies as a crucial component of effective teaching practice. According to nTPD participants, the group blog supported their understanding of the courselet content providing them with opportunities to see the content from other teacher's perspectives. Teachers' ability to capture their own reflections, share them with other courselet teachers, and review other teacher's blogs about the courselet content and learning was valuable. It provided an inside view of teacher growth or professional learning resulting from the courselet. Teachers reported, in their final reflective blog posts, that they learned about technology-integrated learning approaches, how to use the tools presented in the courselet content, and the potentials for online and networked learning. The ability to share these reflections in a group space that supported ease of access to other teacher's reflections describes the unique value of SNS situated TPD. Through the reflective blog element of the nTPD courselet, teachers not only had opportunities to reflect on what they learned that was specific to the content of the courselet, but to also access descriptions of what other teachers learned during the process. The potentials of group blogs (Fessakis, Tatsis & Dimitracopoulou, 2008) and reflective blogs in SNS mashup spaces (Wheeler, 2009) to be used as valuable learning design elements have been previously reported. The result of reflective group blogs is that teachers are given opportunities to check on their personal progress in relation to other teachers' progress. The opportunity to participate in reflective group blog activities in the nTPD courselets supported the networked learning being delivered in the SNS group space. In summary, teachers reported that reflective blogs affected their teaching practice by providing an

understanding of blogging as an online learning activity, and the reflection on teaching practice and pedagogy related to the courselet content.

Summary

Chapter 5 has presented a discussion of the findings of the nTPD study integrated with an evaluation of the nTPD model. This discussion and evaluation was structured around the three research questions guiding the study, exploring the literature and findings in relation to the nTPD model. The discussion provided details about the profession-centered technology learning that teachers reported they experienced during the nTPD courselets. Overall teachers reported that they engaged in technology-pedagogy learning described further as learning about technology and the associated relevant pedagogical implementation resources and considerations. An evaluation of the nTPD model descriptors and characteristics were presented where appropriate throughout the chapter. This evaluation resulted in significant support, with minor revisions, of the descriptors of networked teacher professional development as a unique and separate model of online teacher professional development. With regards to the nTPD design components of teacher discourse and teacher activities, the findings and literature relating to the second research question was presented. Overall teachers reported that what had the most profession-centered value were the experiential learning activities they engaged in, described further as active use of the technology tools, review and sharing of relevant resources, and lesson plan creation. A new kind of teacher profession-centered learning was also identified in this study as *peering over other teacher's shoulders* as a result of teacher

participation in courselets designed using the nTPD model. The social networking site tools in combination with the nTPD design components support this new kind of teacher learning. The final section of Chapter 5 presented the findings related to the nTPD design elements resulting in an evaluative discussion of these elements based on their effect on teacher practice. The "article" design element, described by teachers as materials and resources and the file-sharing design element, were identified as the elements that resulted in the largest positive effect on teacher practice. Other design elements of videos and reflective group blogs were also reported to affect teacher practice positively and contributed to the additions to teachers' practice and pedagogical repertoires. In closing, the nTPD instructional system composed of model descriptors, characteristics, design components, and design elements have all been discussed and evaluated in this chapter. The following final Chapter 6 presents the conclusions of the research questions, the revised nTPD courselet instructional system, and recommendations for distance education and teacher professional development arising from this study's findings.

CHAPTER 6: CONCLUSIONS, REVISED MODEL, AND RECOMMENDATIONS

Summary of the Study

The nTPD courselet model, outlined and presented for study in Chapter 1:

Introduction, is the contribution this study makes to research in online teacher

professional development and distance and online learning. An overview of the

distance education, online learning, and professional development described in the

first chapter contextualized this research study. The primary goal of this study was to

evaluate the nTPD model and design principles and the three research questions used

to frame the research were detailed. The final section of Chapter 1 presented the

definitions and significance of the study.

A comprehensive literature review of the teacher professional development,

models of professional development, online teacher professional development, and the

emerging field of networked TPD were described in Chapter 2: Literature Review.

The gap in the literature, which this study identified, is a lack of evaluated oTPD

models which can be utilized to provide accessible, flexible, quality oTPD. The

contribution this study intends to make, addressing the gap, is the presentation of a

refined model of networked teacher professional development utilizing social

networking tools and addressing technology in education needs. The definition of the

nTPD model (Ostashewski & Reid, 2012a) presented originated from the literature

informed by the previous iterations of this DBR research project. The nTPD model,

described in Chapter 2, makes explicit the instructional design of online activities

used for developing the nTPD courselets. The evaluation of this model describes the

outcomes of that design detailing the teacher learning that occurs as a result of

participation in nTPD courselets.

Chapter 3: Method outlined the specifications of this study detailing the nTPD activities that would be the subject of the study. The selection and support for a design-based research method evaluating the third iteration of an ongoing nTPD implementation project was detailed. This design based research study used a combination of online survey, semi-structured interview, and document and record data analysis using quantitative and qualitative processes Further details on data collection, analysis, triangulation of results, and other research method elements were provided in Chapter 3.

In Chapter 4: Results, the data analysis and reporting of results of those analyses are presented. Demographics, teacher characteristics and groupings, as well as macro view descriptions of the nTPD courselet experience were presented as an outcome of the online survey data. Rich descriptions of the teacher learning and experiences were provided by teacher interview data analysis. A content and record analysis of the nTPD courselet materials provided confirmation and further descriptions of the teacher learning and elements of the courselet design that were effective. In summary, Chapter 4 reported on the teacher learning outcomes resulting from nTPD technology courselet model and as well as the effectiveness of the courselet components and design elements.

An integrated discussion of this study's finding were presented as an evaluation of the individual components of the nTPD model composes the first section of this section of Chapter 5. Further discussion of related demographics, teacher groupings, computer use, and other related descriptions of the teachers and their courselet

learning experiences are also presented. The next section discussed the study findings

in relation to the nTPD design components and design elements integrated with an

evaluation of the nTPD design principles.

This final Chapter 6 begins with a review of the conclusions that can be drawn

from the findings identified in Chapter 4 and discussed in Chapter 5. These

conclusions are presented according to each research question and in context with

corresponding literature in the fields of TPD, oTPD, and distance and online

education. Next in the chapter is presented the revised nTPD model, a

conceptualization of the nTPD model instructional design, and the seven nTPD design

principles modified to reflect this study's findings. The final part of this chapter

presents the recommendations for distance and online education as well as oTPD that

come out of this research. In closing, future recommendations for research in oTPD

and in relation to the nTPD model are identified.

Conclusions

The described goal of this study was to evaluate and refine a model of

networked teacher professional development delivered within a social networking site

environment. An integrated discussion and evaluation of the findings in relation to the

nTPD model descriptors and characteristics was presented in Chapter 4. However the

conclusions that can be drawn from the findings of the study need to be made explicit

and be contextualized in order to guide future research and practice in the field of

nTPD. These conclusions and the resulting revised nTPD model provide a lens for the

revision of the nTPD design principles used to develop the iteration 3 nTPD

courselets. In summary, the conclusions presented below in Chapter 6, as well as the revised nTPD model and design principles are the contributions to the gap identified in the oTPD literature (Dede, 2006; Sprague, 2006; Dede, et al., 2009).

A clear articulation of the resulting nTPD instructional system (nTPD IS) is a second outcome of this study that can potentially guide organizations in designing, implementing, and evaluating online-delivered TPD. The DBR methodology used in this research program was selected because it could provide the kind of approach that provides answers to the questions posed in the study while resulting in an evaluated model outlining "what works; for whom; under what authentic, field-based conditions; and why this approach is effective." (Dede, et al., 2009) The components of the instructional system allow for the system to be transportable to other kinds of online learning designs using social networking sites beyond TPD. One of the conclusions of this study is that in order for a complex instructional design to be transportable, there is a need for clear articulation of the design model and implementation components. The nTPD Instructional System is an evaluated instructional system that could be utilized in the design and delivery of other professional or practical learning with one modification: a change of the design principles that relate to the content that provides value for the network of learners. While the evaluation or study of the transportability of the instructional system is outside the scope of this study, the design and delivery, based on the Networked Learning Framework and other online learning models, provide at minimum a concise starting point.

Research Question 1 Conclusions

Research question one asked: *What kinds of profession-centered technology learning do teachers who participate in networked professional development activities engage in?* In 2001 Brophy (p. 150) stated that "[n]etworked learning offers a new paradigm which fundamentally changes the learning experience in ways that are not as yet clearly understood." This study provides evidence describing some of these new kinds of networked learning that teachers involved in nTPD experience. Overall, teachers report that nTPD provides experiential learning opportunities that are useful for their classroom teaching practice. These learning opportunities specifically include learning about: new technology-integrated pedagogical approaches, how to use the technology tools, the power of online networking with other teachers, and about online learning in general. Furthermore, teachers report that the nTPD courselets provide ongoing, flexible, practice-centered learning that allows them to connect with other teachers using social networking tools. NTPD courselets provide authentic learner-centric activities and put networking tools in the hands of the learners who control when, what, and how they will participate. NTPD is different from other TPD activities in that it supports the connections of a network of similar-interest teachers, regardless of their geographical location.

Teachers' experiential learning opportunities resulting from their nTPD participation had specific characteristics that were reported to support the profession-centered learning. One key characteristic was the sharing of resources and lesson plans enabled by the SNS group environment. Other characteristics were that it utilized networking, or the development of connections, with other teachers and that it

provided opportunities for pedagogical reflection. Wenger et al. (2011) describe one benefit of networked learning for communities of practice, where network refers to the relationships, interactions, and participant connections, is to focus learner attention on specific learning resources. The results of this study confirm the value of networked learning that Wenger et al. (2011) have described.

The nTPD courselet builds on TPD models (Borko, 2004) of the past incorporating new understandings of teacher technological-pedagogical skill and technology TPD (Koehler & Mishra, 2005; Mishra & Koehler, 2006). In the past, computer-training sessions were delivered in one-off seminars providing teachers with technology skill development. One challenge these old delivery models of training had was the lack of authentic activity (Borko, 2004; Ostashewski, 2004) or meaningful connection to practice in context (Desimone, 2009). The nTPD experience allows teachers to develop their teaching skills in the use of networked technologies and tools in an ongoing self-directed and authentic manner. NTPD courselet participation results in teacher experiences developing Technological-Pedagogical Content Knowledge (TPCK) skills (Koehler & Mishra, 2005; Mishra & Koehler, 2006). Mishra and Koehler's (2006) widely adopted TPCK description of required teacher technology skills and their TPD approach are parallel to the finding of this study and the nTPD courselet approach. In this nTPD study teachers recounted and described classroom implementations of the technology providing evidence they are developing TPCK stills as a result of their nTPD participation.

Three aspects of the profession-centered learning teachers reported in this nTPD study support a conclusion that a unique kind of networked learning TPD opportunity

developing TPCK (Mishra & Koehler, 2006) skills is provided by nTPD courselets.

The first aspect of the unique of networked learning TPD teachers experienced in the courselet relates to the kind of learning that is occurring. Teachers reported that they engaged in professional learning that can be described as learning through guided experience at the cognitive or metacognitive level (Dennen, 2002). This type of learning has been described in the literature as cognitive apprenticeship (Collins, 2006; Dennen, 2002) learning. The traditional apprenticeship model has learners acquire domain-specific methods through combinations of observation, coaching, and practice activities. Cognitive apprenticeship emphasizes that the focus is on solving real-world problems using cognitive skills and practices (Collins, 2006). The kind of learning activities and learning outcomes of the nTPD courselet activities can be categorized as online networked-supported cognitive apprenticeship (Collins, 2006; Dennen, 2002) learning. The unique aspect evident in nTPD courselet is that this kind of learning is supported by the environment and learning design.

A second aspect of the unique networked TPD learning teachers participated in during nTPD courselets relates to the technology-pedagogical implementation topic while using technology as a delivery platform for learning; a two-fold learning benefit. As the topics of the courselets were themselves technology-focused, the nTPD experiences resulted in a two-fold benefit: learning how to engage with networked technologies and tools (practical computer skill), and learning about the specific technology topic and pedagogical considerations as presented in the courselets (teaching skill). This two-fold benefit supports the reported potentials of information technologies for oTPD in the literature (Sinha, et al., 2010; Signer, 2008,

Dede et al., 2009; Ostashewski, Reid, & Moisey, 2010).

A third aspect of the unique experiential learning reported by teachers in this study and occurring in nTPD courselets is the networked nature of the learning. In the case of the nTPD courselet, delivered in a social networking site, the networked characterization describes both the potential teacher-resource connections and the potential teacher-teacher connections. Other descriptions of networked learning (Jones, Asensio, & Goodyear, 2000) or connected learning (Anderson & Dron, 2012) support this networked characterization. The networking nature of nTPD courselets is evident in that communication and information technology networks promote and enable connections between learners, learners and facilitators, learners and resources, and the overall learning community. In this study teachers are reporting that they connected to other teachers, resources, and the group learning community during their courselet participation. Furthermore, teachers report that this network or these connections supported their learning and implementation of the TPD topic into their own teaching practice, which is the goal of nTPD courselets.

In summary, three aspects of the networked TPD learning: a) the networked cognitive-apprenticeship kind of learning, b) the two-fold computer skill and teaching skill benefit, and c) the networked nature of the learning, support the conclusion that a unique kind of networked learning opportunity supporting TPCK skill development occurs in nTPD courselets.

In addition to a unique kind of networked TPD learning, a second conclusion of this study is that a new networked-learning affordance occurring as a result of nTPD design can be described. This is supported by Whitehouse's (2011) findings that

teachers are provided new kinds of learning opportunities and affordances using SNS

tools for TPD. In the nTPD courselets, teachers reported that they had opportunities to

read how other teachers in the courselet viewed the resources presented in the

discussion forum. Further teachers indicated that they had opportunities to download,

review, and use other teacher's lesson plans on the same curricular topic to support

their own practice. Finally teachers also described some measure of ability to connect

with other teachers, using the discussion forum and group blog, and then further

reflect on what other teachers created as technological pedagogical lessons. Teachers

described these activities that supported their peering over other teachers' shoulders as

a kind of technological-pedagogical apprenticeship-like activity, similar to what pre-

service teachers experience during practicum placements.

Put together these activities result in a new kind of amplified learning

opportunity, supported by the networked courselet space and activity design. The

phrase "learning over the shoulders of giants" is used to represent the networked

learning affordance identified in this nTPD study. The metaphor describing the new

kind of networked learning affordance conveys several meanings which relate to the

educational aspect of knowledge building, while being consistent with the design

elements of networked learning in a social networking site.

This new learning metaphor expands on an existing metaphor "Standing on the

shoulders of Giants" made famous by Isaac Newton (Wikipedia, n.d.). In a letter dated

February 5th, 1676 to Robert Hooke, Isaac Newton described his knowledge insights

stating that "If I have seen further it is by standing on the shoulders of giants."

(Wikipedia, n.d.) Wikipedia provides the following understanding of the metaphor as

being: "One who develops future intellectual pursuits by understanding and building on the research and works created by notable thinkers of the past." (Wikipedia, n.d.) Newton's quote refers to John Salisbury's book which is the first recorded version of the phrase's use:

> Our own generation enjoys the legacy bequeathed to it by that which preceded it. We frequently know more, not because we have moved ahead by our own natural ability, but because we are supported by the [mental] strength of others, and possess riches that we have inherited from our forefathers. Bernard of Chartres used to compare us to [puny] dwarfs perched on the shoulders of giants. He pointed out that we see more and farther than our predecessors, not because we have keener vision or greater height, but because we are lifted up and borne aloft on their gigantic structure. (Salisbury, 1955, p. 167)

As such, the term "giants" in the new nTPD learning metaphor refers to the collective past knowledge or information of the world. In fact, Google has made a segment of this phrase its corporate motto representing this company's recognition of the fact that the Google Internet search engine allows users to access the knowledge and information of the world. The reason that these two collective information open online websites (Wikipedia and Google) are relevant parts of the metaphor is that they are representative of the "collective" type of resources utilized in the learning design of nTPD courselets. The new learning affordance articulated in the nTPD design is only possible because participants are supported by the mental strength of other participants in order to achieve their new learning occurring because of their participation in the courselet space. Without the technological affordances, such as

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profiles, group blogs, and file sharing, the learning over the shoulder affordance is perhaps absent. The new nTPD learning metaphor provides one way in which to conceptualize the new types of learning that Whitehouse (2011) indicated were a result of NTPD.

The "learning over the shoulders of giants" metaphor also provides for a connection of the nTPD learning with the structure and design of nTPD. Chapter 2 presented the NLF that described the relationship of the network and the "collective" in relation to the group where nTPD courselets take place. The NLF makes explicit that interactions with the larger network (other teachers in the network) and the collective (all possible online information sources) are supported and shared with the learning group (nTPD courselet group space). The learning group in effect amplifies the capacity of both: a) the group's ability to collect and evaluate information relevant to the learning focus, and b) the individual learner's ability to filter all new group information to fit their situational context. The result of this collective-network-group relationship is that rather than one learner gathering and evaluating information for a specific purpose, the information of the collective, filtered by the network, is brought to the attention of the learning group. In this way, all of the teachers learning in an nTPD courselet group space benefit from the network that supports their ability to participate in learning over the shoulders of giants.

In summary nTPD provides a viable model for TPD (Dede, 2006) that results in supporting the development and implementation of new teaching practices, which is the goal of TPD activities (Borko, 2004; Desimone, 2009; Putnam & Borko, 2000). The nTPD study supports the following conclusion relating to the first research

question: It can be concluded that the nTPD courselet participation results in valued

TPD characterized as: a) experiential technology focused, b) learning described as a

networked cognitive-apprenticeship type, c) having two-fold technology TPD benefits

developing TPCK knowledge and technology skills at the same time, and d)

networked learning. It can be further concluded that a new networked learning

affordance, supported by the SNS group and nTPD design, described as learning over

the shoulders of giants, has been identified. The next section presents the conclusions

of the second research question guiding the nTPD study.

Research Question 2 Conclusions

Research question two in this study asked: *What components (discourse or*

activities) of professional development delivered in an online social networking site

do teachers identify as having professional value? Overall, teachers reported that the

nTPD activities were the most valuable component of their nTPD courselet

participation. Three characteristics describe these activities: a) the active use of the

technology tools, b) the review and sharing of resources, and c) the creation of lesson

plans. One lens that can be used to review a conclusion around this nTPD finding is

Villegas-Reimers' (2003) successful TPD knowledge type requirements. The three

nTPD activity characteristics represent all three types of knowledge-practice types

that Villegas-Reimers (2003) described are present in order for teachers to have

successful TPD experiences:

1. Knowledge in practice; as active use of technology tools.

2. Knowledge for practice; as review and sharing of resources.

3. Knowledge of practice; as lesson plan creation.

Success in TPD experiences can be described as teachers acquiring new knowledge-practice understandings which result in additions or changes to teacher practice (Putnam & Borko, 2000; Borko, 2004; Villegas-Reimers, 2003; Dede, 2004) Teachers report that their engagement with the nTPD courselet activities results in their development of teaching practice related skills. The conclusion supported by this nTPD study is that teacher participation in nTPD activities results in the development of practice-centered knowledge of the topic presented in the nTPD courselet.

The first successful TPD knowledge requirement that can be used to review the nTPD activity conclusion is the knowledge in practice requirement. The knowledge in practice requirement is evidenced in the finding describing nTPD activities as the active use of technology tools. Teachers reported that they participated in hands-on practical activities. These hands-on activities included tasks such as the use of the technology tool that was the topic of the courselet. In the robotics courselet, hands-on tasks were creating Lego-robots. For the online collaborations courselet, it was using Web 2.0 collaboration tools such as Voicethread. In the IWB courselet, the hands-on technology tool was the IWB itself. Providing teachers with opportunities to experiment, in the closed safe SNS environment, contributed to several teachers' willingness to take risks and practice online tools and develop, at least in a small way, some new understandings in practice. Teachers reported that the postings of blog and forum discussion messages, while in some ways were frustrating, resulted in opportunities to reflect on their knowledge in practices they were being presented. In summary, there is significant evidence that nTPD courselet activities provided knowledge in practice development opportunities for teachers.

The second successful TPD knowledge requirement that can be used to review the nTPD activity conclusion is the knowledge for practice. Evidence of the knowledge for practice requirement is found in the activity characteristic described as the review and sharing of resources. In Chapter 4 the review and sharing of resources by teachers was referred to as a form of digital curation. Teachers reported that they participated in the review and sharing of online resources which resulted in their acquiring knowledge for their teaching practice. Reviewing and critiquing online resources supported the development of knowledge of the courselet topic. Teachers further described the activities that resulted in this knowledge as being supported through the sharing of images and lesson plans in the courselet space. While there was a wide range in the amount of curation and sharing activities that individual teachers participated in, overwhelmingly, teachers reported this activity as one of the most important in the courselet. Teachers' comments and high valuation of the resource sharing and curation provides evidence of the knowledge for practice requirement occurring in the nTPD courselets.

The third successful TPD knowledge requirement that can be used to review the nTPD activity conclusion is knowledge of practice. The creation of lesson plans demonstrating classroom implementations provides evidence of the knowledge of practice requirement. Teachers reported that the creation and sharing of lesson plans was important as an example of their technological-pedagogical knowledge both as a lesson plan they could use as well as one that could be shared with other courselet teachers. The discussions, reflection, and ability to view the lesson plans of other teachers further supported teacher confidence and the perspectives of other teachers

implementing the same curricular topic. Teacher participation in the creating and sharing of lesson plans provide evidence of the knowledge of practice requirement occurring in the nTPD courselets.

In sum, a conclusion that can be drawn relating to research question 2 is that teacher participation in nTPD activities resulted in the development of practice-centered knowledge of the nTPD courselet topic. This conclusion is consistent with research on technology TPD (Desimone et al., 2002) describing effective TPD deliveries as ones engaging teachers in active learning as opposed to passive recipients of information. Interactions with other teachers is important for effective TPD (Desimone et al., 2002, Borko, 2004) and while discussion is reported to play a large role in some TPD deliveries – engagement in activity is the driver for teachers acquiring new teaching practices. This conclusion provides evidence of the effectiveness of a key theoretical design component of the NLF, which is the constructionist approach to activity design upon which the nTPD learner engagement is built. NTPD is different than traditional sessional or day-long, face-two-face activities in that it allows for ongoing teacher-controlled constructionist activities which are resulting in teachers' learning and incorporating new teaching strategies and knowledge into their practice. The final conclusions that can be drawn from this study's results relate to the design elements utilized in the delivery of the nTPD courselets and are presented next.

Research Question 3 Conclusions

Research question three in this study asked: *What design elements of the networked teacher professional development experience affect teacher practice*? The

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design elements available for use in the delivery of the nTPD courselet where previously described in Chapter 5 as materials, videos, reflective blogs, and file sharing. Discussion and review of the teacher reported importance for TPD learning of each of these design elements was presented in Chapter 5. The findings of this nTPD study support the conclusion that articles, file sharing, videos, and reflective blogs used in combination to deliver nTPD courselet topics result in new teacher practices.

Articles, file sharing, videos, and reflective blogs are the four nTPD design elements which are particularly important for the delivery of PD that has a positive effect on teacher practice. Articles provided in nTPD courselets included open-access, online materials, excluding videos, presenting text or media based information about the topic of the courselet. As teachers reported that the articles were the most important design element having an effect on their practice, the selection of articles demonstrating best-practices in the topic area are crucial for effective nTPD. In addition the digital curation aspect of these resources by the teachers within the SNS group highlights as well as filters these resources further for the group.

File sharing was the second design element that had a positive effect on teacher practices. Teachers reported that the shared files, primarily teacher lesson plans and supporting images, contributed to their understanding of alternative pedagogical implementations as well as direct lesson support for future lessons in the courselet topic area. Videos, which comprised the third design element, were reported by teachers to provide content knowledge, support, and pedagogical context for teachers. Videos were provided in nTPD courselet for both tutorial and exemplar purposes and

teachers commented on the potential value of using these videos for their own lesson delivery as well as to support their learning. Finally, the reflective group blog design element was reported by teachers to support their personal reflection of the courselet topic as well as understand other teachers' perspectives. The reflective blog design was particularly effective with regards to the final blog posting where teachers were asked to reflect on their courselet experience using the group blog spaces.

In closing the conclusions of this study provide evidence that nTPD is an effective way to provide technology TPD experiences. The conclusions resulting from this study are:

1. That nTPD participation results in TPD that is experiential technology focused, of the networked cognitive-apprenticeship type, having two-fold PD benefits developing TPCK knowledge and technology skills, and utilizes networked learning elements.

2. That a new networked learning affordance described as learning over the shoulders of giants is evident in nTPD courselets.

3. That teacher participation in nTPD activities result in the development of practice-centered knowledge of the topic presented in the nTPD courselet.

4. That articles, file-sharing, videos, and reflective blogs used in combination to deliver nTPD courselet topics result in new teacher practices.

These conclusions support many of the described characteristics and elements of effective and quality TPD (Borko, 2004; Desimone, 2009; Dede et al., 2009). Where TPD aims to support the development of teacher TPCK or online-networked skills, nTPD courselets are particularly useful to implement. Calls in the current TPD

literature (Hechter, Phyfe, & Vermette, 2012) continue point to the need for quality

TPD that can meet the rising TPCK support needs of teachers, with the potential of

TPCK being adopted for all K-12 learning needs (Koehler, 2011). The nTPD

instructional system appears to be one model that can meet some of these needs.

The Revised nTPD Model

As described earlier in this chapter, revisions to the nTPD model as a result

from this study originate from an evaluation of the iteration 3 nTPD courselet model.

An original oTPD learning design was developed as a result of the pilot study

described as iteration 1 of this DBR program of study (Ostashewski, 2010). DBR

iteration 2 resulted in the oTPD learning design being expanded to include a set of

design principles (Ostashewski & Reid, 2010a; 201c) as well as the development and

implementation of a custom LMS and CMS. These design principles were further

revised based on iteration 2 evaluations as well as a concerted effort to incorporate

networked learning literature during the development of the iteration 3 courselets

(Ostashewski & Reid, 2012a). As a result, the seven nTPD design principles used for

the iteration 3 included explicit networked learning tool references. The evolution of

the nTPD Courselets resulting from the DBR program of courselet research is

presented in Figure 29.

Design Based Program of Research: NTPD Courselets
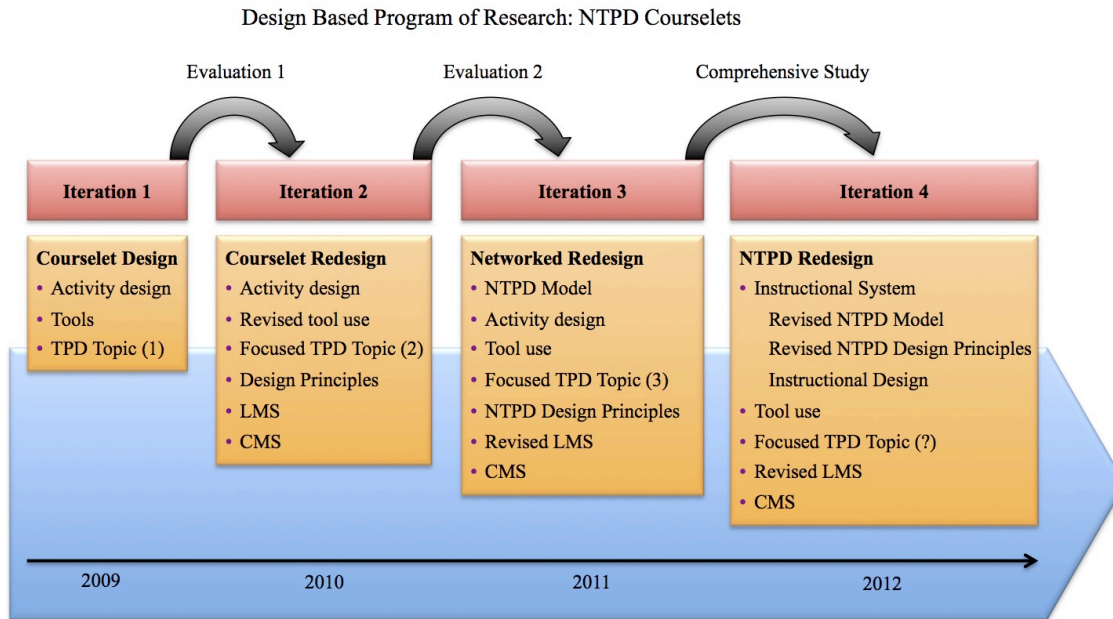
Figure 29. Design Based Program of nTPD Research

The first revision to the nTPD model is the reorganization and extension of the model into an instructional system. Figure 25, at the beginning of Chapter 5, presented the nTPD instructional system and its three elements: the model, the design principles, and the instructional design. As the goal of this study was to evaluate and present a revised nTPD model, the next three sections of this chapter present the three elements of the nTPD instructional system in their revised form. When the next iteration of nTPD courselets are designed and delivered, the following elements form the design and delivery upon which iteration 4 can be based.

Revised nTPD Model Description & Characteristics

The nTPD model makes up the first element of the nTPD instructional system. The nTPD model was discussed and its components evaluated in Chapter 4 as part of the integrated discussion of this study's findings. The revised nTPD model contains a revised set of model descriptions and one added characteristic. The revised nTPD

model, where italics has been used to highlight the revisions resulting from this study, is:

NTPD is online-delivered TPD utilizing a social networking environment that supports and promotes teacher connections while learning together, both formally and informally, allowing teachers to retain control over their time, space, presence, activity level, identity, and relationships. There are *four* key characteristics of *that make it unique*:

1. nTPD allows teachers a technology-facilitated opportunity to develop a network of relationships which they can access to support their classroom teaching practices beyond the more formal oTPD activities.

2. nTPD provides teachers with firsthand experiential learning about online social media tools such as blogs, forums, video and file sharing that affords teachers an authentic, *situated* experience of how online tools can be used in their own classrooms.

3. nTPD allows teachers to participate in professional learning that is *focused, ongoing,* just-in-time, accessible, and that is self-guided.

4. *nTPD provides opportunities for teachers to participate in networked cognitive-apprenticeship type learning taking advantage of SNS group affordances which allows them to learn over the shoulders of giants.*

Revised NTPD Design Principles

The design principles make up the second element of the nTPD instructional system. The basis for design principles revision is to increase their effectiveness in meeting the topic and supporting context requirements that will result in effective

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TPD. The conclusions arising from this study identify the specific activities and elements of the nTPD courselet that results in effective TPD for teachers. Further, the literature presented in Chapter 2 presented the key dimensions of successful TPD (Schwille, et al., 2007) and critical characteristics of successful TPD (Desimone, 2009). The addition of an online education "quality" framework (Hosie, Schibeci, & Backhaus, 2005) provides a third perspective that can be used to review the nTPD design principles. The relationship of the revised nTPD design principles to the qualifiers of successful and quality TPD are provided in Table 46.

Table 45

Evidence of Success and Quality in nTPD Design Principles

Keys for Successful TPD		Critical for Successful TPD		Quality Online Learning	
(Schwille et al., 2007)		Desimone (2009)		Hosie, Schibeci, & Backhaus (2005)	
Key	DP	Critical	DP	Quality	DP
Duration	2	Content focus	1	Authentic tasks	1, 5, 6
Form	1, 5	Active learning	2, 3, 6, 7	Collaboration	6, 7
Participation	2, 7	Coherence	4	Learner-centered	1
Content Active	3	Duration	2	Engaging	2, 3, 6
Coherence	4, 6	Collective participation	6, 7	Meaningful tasks	1, 6, 7

Note: DP= Design Principles.

From the data presented in Table 46, is can be concluded that the nTPD design principles include numerous overlapping key, critical, and quality TPD elements. Further it can be concluded that elements of quality online learning are also evident. In summary, it can be concluded, based on the literature and evaluation of the iteration 3 nTPD courselets that if designers use the revised nTPD design principles,

successful quality nTPD implementations will result.

The revised nTPD design principles are presented below, where italics has been used to highlight the revisions resulting from this study:

Design Principle 1: Design learning relevant to teacher professional practice. To do so,

1. Ensure that the resources and the learning experiences are relevant to the learner.

2. Situate learning in current teaching challenges.

3. Design the learning activities so that they lead to an outcome that can be applied in teacher professional practice.

Design Principle 2: Provide for easy access, *scheduling and interaction* flexibility, and ongoing support, by

1. Providing short focused courselets addressing specific technology issues.

2. *Designing courselets to allow for anytime, anywhere participation.*

3. Designing activities to allow for flexibility and teacher choice in activities.

Design Principle 3: Provide theoretically and pedagogically sound activities by

1. Providing a rich array of resources to support the learners' individual needs (exploration and scaffolding).

2. Supporting the teacher in linking conceptual understanding and practical application (critical thinking).

3. Providing activities that engage teachers with the content area using technology tools (active-learning).

Design Principle 4: Provide support for learners with varied experience levels by

1. Providing a scaffolded educational experience that supports learning and reflection for a variety of learners.

2. Scaffolding teacher opportunities for inquiry, engagement, and reflection.

3. Making available pre-courselet materials (in a variety of formats) to support tool use for new social networking site users.

4. *Providing synchronous administrative and facilitator support (telephone, videoconference) for new online learners.*

Design Principle 5: Provide authentic opportunities for networked learning skill development by

1. Providing external resources as primary content.

2. Designing activities to utilize *group* blog and forum contributions.

3. Providing lesson plan *templates and exemplars.*

Design Principle 6: Support sharing and discourse between learners by

1. Designing activities that focus on reflective practice, *particularly at the end of the structured activities.*

2. Designing *flexible* activities that lead to meaningful learner discourse.

3. Providing opportunities for teacher collaboration and sharing.

4. *Supporting learner exploration and discussion of other teacher materials and lesson plans.*

Design Principle 7: Support learning connections to the broader networked community by

1. Utilizing information sources external to the group.

2. *Designing activities to include digital curation tasks.*

3. Identifying and share other potential sources of content information.

The nTPD Instructional Design

The instructional design makes up the third and final element of the nTPD instructional system. The oTPD instructional design was initially articulated in publications arising from DBR iterations 1 and 2 (Ostashewski & Reid, 2010a; 2010b, 2010c; Ostashewski, Reid, & Moisey, 2011). The content analysis conducted in this study provided a detailed review of courselet records resulting in a detailed description of the instructional design of the nTPD courselets. Instructional design refers to the structure of instructional interactions and in particular the way in which the elements of the interactions are chosen and integrated into a design (Gibbons & Rogers, 2009). The instructional design of the nTPD courselets is constructivist (Bednar, et al., 1992) and constructionist (Papert, 1992) in nature. Two components of the instructional design are used to develop the learning materials and resources in courselets - learning events and learning activities.

The nTPD instructional design has two parts: the event framework describing the learning events, and the activity design describing the learning activities. Figure 30 presents the nTPD event framework showing the relationship of the collective (online resources), the SNS, the SNS group, and the four cornerstone learning events: engage, explore, discuss, and create. The event framework provides an overview of how the learning events are situated in relation to the SNS learning environment, as well as the order of the learning events that needs to be planned for in the nTPD activity design.
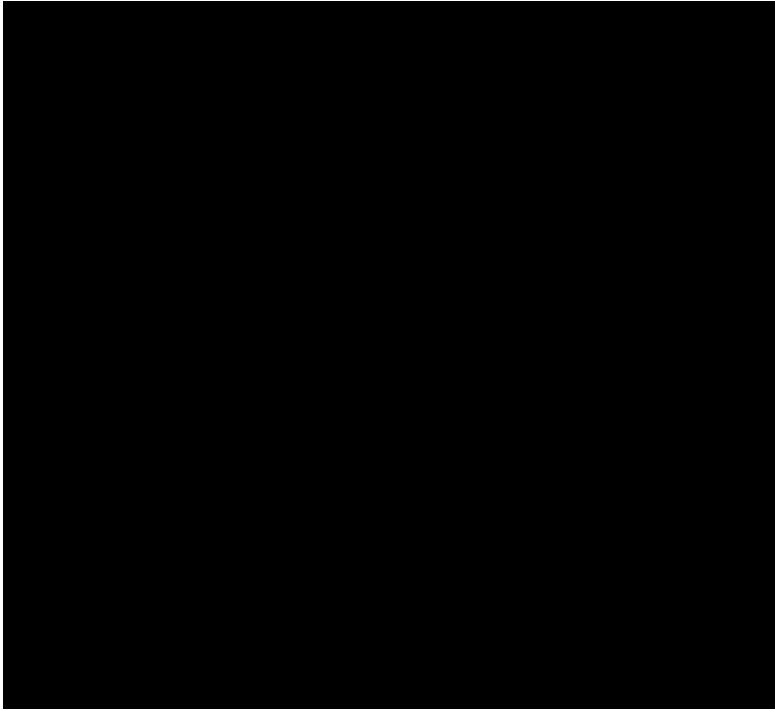
Figure 30. The nTPD Event Framework

The four cornerstone learning events of the nTPD event framework guiding the learning activities are:

1. ENGAGE with research and practices: new understandings come from learner interactions with content, environment, and other learners.

2. EXPLORE resources and strategies: cognitive conflict is a learning stimulus for determining what is learned.

3. DISCUSS ideas and potentials: knowledge evolves through reflection and social negotiation.

4. CREATE implementations and practice: networks provide opportunities for learners to construct, contribute, and validate new knowledge.

The second part of the nTPD instructional design is the nTPD activity design. Figure 31 presents the activity detailing the individual learner activities. The nTPD activity design includes a delivery timeline, learning events, learning activities, design

elements, and networked learning tools used to design the instructional interactions in the nTPD courselets. The design elements such as articles, videos, presentations, discussions, group blog, and lesson plan activities comprise the experiences that teachers participate in over the delivery timeline. In closing, the complete nTPD
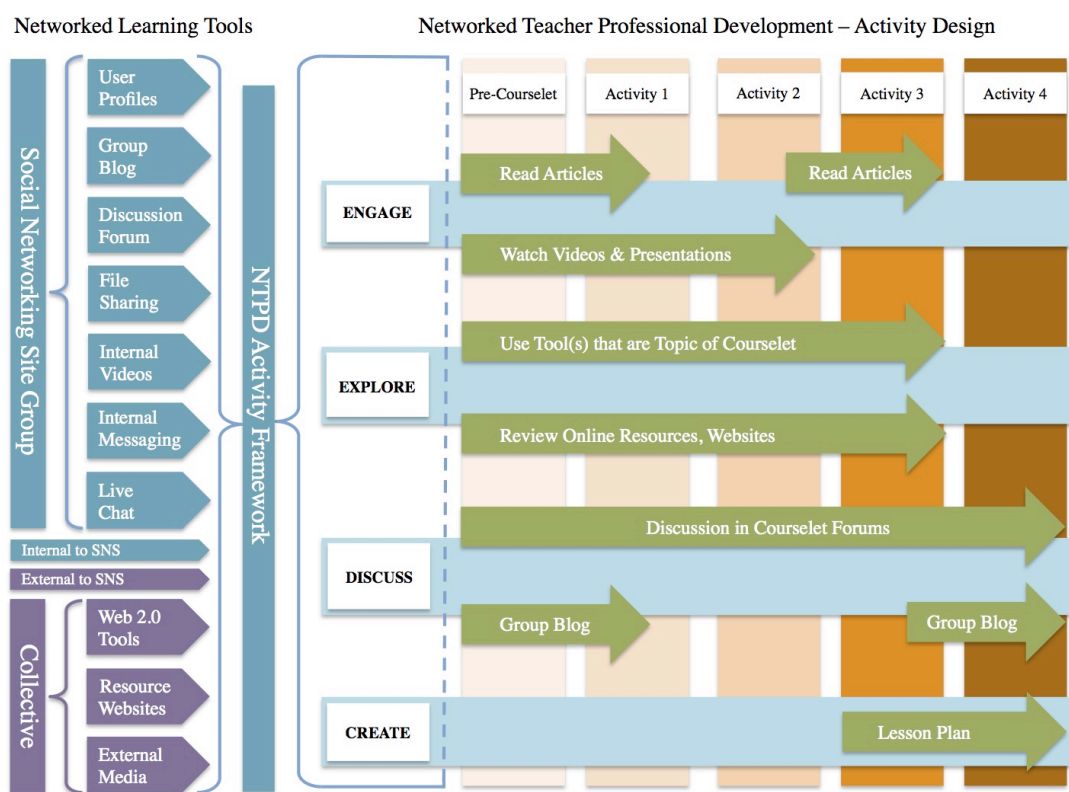
Figure 31. The nTPD Networked Learning Tools and Instructional Design instructional system presents an overview of all of the instructional aspects of the nTPD courselet. This complete system is the contribution to the fields of TPD and online education that this study makes and provides a transportable model of professional learning where learners are engaged in practice-based tasks.

Limitations of the Study

Limitations of a research study are those factors beyond the control of the researcher. In the case of this nTPD study, limitations potentially affect the

transportability of the nTPD model. One set of limitations that affect the transportability of this study relates to the sample of teachers participating in the study. While many of the 26 teachers reported that they never had participated in online education prior to taking the courselet, all of the teachers chose to participate in the nTPD courselets. The teachers who self-selected to participate indicated that they perceived that they had a high level of computer knowledge and experience, and they were motivated by interest in the courselet topic. This limits the study findings in that when teachers do not feel they have sufficient computer knowledge, they may not participate in nTPD, unless other motivations are provided. Another limitation is that teachers who participated had readily available broadband Internet both at home and at school from which to access online videos, multimedia, and to share files. This limits the study's findings to teachers in countries where broadband Internet is readily available for teachers, particularly since one of the most commonly reported strengths of nTPD is file sharing and use of online resources. A third participant limitation is that only Alberta teachers were eligible to participate, as the SNS is a professional website restricted to Alberta teachers. While these teachers are probably representative of Canadian teachers in general, teachers in other countries may not have cultures of sharing, collaboration, or peer-discussion built into their teaching practice in the same manner as Canadians. These limitations may affect the generalizability of the results to other TPD contexts, such as countries where broadband Internet is unavailable or filtered. With regards to teacher readiness to participate in oTPD, a 5 year study of 11,550 teachers in the US (Reeves & Li, 2012) reported that teachers in general: perceive oTPD to be as valuable as face-to-face

TPD, have easy access to technology, and possess the computer and technology skills for oTPD participation. Another study of world-wide broadband access (Jakopin & Klein, 2011) indicates that more and more countries around the world view internet access and bandwidth as limiters to global success and are developing access to address this need. In summary, while this study may have teacher-based limitations, the source of these limitations are decreasing over time.

Another factor limiting this nTPD study is related to the modified social network software within which the nTPD courselets in this study were delivered in. The www.2Learn2Gether.ca network is an open source software[1] implementation with a customized LMS and CMS which required significant programming customization and ongoing support to operate. Not all of the tools used in the nTPD courselets are readily available in all social networking sites and, in order to replicate all aspects of this particular SNS environment, the need to access to a programmer to develop and manage it, may make it difficult to duplicate by PD organizations. Online social software such as Facebook or LinkedIn may not be suitable for replications of this study's findings due to the content ownership restrictions or courselet management challenges. This limitation however is likely to continue to decrease in importance as new social networking sites are becoming increasingly easy to manage, host, and customize. Other SNS such as Edmodo, Ning, and LinkedIn continue to evolve (Karabulut, et al., 2009; Pferdt, 2008) and expand their offerings of tools and control to organizations interested in using them to deliver and manage internet-based content. In order to minimize this factor's impact on the nTPD study, readily available

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[1] Originally developed for an online dating website, this social networking software was sold by Boonex as the Dolphin Smart Community Builder software.

online tools such as blogs and forums, which are easily accessed at no cost online, were utilized for the core delivery design. An open source video player was integrated into the design of the LMS platform to maximize Internet browser compatibility and make it easier to replicate. Using online video hosting sites, such as YouTube or Vimeo could offer more elaborate video capabilities than were used in the nTPD design. In summary, the social networking site factor limitations of this study are expected to continue to decrease over time as more open source and inexpensive social media sites become available.

Another potential limiting factor for the transportability of the results of this study exists in the relationship between the teacher educator organization, the 2Learn.ca Education Society, and the teachers of Alberta. A trust relationship between the school boards and the teachers employed by them has been built up over the past 15 years (2Learn Education Society, n.d) this may play a positive role in the reported successes of the networked teacher professional development model. The 2Learn.ca Society has been providing ongoing direct support at no cost to teachers in Alberta as part of their funded mandate, and this open relationship between Alberta teachers and the 2Learn.ca Education Society may not exist elsewhere. The issues of quality PD, online delivery opportunities, and no cost participation may have influenced teachers' motivations to participate in the PD offerings evaluated in this study. The cost implications for profit or credit-based online PD providers wishing to replicate the model and design principles coming out of the study are significant enough to be considered as a limitation. However, oTPD is continues to be explored as a scalable, accessible TPD delivery solution around the world (Reeves & Pedulla, 2011;

Wheeler, 2009; O'Dwyer et al., 2010; Pachler, Ranieri, Manca, & Cook, 2012; Signer, 2008) and there may be many teacher organizations around the world whose TPD needs could be met by the nTPD model evaluated in this study. As other similar networked and open learner-directed online learning implementations continue to grow in access, such as MOOCs, the value of this study to provide inexpensive, scalable, quality TPD for teachers around the world provides clear support for the value of this study.

Recommendations

There are several recommendations from this study, relating to the nTPD design and delivery that can be made for future research on the topic of nTPD. The first recommendation is to study extensions of the current study to another iteration of the DBR program in the same professional social networking site. Additional DBR iterations should explore the delivery of TPD topics that are not technology focused, continuing to refine the design principles and activity design. Other iterations should explore the nTPD instructional system's delivery in other social networking sites, and also in other professional learning areas. Nursing, law, medicine, public service sectors are other areas where the overall networked professional learning model articulated in this study may also be applicable.

One area of research in the oTPD literature that is missing continues to be a definitive description of what quality online TPD looks like. Developing an instrument to support the concept of quality nTPD or oTPD would be valuable to instructional designers. The identification of the specific characteristics of what

quality networked professional learning would be valuable for many online and distance education applications. Blended or hybrid deliveries of TPD would also be an area for future research related to nTPD. The initialization of nTPD courselets with asynchronous online activities, using online conferencing software, or by including blended delivery components to support teacher networking are other areas that require further research.

An area of TPD that continues to be an interest in the literature is how to adequately support novice teachers at the beginning of their careers. The potential value of nTPD to connect early career teachers with their recent university peers may be a particularly good application for the nTPD model, delivering beginning teacher support via nTPD opportunities. A final recommendation is that the role and requirement of the administrator or facilitator of online-networked learning be explored and described. While online education is becoming more and more accepted as a viable delivery (Allen & Seaman, 2011), additional research guiding the delivery of online education using well designed and developed materials is needed.

In summary, this study has made an attempt to provide some evidence of what nTPD looks like, what are the outcomes and affordances of nTPD learning, and how it might be designed and delivered effectively. Future research can potentially extend the findings of this study to other professional learning areas as well as continue to refine this form of networked learning.

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APPENDIX A: SURVEY INSTRUMENT

Online Survey Instrument
Delivered by password protected online survey

Teachers' learning and experiences in an online professional development courselet.

Hello! I am a researcher who would like to discover what educators experience when they participate in online teacher professional development activities. I hope you will be willing to help by responding to the 46 questions included in this survey. This survey will take approximately 20 minutes to complete and needs to be completed in one sitting. Please answer the questions you feel comfortable responding to, and please be aware that until you click the submit button at the end of the survey, no data has been saved. At a later date, should you choose to withdraw from the study, please send me an email and I will remove the data collected in this online survey.

I. You and your Teaching Situation (13 questions)
Please provide the following information about your teaching assignments and computer use.

1. Please type your primary e-mail address here:
I will use this information only to differentiate your set of responses from someone else's, and to notify you when study results are available for your review in 2009. Your email address is held in confidence and will only be used to contact you with regards to this study.

If you are willing to participate in a short 30 minute interview with the researcher about your participation, please include your name here as a potential interviewee.

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2. Grade level(s) currently taught: (check all that apply)

℮	Pre-Kindergarten	℮	6th grade	℮	Undergraduate
℮	Kindergarten	℮	7th grade	℮	Graduate
℮	1st grade	℮	8th grade	℮	Community College
℮	2nd grade	℮	9th grade	℮	Teacher inservice
℮	3rd grade	℮	10th grade	℮	Other teacher ed.
℮	4th grade	℮	11th grade	℮	Other higher ed.
℮	5th grade	℮	12th grade		

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3. Other level(s) taught previously: (Please click all that apply.)

☉	Pre-Kindergarten	☉	6th grade	☉	Undergraduate
☉	Kindergarten	☉	7th grade	☉	Graduate
☉	1st grade	☉	8th grade	☉	Community College
☉	2nd grade	☉	9th grade	☉	Teacher inservice
☉	3rd grade	☉	10th grade	☉	Other teacher ed.
☉	4th grade	☉	11th grade	☉	Other higher ed.
☉	5th grade	☉	12th grade		

4. Curriculum or subject areas that you currently teach or previously taught: (Please click all that apply.)

Curriculum/Subject	Teach Currently	Taught Previously
Language Arts/English	☉	☉
Mathematics	☉	☉
Social Studies/History/Geography	☉	☉
Science	☉	☉
Foreign Language/Language other than English	☉	☉
English as a Second Language	☉	☉
Art	☉	☉
Music	☉	☉
Drama	☉	☉
Physical Education	☉	☉
Health/Family Studies	☉	☉
Speech/Debate	☉	☉
Study Skills	☉	☉
Life Skills	☉	☉
Vocational/Technical	☉	☉
Computer Skills/Multimedia Development/Television	☉	☉
Religion	☉	☉

Service Learning	ͤ	ͤ

5. Total number of years of teaching experience: [ ]

6. Type of formal preparation to become a teacher: (Please choose the one best answer from the list below)

- jn　College or university undergraduate teacher preparation program
- jn　College or university graduate teacher preparation program
- jn　College or university after-undergraduate certification program
- jn　Alternative certification program
- jn　College or university program other than teacher preparation
- jn　Credit for experience working in educational situations
- jn　Other -- Please specify: [ ]

7. Gender: jn　Male　jn　Female

8. Age

[ ]

9. What type of school setting do you presently teach in (Please choose only one answer.)

- jn　Rural (country)
- jn　Urban (city)
- jn　Online Environment
- jn　Other

10. Which of the following have you used with your students and/or by yourself? (Click all that apply.)

Application	Use with students	Use myself
electronic mail (email)	ͤ	ͤ
Computer-based conferencing (e.g., WebBoards, Web forums, e-groups, listserve)	ͤ	ͤ
World Wide Web pages/sites that others created	ͤ	ͤ
World Wide Web pages/sites that my students and/or I created	ͤ	ͤ
realtime text chat (e.g., IM, chat rooms)	ͤ	ͤ
Interactive whiteboards	ͤ	ͤ

Audio or video conferencing	e	e

11. How would you describe your level of comfort with the use of a desktop or laptop computers in general?

- j Very comfortable
- j Somewhat comfortable
- j Neutral
- j Somewhat uncomfortable
- j Very uncomfortable

12. My participation in online professional development activities occurred primarily from:

Home   j

School   j

13. I have access to high speed internet for participation in online professional development activities from:

Home   j

School   j

Both   j

14. To access the online professional development activity, I used computers located at:

Home   j

School   j

Both   j

15. What are other types on teacher professional development that you have participated in? (Please choose all that apply)

- j One-hour sessions
- j Half-day workshops
- j Full-day workshops
- j School-based Professional Learning Communities
- j Alberta Teachers Association Institutes
- j University courses (beyond Bachelor of Education degree requirements)
- j Other -- Please specify:

II. Your Online Professional Development Experience (10 questions)
Please answer the following questions about your previous experience participating in online professional development activities such as online courses.

Section Question: Have you ever participated in any online professional development previous to your participation in the 2Learn.ca courselet occurring May 25th to June 21st, 2009?

YES – proceed to question 16
NO – proceed to question 22 of the survey

16. My previous participation in formal online professional development activities was in the following manner (list all that apply)

Online University course	jn
Electronic Listserve	jn
Online Professional Learning Community (PLC)	jn
Webinar or webcast	jn
Other	jn

If Other, please describe: _____

17. While participating in online professional development activities, I feel that I learned something that related to my practice of teaching, or to teaching in general.

Strongly agree:	jn
Agree:	jn
Neutral	jn
Disagree:	jn
Strongly Disagree:	jn

18. Participating online professional development activities has changed my teaching approaches or practices.

Strongly agree:	jn
Agree:	jn
Neutral	jn
Disagree:	jn
Strongly Disagree:	jn

19. I have regularly encouraged other teachers to participate in online professional development activities.

Strongly agree: j·n

Agree: j·n

Neutral   j·n

Disagree: j·n

Strongly Disagree: j·n

---

20. What do you feel are the ***advantages that your previous*** online professional development activities had over other types of teacher professional development?

---

21. What do you feel are the ***disadvantages that your previous*** online professional development activities had over other types of teacher professional development?

Section Question: Please complete the following section referring to your online teacher professional development experience in the **2Learn.ca courselet** from May 25th to June 21st, 2009.

22. I decided to participate in the 2Learn.ca online professional development courselet because I thought that these would be valuable learning experience that related to my practice of teaching, or to teaching in general.

Strongly agree: j·n

Agree: j·n

Neutral   j·n

Disagree: j·n

Strongly Disagree: j·n

---

23. My decision to participate in the 2Learn.ca online professional development courselet was primarily because of the topic being presented.

Strongly agree: j·n

Agree: j·n

Neutral   j·n

Disagree: j

Strongly Disagree: j

---

24. My decision to participate in the 2Learn.ca online professional development courselet was primarily because of the delivery method of the activity.

Strongly agree: j

Agree: j

Neutral j

Disagree: j

Strongly Disagree: j

---

25. My participation in the 2Learn.ca online professional development courselet has changed my teaching approaches or practices.

Strongly agree: j

Agree: j

Neutral j

Disagree: j

Strongly Disagree: j

---

26. I would encourage other teachers to participate in 2Learn.ca other online professional development courselets.

Strongly agree: j

Agree: j

Neutral j

Disagree: j

Strongly Disagree: j

---

27. I feel that my access to the professional development activity was increased due to the online delivery format of the 2Learn.ca online professional development courselet.

Strongly agree: j

Agree: j

Slightly Agree: j

Slightly Disagree: j

Disagree: j

Strongly Disagree: j

---

28. I am able to participate in this type of month long professional development activity only because it is delivered online.

Strongly agree: jn

Agree: jn

Neutral   jn

Disagree: jn

Strongly Disagree: jn

---

29. I have improved my technology skills as a result of being involved with the 2Learn.ca online professional development courselet.

Strongly agree: jn

Agree: jn

Neutral   jn

Disagree: jn

Strongly Disagree: jn

---

30. I am motivated to try new technology activities by participating in the 2Learn.ca online professional development courselet.

Strongly agree: jn

Agree: jn

Neutral   jn

Disagree: jn

Strongly Disagree: jn

---

31. My participation in the 2Learn.ca online professional development courselet helped me to feel more connected with other teachers around the province.

Strongly agree: jn

Agree: jn

Neutral   jn

Disagree: jn

Strongly Disagree: jn

---

32. I feel that my access to the professional development activity was increased due to the online delivery format of the 2Learn.ca online professional development courselet.

Strongly agree: jn

Agree: jn

Neutral   jn

Disagree: jn

Strongly Disagree: jn

---

33. I have a lot of experience with online social network sites.

Strongly agree: jn

Agree: jn

Neutral   jn

Disagree: jn

Strongly Disagree: jn

---

34. I found the conversations with other teachers in the 2Learn.ca online professional development courselet resulted in new educational tactics I will use in the classroom.

Strongly agree: jn

Agree: jn

Neutral   jn

Disagree: jn

Strongly Disagree: jn

---

35. I feel that the video examples of technology use provided in the 2Learn.ca online professional development courselet were important to the online courselet.

Strongly agree: jn

Agree: jn

Neutral   jn

Disagree: jn

Strongly Disagree: jn

---

36. I feel that the instructor video introductions provided in the 2Learn.ca online professional development courselet were important to the online courselet.

Strongly agree: jn

Agree: jn

Neutral   j🔘

Disagree: j🔘

Strongly Disagree: j🔘

---

37. The online discussion forums were critical to my success in the 2Learn.ca online professional development courselet.

Strongly agree: j🔘

Agree: j🔘

Neutral   j🔘

Disagree: j🔘

Strongly Disagree: j🔘

---

38. The delivery of the online professional development courselet within an online educational network was motivational.

Strongly agree: j🔘

Agree: j🔘

Neutral   j🔘

Disagree: j🔘

Strongly Disagree: j🔘

---

39. What do you feel are the *advantages the* 2Learn.ca online professional development courselet had over other types of teacher professional development you have participated in?

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40. What do you feel are the *disadvantages* that the 2Learn.ca online professional development courselet had over other types of teacher professional development you have participated in?

---

41. What was your most valuable learning experience (if any) that was a result of your participation in the 2Learn.ca online professional development courselet?

---

42. What was a source of frustration (if any) that was a result of your participation in the 2Learn.ca online professional development courselet?

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┌──────────────────────────────────────────────┐
│                                              │
│                                              │
│                                              │
└──────────────────────────────────────────────┘
```

43. What component of the 2Learn.ca online professional development courselet contributed most to your learning about the technology topic presented?

```
┌──────────────────────────────────────────────┐
│                                              │
│                                              │
│                                              │
└──────────────────────────────────────────────┘
```

44. My participation in the 2Learn.ca online professional development courselet helped me to understand more about the processes for acquiring knowledge and skills in the online format.

Strongly agree: ȷ◌

Agree: ȷ◌

Neutral   ȷ◌

Disagree: ȷ◌

Strongly Disagree: ȷ◌

45. Discussions that I participated in or read in the 2Learn.ca online professional development courselet allowed me to reflect on my own teaching practice.

Strongly agree: ȷ◌

Agree: ȷ◌

Neutral   ȷ◌

Disagree: ȷ◌

Strongly Disagree: ȷ◌

46. I feel that participating in 2Learn.ca online professional development courselets is an effective way in which I learn to incorporate ICT into my teaching practices.

Strongly agree: ȷ◌

Agree: ȷ◌

Neutral   ȷ◌

Disagree: ȷ◌

Strongly Disagree: ȷ◌

I appreciate the valuable information that you have shared with me!
Please take a moment to check back over all of your answers, making any and all changes that you would like to make. When you are sure that you have answered all of the questions, and answered them in the ways that best reflect your thoughts, feelings, and experiences, please click the SUBMIT button below.

Thanks again for helping me to understand your experiences with the 2Learn.ca online professional development courselet and once the research is completed I will email you to share our results with you!

Nathaniel Ostashewski

APPENDIX B: INTERVIEW INSTRUMENT

Semi-structured Interview Protocol

Thank you for meeting with me. I have some questions to ask about your participation with the 2Learn.ca courselet. These questions are part of the research study I am conducting looking at online teacher professional development, factors which affect those experiences and the relationship between the factors and experiences. This study is particularly interested in your views of the online teacher professional development and the courselet you were involved with.

What you tell me will be anonymous and remain confidential. I hope you will feel free to be very candid in your responses. I have an audio recorder strictly for accuracy and completeness. I will not be identifying individual names with comments in any reports. You are free to withdraw from this study at any time.

Personal Experience & Demographics
1. What is your current teaching employment?
2. What previous experience with the technology topic that was presented in the online professional development activity?
3. What led you to become interested and involved in this online professional development activity?
4. What was involved in your participation in this online professional development activity?
5. Have you been involved in an online course before? If so, how did it compare with what was required for this courselet?
6. Overall, has studying this topic online been a fulfilling or frustrating experience?
7. In what ways was it a valuable professional development experience?
8. In what ways was it a frustrating professional development experience?
9. Would you choose to take another online professional development activity? Why or why not?
10. What do you see as the future for online professional development in Alberta?
11. Do you feel that there was adequate time during the courselet for your participation? Would you like to see more/less time?
12. What do you feel was the value of the media segments that were provided in the courselet?
13. Any other comments you would like to make regarding your courselet experience?

APPENDIX C: Document and Record Examples

A) Document Example of teacher Lesson Plan

Lesson Plan

Name: D4
Grade / Course: *Options – comparing and integrating technologies*

Lesson Summary:
Students will be able to use one technology to compare it with another.
I will show the students how to use imovie using their ipads and ipods and they will comment on it's many uses and functions through the voice thread. The one drawback is that you cannot do voice thread on the ipad, so you'll need a computer as well.

Lesson Objective:
To provide students with 2 forms of technology to demonstrate their learning.
Imovie &Voice Thread

Materials Teacher
Smartboard
Ipods & Ipads (new os 5 software to run imovie)
- http://voicethread.com/#q.b409.i848804   (great link for explanation on voicethread)
- demonstrate video & audio creation , text commenting, net etiquette as well
- Imovie : youtube
  - http://www.youtube.com/user/nyvs?v=c4QxUzsA9BM&feature=pyv (basic)
  - http://www.youtube.com/watch?v=1arDcSJcc54&feature=related
    - Splicing (red arrow – slide down)
    - Delete: double click

Materials Student
Computer Lab, & Ipads – download imovie $4.99 from Itunes

Intended Learning Outcomes
- Students will learn about voicethreads , make comments on it's possible usuages
- Students will learn about imovie

Instructional Activities
Teacher will give quick video clip on voicethread (see link above) and jump into how to create movies in imovie on Ipads. 15 minute presentation & how to use it.
- Title, add video, pictures, music, slice, audio record
- Autobiography: Model mine

- have students will create short biography on themselves - (30 min)

Instructional Activities (continued)

Students will watch short video clip on voicethread, then receive on instruction on imovie for ipads. Students will work on autobiography, capturing themselves as video.

Learner Assessment
    Students will demonstrate the many uses of imovie and incorporate;
    Music from tool box
    Music from from playlist
    Video recording
    Recording audio and inserting in video
    Splicing
    Delete
    Add texte
    Saving to itunes

Voice Thread
    Students will demonstrate it's many tools by;
- inserting their picture
- commenting through texte, audio and video

B) Document Example of Robotics courselet Image file

C) Forum Analysis Coding Scheme details

Profession-centered technology learning reported by teachers who participate in nTPD
four key themes: (Term: technology, online, networking)
- learning how to use technology tools,
- learning about online learning,
- learning about the power of teacher networking
- learning new technology-integrated pedagogical approaches.

Blog
- very valuable for teachers new to blogs,
- old or forced blogs were not very valuable to teachers experienced with blogs.

Components of professional development delivered in nTPD that teachers identify as
having professional value fall into two categories & four themes
- discourse that is valuable,
- discourse that is frustrating,
- activities that is valuable,
- activities that is frustrating

Discussion – Discuss (pedagogy, potential use, tool, social networkingish)
Discussion – Valuable (Informative, collaborative, supportive, social networkingish)
Discussion – Frustration (Not enough participation, timeline issues, lack of depth)
Discussion – Connected

Articles, as a factor of the nTPD experience (Term: Article, Resource)
- Resource sharing was very valuable
- article for me was not beneficial

Videos (Term: Video)
- videos were very helpful to understand how to participate in the courselet
- videos were good for providing classroom technology exemplars.

Discuss: pedagogy
- common educational topics to be very informative

Valuable: potentials
- creation of new ideas and perspectives
- valued resources being created and shared

Frustrations: Questions & Answers (access support and clarifications)
- lack of discussion (not participating in discussions) – Not many questions
  answered
- lack of depth in the courselet discussions where other courselet participants
  seemed to be posting their opinion and that rather than discussions was more like
  people completing their homework

APPENDIX D: Courselet Promotional

Materials

Would you like to participate in a Professional Development activity that is relevant for your classroom right now?

What is a Courselet?

A courselet is a Professional Development opportunity that allows teachers to participate and collaborate anytime and anywhere, using 2Learn.ca's online professional community, **www.2Learn2Gether.ca**.

Participants registered in any 2Learn.ca Courselet that commences February 22, 2011 will be entered in to win one of three Personal iPads!

Courselet: **ONLINE COLLABORATIONS IN THE SECONDARY CLASSROOM**

> **Participants:** Teachers and Administrators
>
> **Courselet Begins:** Tuesday, February 22, 2011
>
> **Courselet Ends:** Friday, March 25, 2011
>
> **Courselet Details:**
> This 2Learn.ca courselet provides teachers with an opportunity to develop their understanding and skills in creating online collaborative activities.
>
> The topics covered include using blogs and wikis for text-based collaborations, and tools such as Voicethread for multimedia collaborations. Participants will explore the uses of these collaborative tools and to develop a core understanding of how to implement them in meaningful classroom activities. The identification of resources and development of shared resources or lesson plans culminate the activities in the courselet.
>
> Upon completion teachers will have developed a core understanding of online collaboration practices and receive resources for classroom use.
>
> **Upon Completion:**
> Participants who complete 4 activities in this courselet will receive a Certificate of Completion and a chance to win an iPad.
>
> **To Register:** To register or to request more information, email **Jocelyn@2Learn.ca**

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www.2Learn2Gether.ca

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MEMORANDUM

Athabasca University
Canada's Open University™

DATE: March 8, 2011

TO: Nathaniel M. Ostashewski

COPY: Dr. Rick Kenny (Research Supervisor)
              Janice Green, Secretary, Research Ethics Board

FROM: **Dr. Simon Nuttgens, Chair, Research Ethics Board**

SUBJECT: Ethics Proposal #10-70 *"Networked Teacher Professional Development: Assessing K-12 teacher professional development delivered within a social networking framework"*

Thank you for the revised application in response to the Board's Conditional Approval of February 23, 2011. On behalf of the Athabasca University Research Ethics Board, I am pleased to advise that this project has now been granted **FULL APPROVAL** *on ethical grounds, and you may proceed immediately once the items below have been addressed for file purposes only (further review not required).*

Please use the attached *(most recently reviewed) version of the application* ***to make revisions and resubmit the entire application,*** *showing the additional changes on the documents by highlighting in yellow. The following minor changes to the informed consent documentation are required for participant clarification purposes, to match what was stated on the application form:*

Appendix D – Participant Letters of Informed Consent:

1. **Request for Study Participation** *(Teachers)* –

   a. *In the body of the information letter, at the beginning of the paragraph directly below the 3 bullets add a voluntariness statement: "Your decision to participate or not to participate in the research study will in no way affect your current or future relationship with 2Learn.ca Education Society."*

   b. *Same paragraph: add to the existing first sentence to indicate that consent to participate means not only will the courselet postings be viewed, but they will be included in analysis and parts may be cited without identifiers in the study reporting; and*

     c. *In the Consent statement at the end, to be copied and pasted to e-mail: modify item A) to indicate the inclusion in analysis and possibility of citation without attribution.*

   2. **Request for Study Participation *(Facilitator)*** *–*

     a. *Body of the information letter, at the beginning of the paragraph directly below the 5 bullets add a voluntariness statement: "Your decision to participate or not to participate in the research study will in no way affect your current or future relationship with 2Learn.ca Education Society."*

     b. *Same paragraph, add to the existing first sentence to indicate that consent to participate means not only will the courselet postings be viewed, but they will be included in analysis and parts may be cited without identifiers in the study reporting.*

*The approval for the study "as presented" is **valid for a period of 12 months from the date of this memo***. *If required, an extension must be sought in writing prior to the expiry of the existing approval.*

A final Progress Report (form) is to be submitted when the research project is completed. *The reporting form can be found online at* *http://www.athabascau.ca/research/ethics/.*

As you progress with implementation of the proposal, if you need to make any changes or modifications please forward this information to the Research Ethics Board as soon as possible. If you have any questions, please do not hesitate to contact *rebsec@athabascau.ca*