

Running Head: GRASSROOTS PROFESSIONAL GROWTH

Grassroots Professional Growth:
Inquiring into the Effectiveness of a Locally Constructed Professional Development Model
for Rural Teachers

by
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A thesis submitted to the Faculty of Graduate Studies of
the University of Manitoba
in partial fulfillment of the requirements of the degree of

DOCTOR OF PHILOSOPHY

Faculty of Education
University of Manitoba
Winnipeg

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Abstract

Rural school divisions in Canada, if they can be spoken of as a collection, consist of extremely diverse groups of people, living in varied geographical settings, with unique community strengths and challenges. The provision of professional development (PD) for rural teachers is one area in which rural school divisions face particular challenges due to the contexts in which they operate. Issues relating to funding, geography, staffing, and local contextual differences impact the ability of rural divisions to provide effective PD for their teachers. The research described in this thesis sought to address the problem of *how* rural school divisions and teachers might go about creating models of PD that lead to the provision of effective and meaningful PD for teachers, and that mitigate the challenges faced in providing effective PD locally. Through a qualitative, single case study design, the research study inquired into the effectiveness of one locally constructed teacher PD model (the Numeracy Cohort) implemented in a small rural school division in Manitoba in order to address the research problem. The study focused on three questions: (1) To what extent (if at all) is the specific locally constructed PD model utilized in the rural school division able to mitigate the challenges faced by the rural division and its rural teachers in accessing meaningful PD?, (2) To what extent (if at all) is the model effective in terms of supporting teachers' professional growth in the area of mathematics instruction and student numeracy?, and (3) How do social constructivist principles contribute to teacher professional growth through the locally constructed rural PD model? Findings suggested that the Numeracy Cohort model was able to mitigate several challenges faced by the rural division and its teachers in accessing and providing meaningful teacher PD. Moreover, several effective characteristics of the teacher PD model were identified, including social constructivist principles that contributed to teacher professional growth. While findings are not generalizable,

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they may be transferable to comparable contexts, thereby providing important considerations for those interested in designing and evaluating teacher PD models for rural teachers.

Keywords: rural teacher professional development, rural teacher PD, rural challenges, effective PD, rural PD models, social constructivist teacher PD

Acknowledgements

First, I would like to acknowledge my advisor, Dr. Thomas Falkenberg. You have been my advisor, my supporter, my counselor (at times), and my friend during this difficult process. Without your expertise, encouragement, and compassion, this would not have been possible. Thank you from the bottom of my heart.

I would like to acknowledge the other members of my doctoral committee, Dr. Dawn Wallin, Dr. Donna Martin, and Dr. Allan MacKinnon (external), who spent countless hours reading and providing feedback about the thesis and my research. I would also like to acknowledge Dr. Dauna Crooks, who served on my committee up until the final year of completion. The input from all of you has been extremely valuable, and has helped make this research the best it can be. Thank you for your gifts of time, energy, patience, and support.

I would like to thank the participants in the research study, including the rural teachers, principals, and superintendent who were so open to participation, and who contributed to significant new knowledge in the field of rural teacher PD. This would not have been possible without you.

Finally, I would like to thank my family. You understood when I spent hours at the computer, away from you. You listened to my agonizing over details and stresses. You supported me in my excitement about my research, through my difficult battle with cancer during this process, and through my return to academic work following treatment. You were there for me, and this work belongs to you just as much as it does to me. Thank you so much for your love and support. I love you with all of my being.

Dedication

For **Gregory Cecil Jones**
my father
June 25, 1953 – Aug. 13, 2011

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Chapter 1 - Introduction

The research study reported upon in this thesis is focused on rural teacher professional development (PD). The qualitative, single case study describes the impact of a locally constructed teacher PD model within the context of a small rural school division in Manitoba. The model was designed specifically to meet the unique needs of the rural teachers employed within the division in the area of mathematics instruction and student numeracy. It was also designed to mitigate the local challenges faced by the division¹ and its teachers in terms of providing and accessing meaningful teacher PD. The purpose of the research study was to investigate the effectiveness of the PD model in three areas: mitigating the challenges faced by the division and its teachers in providing and accessing meaningful teacher PD, supporting teachers' professional growth in the area of mathematics instruction and student numeracy, and incorporating social constructivist principles in order to promote and support teacher professional growth. As such, the research questions addressed in the study were: (1) To what extent (if at all) is the specific locally constructed PD model utilized in the rural school division able to mitigate the challenges faced by the rural division and its rural teachers in accessing meaningful PD?, (2) To what extent (if at all) is the model effective in terms of supporting teachers' professional growth in the area of mathematics instruction and student numeracy?, and (3) How do social constructivist principles contribute to teacher professional growth through the locally constructed rural PD model? In addition to providing valuable information to the rural

¹ At times, I use the term "division" in this thesis to refer to the geographical and organizational structure of the school division in the study, at other times, the term refers to the people that act within the organization, such as the senior administration, trustees, and/or other employees. Anthropomorphism is used in other cases as well, for example in reference to the locally constructed PD model. The use of such anthropomorphism is commonly used in the field of education.

school division that implemented the model about the model's effectiveness, the research study also provides the Ministry of Education in Manitoba and others interested in the challenges faced by rural school divisions and teachers in accessing and providing meaningful teacher PD with insight into some of the challenges faced in rural contexts in Manitoba. Not much has been written about accessing and providing teacher PD in rural contexts, particularly in Canada. The research study described in this thesis adds to the body of literature on teacher PD by providing a lighthouse example of a grassroots effort to improve teacher PD within a rural Canadian context.

The thesis has been titled *Grassroots Professional Growth* for several important reasons. The term *grassroots*, itself, has several meanings associated with it, including being linked to: the common person in an organization, rural areas or the people that come from rural areas, and the origin or birthplace of something (grassroots, 2017). The PD model that was the focus of this study can be described as grassroots in all three of these ways. As well as being designed within and for a rural context, the PD model was conceptualized collaboratively between a teacher and the superintendent of the division. It was also completely original, and drew on the inherent strengths of the rural context in order to mitigate challenges faced by the division and its teachers. The PD model literally grew from the bottom up, and was supported by (and intertwined with) its rural roots. The research study described in this thesis inquired into the effectiveness of this grassroots PD model both in terms of affecting teacher professional growth, and in terms of mitigating the challenges faced within the rural context in which it was conceptualized.

This first chapter of the thesis provides a thorough background to the study, including: my own background as a researcher, how I became focused on the issue of teacher PD, how I came to identify the research problem, how the local PD model was developed, and why I

decided to research it. The first chapter also includes a statement of the research problem, a brief consideration of the importance of the research within the field, and a description of the thesis's organization.

Background to the Study

It is important to consider the background to the research study in order to frame its evolution as a qualitative research study. By considering my own background as a researcher, and the series of events that led to the generation of the research study, the context in which the study evolved becomes evident. In alignment with social constructivist learning theory, I believe that my own learning as a researcher is inextricably linked to both the context in which the research takes place, and the prior experiences and beliefs I bring to the research process. By describing my background and experiences, I share some of the variables that shaped both the study and my learning as a researcher.

Researcher's Background

My background experiences in rural places have had, and continue to have, a profound impact on my positioning as a researcher. I am currently a teacher educator in the Faculty of Education at Brandon University, an institution with strong ties to rural communities and schools in Manitoba. Prior to my position at Brandon University, I spent twenty years as a rural teacher, teaching in three different rural divisions: one in northern Manitoba for five years, and two in south central Manitoba for three years and twelve years respectively. As well, prior to becoming a teacher, I spent thirteen years as a student in a rural school division just outside of Winnipeg, Manitoba. I mention these parts of my background for three important reasons. First, I have no experience teaching in an urban centre, and but for a few sporadic years, have limited experience

living in an urban centre. Second, my experiences growing up, living, and eventually teaching in rural communities have led to a significant appreciation for rural communities and the people who live and work within them. Finally, having experienced four different rural school divisions, as well as the communities of which they are a part, I have developed an appreciation for the unique contexts that exist in different rural places. I acknowledge that while rural communities are often referred to collectively, they are, in fact, not homogeneous, but rather beautifully heterogeneous and unique in their own right.

In 2006, I began my Master's program, and in 2010, I began my Ph. D. program through the University of Manitoba. Over the past several years, I have experienced significant dissonance as I have attempted to reconcile my rural lifestyle and career with my professional and academic identities. While my identity as a rural teacher and community member were comfortable for me, largely due to my background and the several positions I have held in rural places, I found myself having to re-conceptualize my own identity as a postgraduate student, educator, and university faculty member within the broader educational community outside of my rural context. For me, the juxtaposition between the familiar context that existed within my rural communities, schools, and professional life; and the more unfamiliar contexts of urban-centred educational policy and university academia, provided fodder for personal growth. The contrast led me to think, sometimes intensely, about the differences between rural and urban contexts, lifestyles, education, teachers, professionalism, and PD. This vein of growth has had a profound impact on who I am as a person, educator, and researcher; and as such, contributes to the foundation on which the research study is constructed.

In addition to my background living and working in rural communities, and the dissonance I felt between rural and urban contexts, I have also experienced significant challenges

to engaging in my own professional growth as a rural educator. As a graduate student, attending university courses was difficult, necessitating three hours travel to attend evening courses, and relocation to Winnipeg to attend summer courses. Logistically, it was often not possible for me to fully take advantage of the academic culture and opportunities available at the university. As a rural teacher, attending PD opportunities in urban centres necessitated significant travel time outside of the rural communities in which I worked and lived. While in northern Manitoba, attending PD sessions often required a day of travel each way, completely uprooting everyday life. Financially, I have experienced restrictions as both school budgets and my own personal finances have been stretched in order for me to attend PD opportunities, and like many other rural educators, I have personally experienced difficulties finding substitute teachers to teach my classes as I engaged in professional growth opportunities. I have experienced difficulty finding PD that related to my workload, and have talked to many of my colleagues over the years about this difficulty within our rural context(s). These first-hand experiences have profoundly impacted how I view both rural education and teacher PD. Moreover, they offer a unique lens through which I view this study as a researcher.

Becoming (more) Focused on Teacher PD

Seven years after beginning my last teaching position in a division in southern Manitoba (in 2010), my interest in the professional development of teachers gained tremendous focus when I took on the position of chair of the local union PD committee. The chair position required me to participate in Manitoba Teachers' Society activities, as well as work collaboratively with a school division committee to plan PD activities for teachers in the division. Along with teachers from each school in the division, the committee included the superintendent and student services coordinator, the division's only two upper administrative positions. This experience was

invaluable, as it acquainted me with financial matters surrounding the funding of PD both within the division, and within the province. Moreover, the experience allowed me to understand how PD was being planned, and helped me develop a much closer relationship with other colleagues interested in PD than might otherwise have been possible.

In 2011, I entered the division's leadership development cohort, a new endeavour led by the superintendent in promoting the development of leadership capacity at all levels in the division. It was during this time that I began to see myself as a teacher leader, and to consider the potential of teacher leaders to promote improvement in rural schools and school divisions. Between my PD committee involvement, and my participation in the division's leadership development cohort, I found myself having frequent conversations with my superintendent about teacher PD, rural challenges, and system change. During these conversations, ideas were exchanged, and possibilities were considered, charting a course for divisional change in the area of teacher PD.

Initial Identification of the Problem

As previously mentioned, I began my Ph.D. in 2010, precisely at the same time I became PD chair in the school division in which I was working. Throughout my doctoral program, I studied topics such as rural education, barriers faced by rural teachers in accessing PD, teacher leadership, organizational change, characteristics of effective PD, educational finance, adult learning, and blended learning. One of my very first courses in my doctoral program was a course focusing on critical research methods in education. As part of the course, I was asked to think of a social justice issue in my own context, and to develop an action plan for addressing the issue. At the time, I was the local union PD chair and joint divisional/union PD committee chair, and PD was at the forefront of my mind. I had been frustrated by the inequities teachers within

my division had experienced in accessing meaningful PD, and had noticed through my conversations with other rural educators that these inequities existed in other rural divisions as well. As a result, I began to think about what the specific challenges were that rural teachers faced, as well as how some of these challenges might be overcome. Moreover, I also began to think about what models of PD existed within the province and rural schools, and about what made them effective or ineffective in terms of teaching and learning. I chose this topic for my action plan in the course, and my interest in this issue continued to grow. I found myself coming back to this issue in other courses, frequently choosing to read and write about it in subsequent courses in my doctoral program.

Development of the Numeracy Cohort

At the same time as I was engaging in my doctoral studies, I continued to be employed by my rural school division. I shared many of my thoughts about the issues facing rural divisions in providing effective PD for teachers with colleagues, including the superintendent. Because of the relative small size of the division, I had significant access to my superintendent for informal conversations when he visited the school, when I attended joint PD committee meetings, and when I attended leadership development cohort meetings. Only in a very small school division like mine, could a classroom teacher discuss informally (on a regular basis) with her superintendent ideas and literature about effective PD and what alternatives might exist for supporting PD in small rural contexts. It was within this unique contextual situation that a local PD model was conceptualized collaboratively with my superintendent. Through several conversations that took place over a couple of years, the local model took shape as we collaboratively discussed how the unique features of our own division/context could be leveraged to provide the most effective PD possible for teachers. We discussed issues such as

the divisional focus on numeracy, logistical constraints, and financial costs. We decided to initiate a blended learning design for PD, integrating online, face-to-face, and classroom components. We also decided to create a quarter time position for leadership of the model. The model will be described in detail in subsequent chapters, but it is important to note that the Numeracy Cohort, the division's pilot PD model, was created in an attempt to both overcome local challenges to the provision of effective PD for teachers, and to draw on the unique strengths that existed within the local context.

In the fall of 2013, I applied for, was offered, and accepted the quarter time position, titled the "Numeracy Coach," for leadership of the Numeracy Cohort. As such, I began my work as the facilitator of the PD project. At the time, I remained a three quarter time teacher in the division as well, which put me in a very unique position. The Numeracy Coach position required me to: elicit support and recommendations for potential teacher interest from principals; organize and run of all Numeracy Cohort meetings, of which there were 5-10 per school year; and communicate with all levels of divisional support, including principals, the superintendent, the student services coordinator, and the school board.

Deciding to Research the Local PD Model

Having completed my Ph. D. course work in 2012 and my candidacy exam in 2013, in late 2013, I embarked upon the task of choosing a research study for my Ph. D. thesis. At the same time, my work as Numeracy Coach had begun; and I began to see the potential significance of conducting a study about the effectiveness of the locally constructed PD model. I decided to conduct a literature review in three areas of study: (1) the characteristics of effective PD, (2) the challenges to providing effective teacher PD in rural Canadian school divisions, and (3) existing models of teacher PD and their promise for rural divisions. The results of the literature review

conducted are contained in Chapter 2 of this thesis. From the literature, I identified eight characteristics of effective PD. I also identified four broad areas in which rural Canadian school divisions experience challenges with regards to the provision of effective teacher PD: funding, geography, staffing, and contextual differences. Finally, I examined individually guided, collaborative, and complex models of teacher PD, and considered their strengths and weaknesses for rural divisions. Together, the elements of the literature review brought to light the research problem that I would address. They also provided me with information that would eventually allow me to investigate the effectiveness of the model in terms of mitigating challenges and supporting teachers' professional growth.

Statement of the Problem

The problem of *how* rural school divisions and teachers might go about creating models of PD that lead to the provision of effective and meaningful PD for teachers, and that mitigate the challenges faced in providing effective PD locally, is at the centre of this research study. At the heart of the problem is the issue of equity for rural teachers, students, and communities. In order to provide quality educational programming for rural students, rural teachers and school divisions necessarily must engage in professional growth and local improvement. While this is not uniquely a rural problem, many of the challenges to providing and accessing effective teacher PD faced by rural divisions and teachers are unique to their rural contexts. Overcoming such challenges is of critical importance if rural students are to meet desired learning outcomes, and the question of how school divisions can accomplish this is key.

Organization of the Thesis

Because the evolution of this research study is complicated, it is important to begin with as clear a picture as possible of how it all unfolded. This was ultimately the goal of Chapter 1 – to describe the background and evolution of the research problem and research study. In addition, Chapter 1 provides valuable information about me as the researcher, including a brief description of my own background as it relates to the study and the topic of rural teacher PD. Although my roles and positionality as a researcher will be more thoroughly discussed in Chapter 3, it is clear that being a rural educator, participating in the design of the locally constructed PD model, being employed as the Numeracy Coach responsible for facilitating the initiative with teachers, and being the sole researcher in this study creates a complex situation. One should expect nothing less, however, given the complex roles and contexts that are inherent in rural communities, divisions, and schools already. In many ways, the complexity of these roles and my positioning as a researcher make the study authentic. Moreover, my previous experiences within the context of the study allow for the development of theoretical sensitivity (Glaser, 1978) that would otherwise not be possible.

Chapter 2 of the thesis provides an outline of the literature that was reviewed for the study, including: (1) the characteristics of effective PD, (2) the challenges to providing effective teacher PD in rural Canadian school divisions, and (3) existing models of teacher PD and their promise for rural divisions. An outline of the methodology used for the research study is provided in Chapter 3, including: the conceptual and theoretical frameworks on which the study is founded; a description of the context of the study; an identification of the purpose of the study; the questions to be researched; a discussion of the significance of the study; the reasons for choosing a qualitative single case study; ethics approval and recruitment procedures; types,

sources, and data collection techniques; data analysis and interpretation techniques; a discussion of the delimitations and limitations of the study; a discussion of the researcher's roles and positioning; and validity and trustworthiness considerations. In Chapters 4 through 7, the study's findings are presented, beginning with a description of the characteristics of the rural PD model in Chapter 4, and continuing with the findings for each research question, along with a discussion of the importance the findings in relation to the broader field of literature, in Chapters 5 through 7. Chapter 8 concludes the thesis with a discussion of the contributions of the study to the research problem, identification of potential implications of the study, and a look ahead at future recommendations for research.

Chapter 2 – Literature Review

As mentioned in Chapter 1, the problem of *how* rural school divisions and teachers might go about creating models of PD that lead to the provision of effective and meaningful PD for teachers, and that mitigate the challenges faced in providing effective PD locally, is at the centre of this research study. In order to address the research problem, it was important to consider relevant literature in the fields of rural education and PD. In conceptualizing the study, the literature in three fields of study were reviewed to provide a basis for the research: (1) characteristics of effective PD, (2) challenges to providing effective teacher PD in rural Canadian school divisions, and (3) existing models of teacher PD and their promise for rural divisions. The literature reviewed was selected using a modified snowballing technique. I began with articles already in my possession from my course work on the topics of rural education and teacher PD. I also searched the University of Manitoba library database (using the terms “rural teacher professional development,” “teacher professional growth,” “characteristics of effective professional development,” “rural challenges to teacher professional development,” “social constructivist teacher professional development,” and “models of teacher professional development”) in order to find a base set of articles on three topics identified above. From the base set of articles, I used several iterations of a snowballing technique using the references within papers of interest to find other authors and papers relevant to the topics included in the literature review. This chapter includes a summary of the literature reviewed, and provides the foundation on which the research study was constructed.

Characteristics of Effective PD

Whether utilizing adjectives such as effective (Guskey, 2003), high-impact (Reeves, 2010), or high quality (Bredeson, 2002) in describing PD, it is clear that in the field of

professional learning, a desire to identify characteristics of teacher PD that promote the improvement of teaching practice and that have a positive effect on student learning outcomes (Timperley, 2008) exists. This is for good reason as many view teacher PD as a critical component of educational reform efforts (Reeves, 2010). In the quest to improve teaching and learning, it is clear that attention must be paid to the characteristics of teacher PD that are most likely to result in the use of more effective teaching practices, thus improving student learning outcomes. Through an examination of literature published in this field, eight characteristics of effective PD can be established. For the purpose of this review, the adjective *effective* refers to those characteristics that improve teaching practices and student learning outcomes.

Focus on Student Learning

Ultimately, the goal of all PD is to improve student learning outcomes (Guskey, 2003; Harwell, 2003). As such, effective PD focuses on student learning as its central tenet. Research has shown that when PD activities are focused on student learning, it is more likely that such activities will have a positive impact on outcomes for students (Timperley, 2008). Unfortunately, many PD activities are focused on teaching strategies and sharing information through presentations. While these sorts of activities can be part of an effective PD plan (Postholm, 2012), if the general focus of the PD is not on student learning, it is doubtful that student learning outcomes will be impacted.

Much has been written about the importance of including both content knowledge and pedagogical content knowledge in teacher PD (Hunzicker, 2010a; Mundry, 2005; Porter, Garet, Desimone, & Birman, 2003; Quick, Holtzman & Chaney, 2009; Timperley, 2008). The idea behind such articles is that teachers need to know about the subject matter they teach, as well as acquire skills in how to teach students so that their students are able to understand the subject

matter. Clearly content knowledge and pedagogical content knowledge are important for improving student outcomes; however, some evidence exists in the field that suggests that focusing on “generic” pedagogical content knowledge or teaching strategies may have little impact on student outcomes (Timperley, 2008; Quick et al., 2009). Increasing attention has been paid to the provision of context-specific approaches that “promote teaching practices that are consistent with the principles of effective teaching but also systematically assist teachers to translate those principles into locally adapted applications” (Timperley, 2008, p. 10). Such approaches recognize that context is vitally important in the complex task of teaching, and that what may work for some students, may not work for others (Van Driel & Berry, 2012). Those focusing on context-specific approaches see teacher PD as investing in people and practices rather than programs (Reeves, 2010), advocating for a more professional view of teaching and teacher PD. In such a view, teachers gain not only content and pedagogical content knowledge, but also learn how to adapt such newly acquired knowledge to their local contexts, and to evaluate the impact of changed practice on student learning. By learning how to analyze student reasoning and thinking, teachers are able to assess student understanding of key concepts and identify gaps or misconceptions they may have in order to address them (Whitcomb, Borko & Liston, 2009). According to Timperley (2008), this requires that teachers develop sophisticated assessment skills in order to determine what students know, and to identify what they, themselves, need to know in order to help students meet learning outcomes. Students then become the focus of both what teachers *do* in the classroom, and in what PD they engage as professionals.

In addition to learning how to adapt knowledge to unique contexts and assess the impact of new practices on student learning, “teachers who are engaged in cycles of effective

professional learning take greater responsibility for the learning of all students” (Timperley, 2008, p. 9). Responsibility for *all* students is critical if change is to occur that results in the improvement of educational standards and the ultimate goal of improved student learning. Effective PD has the potential to focus teacher attention on which students are not learning, and to develop strategies for reaching those students. It enables them to take greater responsibility for making sure each and every one of their students is learning the important outcomes they are responsible for teaching.

Student data are extremely important for planning, assessing, and evaluating professional learning (Learning Forward, 2011). Student data provide information about what types of professional learning are needed based on how students are currently meeting outcomes, as well as being a vehicle for professional learning. Analyzing student work can be valuable in helping teachers improve practice. In addition, student outcomes should be the ultimate indicator of success of a professional learning opportunity (Guskey, 2000), requiring that teachers and PD coordinators consider student data when evaluating professional learning initiatives.

Alignment

Effective PD connects to school goals, district goals, curricular goals, and the individual goals of teachers (Hunzicker, 2010b; Learning Forward, 2011; Porter et al., 2003; Quick et al., 2009). It is aligned with other reform initiatives (Darling-Hammond & McLaughlin, 2011; Guskey, 2003; Pitsoe & Maila, 2012), and is part of a coherent long-term plan (Bredeson, 2002). Effective PD is responsive to the needs of teachers and connects to other professional learning opportunities in which they are involved (Quick et al., 2009). It utilizes system and educator data, as well as student data, to plan, assess, and evaluate professional learning (Learning Forward, 2011). Alignment in these areas is important for several reasons. Coherence is

established within improvement initiatives when teacher goals, school goals, district goals, PD goals, and curricular goals are aligned. This enables teachers to work consistently towards improvement over time, and reduces fragmentation. Moreover, motivation, commitment, and knowledge and skill levels are strengthened when individual and district goals are aligned (Hunzicker 2010b; Porter et al., 2003).

Much of the literature on effective PD suggests that learning must take place at all levels of an organization (Bredeson, 2002; Guskey, 2000; Hunzicker, 2010b). When individuals at all levels of an organization work together towards the broader goals of the organization, greater coherence is achieved. Further, development of common goals leads to increased opportunities for collaboration and what Joyce and Showers (1995) refer to as *synergy*, whereby the collective energy of the organization is greater than the sum of individual energies.

The alignment of PD with individual goals is also of critical importance (Higgins & Parsons, 2009). If teachers do not see the PD as helpful to them for meeting their own goals, they are not likely to engage in learning. Similarly, if they do not see how PD relates to their context, they also may choose not to engage in learning. Darling-Hammond and McLaughlin (2011) suggest that effective PD “must be connected to and derived from teachers’ work with their students” (p. 82). When teachers see the relevance of PD to their work and goals for improving teaching and learning, they are more apt to participate in professional learning opportunities and broader school, district, and curricular improvement initiatives.

Active Learning

Effective PD provides teachers with “opportunities for active learning – that is, opportunities for teachers to become actively engaged in the meaningful analysis of teaching and learning, for example, by reviewing student work or obtaining feedback on their teaching”

(Porter et al., 2003, p. 25). Observation of other teachers' instruction, being observed by other teachers, collaborative planning, and engaging in meaningful discussion about teaching practice are further examples of active learning opportunities that improve teaching and learning for students (Quick et al., 2009; Villegas-Reimers, 2003). According to Timperley (2008), "teachers need multiple opportunities to absorb new information and translate it into practice" (p. 15). As a result, effective PD engages teachers in various forms of active learning, allowing them to try out new teaching practices and reflect on their effectiveness. Such learning opportunities are concrete in nature, engaging teachers in the tasks of teaching, assessment, observation, and reflection (Darling-Hammond & McLaughlin, 2011). They cause dissonance for teachers, requiring them to question their beliefs and practices, and to adjust both with the goal of improving student learning (Timperley, 2008).

Engaging teachers in active learning requires adopting an inquiry-oriented approach to PD. In such an approach, teachers inquire into methods of teaching that positively affect student learning outcomes. This notion is predicated on a professional view of teaching that focuses on the ability of teachers, as professionals, to actively engage individually and collaboratively in inquiry about teaching and learning. Advocates for educational change such as Hargreaves and Fullan (2012) suggest that the development of professional capital is critical if educational improvement is to exist. They argue that teaching like a professional is about individuals inquiring into and improving their own teaching, driving up standards, narrowing achievement gaps, and working collaboratively as a high performing team (Hargreaves & Fullan, 2012). In such a view, teachers have a collective responsibility to contribute not only to their own improvement, but also to the improvement of the system in which their students learn.

Collegial and Collaborative Learning Environments

According to Whitcomb et al. (2009), “a growing body of literature indicates that professional development experiences are particularly effective when situated in a collegial learning environment, where teachers work collaboratively to inquire and reflect on their teaching” (p. 210). The establishment of such an environment allows teachers to reflect individually and collectively (VanDriel & Berry, 2012), to collaboratively share information (Darling-Hammond & McLaughlin, 2011), and to benefit from the expertise of other professionals (Guskey, 2003).

A collegial learning environment is characterized by respect, trust, safety, and accountability, allowing teachers to try out new practices without fear of judgment, and fostering support among colleagues (Goos, Dole & Geiger, 2011; Harwell, 2003; Quick et al., 2009; Whitcomb et al., 2009). While much has been written about professional learning communities and their potential for creating collegial learning environments in which professional growth can occur, many have also warned that the establishment of such an environment alone is not sufficient. Timperley (2008) notes that “as an intervention on its own, a collegial community will end up merely entrenching existing practice and the assumptions on which it is based” (p. 19) if it does not challenge current teaching practices and focus on the relationship between teaching and student outcomes. While the establishment of collegial interaction is essential to effective PD, it must go hand in hand with a focus on teaching and student outcomes.

Significant literature exists on the benefits of establishing learning communities that are committed to continuous improvement, collective responsibility, and goal alignment (Learning Forward, 2011). Such learning communities can exist in small partnerships – for example, critical friend pairings (Darling-Hammond & McLaughlin, 2011), mentors, or coaching

situations – or can involve larger school-based groups, similar grade groups, or cross grade or divisional groups. Darling-Hammond and McLaughlin (2011) additionally note that “a powerful form of teacher learning comes from belonging to professional communities that extend beyond classrooms and school buildings” (p. 84). Professional communities such as partnerships with universities (Falkenberg, 2010), government departments, community organizations, professional organizations, other schools, or broader initiatives linking teachers in a variety of locations can provide valuable learning for teachers. Depending on the goals of a particular professional learning initiative, varying construction of professional learning communities are needed. In addition, the greater the variety of professional networks that exist that align with the goals of teachers, schools, and organizations, and that foster collegial and collaborative learning environments, the greater the capacity for professional learning. According to Darling-Hammond and McLaughlin (2011) “a climate rich in sustained and relevant opportunities for teachers’ learning resembles a web, in which networks, seminars, meetings, and focus groups intersect to provide an array of opportunities for teachers” (p. 86). The key, however, is that such opportunities must be relevant to the needs of the educators who form their existence.

Job-Embedded

Closely related to the previous characteristics of effective PD is the suggestion that such learning opportunities are job-embedded (Hunzicker, 2010a). When PD is embedded within the daily work of teachers, it becomes relevant and authentic as teachers engage in such activities as coaching, mentoring, and study groups (Hunzicker, 2010b). These activities, along with classroom observations, discussion and reflection, occur within the school context and become part of the professional lives of teachers. Classroom-embedded professional learning

opportunities have been shown to positively impact student outcomes in mathematics (Bruce, Esmonde, Ross, Dookie & Beatty, 2010), have been shown to impact teacher attitudes and beliefs about teaching, and reduce teacher isolation (Goos et al., 2011).

Ongoing, Sustainable and Scalable

The extent to which PD is ongoing, or exists over an extended period of time, is a key determinant in the effectiveness of the learning opportunity for changing teacher practice and improving student outcomes. While lasting changes in practice are often thought to take a minimum of three to five years (Hunzicker, 2010a; Postholm, 2012), some have suggested that evidence of changes in practice should take place within the first year or two if they are likely to happen at all (Guskey, 2000). Although there is some discrepancy on the amount of time involved to see beginning or lasting change in teaching practice, learning opportunities that are short in duration and for which no follow-up occurs are generally seen as less effective in changing practice and improving student outcomes. According to Quick et al. (2009),

providing teachers with professional learning experiences over an extended period of time – that is, of sufficient duration and intensity – allows for more time for discussions about the content and how students learn, as well as for more opportunities for active learning. (pp. 48-49)

Similarly, Porter et al. (2003) note that the duration of an activity, which refers to both the number of contact hours and the span of time over which it takes place, is a key feature of effective PD.

Closely related to the concept of time or the ongoing nature of PD experiences, is the need to sustain improvement efforts. According to Timperley (2008), “sustainability depends both on what happens during the professional learning experience and on the organizational

conditions that are in place when external support is withdrawn” (p. 24). In addition to the PD experiences themselves, attention must be paid to the supports in place following the experiences. Timperley (2008) goes on to suggest that if PD experiences foster the development of self-regulatory inquiry skills in teachers, they are more likely to continue analyzing student learning, thinking about teaching practice, trying out new strategies, and evaluating the results of changes on student outcomes.

Scalability, along with sustainability and the ongoing nature of PD is an important part of effective PD design. Loucks-Horseley, Stiles, Mundry, Love and Hewson (2010) suggest that although early adopters may quickly translate their learning into practice, bringing the rest of the teachers onboard in a change initiative can be a challenge. If educators truly want to improve the learning of *all* students, the scalability of PD is of key importance. It is not enough to engage a small group of teachers in quality PD and change their practice. Attention must be paid to how the PD opportunities will reach all teachers, and how educational improvement will reach all levels of the system. Moreover, PD initiatives must be flexible enough to be enacted with other teachers and students in different contexts, yet still produce improvement and results when enacted by others (Whitcomb et al., 2009). Scalability, sustainability, and the ongoing nature of PD are critical characteristics that impact the effectiveness of PD initiatives.

Time, Resources and Leadership

Effective PD requires adequate support in terms of time, resources, and leadership (Bredeson, 2002; Goos et al., 2011; Learning Forward, 2011; Timperley, 2008; Villegas-Reimers, 2003). As suggested in the previous section, the amount of time dedicated to professional learning experiences is tremendously important. What is often lacking, is the time for educators to try out new practices in their classrooms and with colleagues to improve skills

and to monitor the effect of such changes on student learning. In a study by Quick et al. (2009), teachers identified the provision of time for collaborating within and across grade levels, as well as the provision of opportunities for modeling, practice, and feedback as critical characteristics of effective PD. Both of these require time for teachers to engage in such learning opportunities. Guskey (2003) warns, however, that the provision of time is important, but that it must be well-organized. The time provided for professional learning cannot be wasted, but rather must engage teachers in structured, active learning opportunities that challenge their practice and create dissonance between their beliefs and practices and new information about teaching and learning (Loucks-Horseley et al., 2010; Timperley, 2008).

According to the *Standards for Professional Learning* published by Learning Forward (2011), “effective professional learning requires human, fiscal, material, technology, and time resources to achieve student learning goals” (p. 32). Attention must be paid to the funding of professional learning, as well as the management of financial resources. While funding for professional learning often varies tremendously between schools (Learning Forward, 2011), by paying attention to existing funding for professional learning and aligning professional learning with other initiatives and funding sources, resources can be increased for PD.

Leadership, as a resource for professional learning, requires specific mention. Principals and other educational leaders must be actively involved in site-based PD occurring in their schools if teacher interest and learning is to occur (Timperley, 2008). According to Timperley (2008), active leadership is required on three fronts – developing a vision of new possibilities so that a common goal of better student outcomes, more meaningful content, and improved teaching approaches can be conceptualized and worked towards; providing support and incentive for teachers to implement new strategies and monitor student learning following professional

learning opportunities; and ensuring that professional learning opportunities are well managed and organized, as well as that conditions are in place for in-depth professional learning to occur (p. 23). In addition to the need for support from formal leaders in the school, leadership is exercised when teachers act as coaches or mentors for other teachers, or when teachers, themselves, lead professional learning communities (Berg, Carver, & Mangin, 2014; Killion & Harrison, 2006). Leadership can be exercised when teachers advocate for their own PD needs, or when they facilitate professional learning sessions (Berg et al., 2014; Killion & Harrison, 2006). Working towards the establishment of school goals, and the alignment of individual, school, curricular, and organizational goals are valuable forms of leadership that enable and support professional learning. Leadership at multiple levels is a characteristic of effective PD, and attention must be paid to supporting and fostering formal and informal leadership within PD and system improvement initiatives.

Evaluation

On top of the above mentioned characteristics of effective PD, inclusion of a mechanism for evaluation of PD initiatives is incredibly important to the effectiveness of the PD. Guskey (2000) identifies five critical levels of PD evaluation in his book on the same subject: (1) participants' reactions, (2) participants' learning, (3) organization support and change, (4) participants' use of new knowledge and skills, and (5) student learning outcomes (p. 82). According to Guskey (2000), the levels of evaluation increase in complexity, and "success at one level is necessary for success at the levels that follow" (p. 78), suggesting that for a quality evaluative structure, all levels are necessary to determine the effectiveness of a PD initiative.

Loucks-Horseley et al. (2010), similarly suggest that evaluation of results is an essential but often overlooked part of the process of designing PD, one that can be a valuable learning

experience, itself, for professional developers and participants as they reflect on the continuous process and their own learning. According to Loucks-Horseley et al. (2010), evaluating the results of a PD process is critical to reflecting on and revising the PD program in the cycle of continuous improvement.

Thorough analysis and ongoing use of student, educator and system data are essential both in terms of informing decisions about PD programs, and in terms of determining the effectiveness of PD initiatives (Learning Forward, 2011). By including a mechanism for evaluating PD initiatives, effective PD programs create additional learning experiences for participants and developers, as well as generating information about the extent to which effective PD has occurred. Moreover, such data can provide valuable information from which future learning can be planned.

In conclusion, several characteristics of effective teacher PD can be established through a review of the literature on the subject. I have identified, through my literature review, eight characteristics of effective teacher PD. As established in this section, effective teacher PD:

- is focused on student learning;
- is aligned with school, district, curricular, and individual goals;
- engages teachers in active learning;
- involves a collegial and collaborative learning environment;
- is job-embedded;
- is ongoing, sustainable and scalable;
- requires time, resources and leadership; and
- includes a mechanism for evaluation.

These characteristics of effective teacher PD can be utilized as a framework from which to evaluate models of teacher PD, whether rural or otherwise. The research study outlined in this thesis employed this list of established characteristics of effective teacher PD to inquire into the effectiveness of one teacher PD model in a small rural Manitoba school division.

Challenges to Providing Effective Teacher PD in Rural Canadian School Divisions

Rural school divisions in Canada, if they can be spoken of as a collection, consist of extremely diverse groups of people, living in varied geographical settings, with unique community strengths and challenges. In actuality, there are more differences between rural divisions than there are similarities, which is perhaps one of the most defining characteristics of rural education. It is difficult to generalize what is typically rural in Canada (Wallin, 2003; Wallin, 2005), and any attempt to do so inevitably leads to the discovery that there really is not much written about the Canadian rural education situation. As a result, it is necessary to consider not only Canadian literature in an examination of challenges facing rural educators, but also international literature on the subject. While some topics such as political climates and government mandates differ from country to country (and even province to province), many of the strengths and challenges of rural communities are similar, due to the nature of geography, distance, size, relationships, and the common goal of improving student learning.

Rural school divisions generally possess tremendous strengths that enable them to provide quality educational programming for their students. In most rural communities, teachers know most (if not all) of the students in the building (Canadian Council on Learning [CCL], 2006). The personal relationships teachers develop with students and parents in rural divisions, allow teachers to better meet individual student needs, and result in teachers who are invested personally in the success of their students (Budge, 2006). In addition, strong networks and

personal relationships between teachers in small rural settings can make it easier for teachers to naturally work with other teachers (Howley & Howley, 2005), and common interests and values make for a more cohesive school community (Chance & Segura, 2009). Rural divisions tend to have greater numbers of teaching principals, which often means that principals are more embedded in instructional issues (Newton & Wallin, 2013). In addition, fewer formal leadership roles in rural settings can allow for greater creativity amongst teachers, and opportunity for bottom-up change within schools (Anderson, 2008). Moreover, because administration is generally more accessible for conversations about learning, teachers are often afforded greater opportunity for input into the direction of change initiatives (Forner, Bierlein-Palmer, & Reeves, 2012). Rural educators tend to foster the development of diverse networks (Wallin, 2008) out of necessity, as they know that they do not always have access to a variety of other professionals in their own schools. There is also an implicit understanding of the importance of place by students, parents, educators, and communities in rural settings, that draws them together to work towards the betterment of life for all members of the community.

Rural education should not be seen as a deficit. There are numerous reasons why rural education should be celebrated for the unique and fulfilling opportunities that are afforded to rural students. However, this does not preclude attempts to make rural teaching and learning better for students, and should not prevent those interested in doing so from looking at the challenges facing rural divisions. Of particular importance to improvement, and quality of teaching and learning in rural settings, is the issue of providing effective PD opportunities for rural educators. Guskey (2000) notes:

notable improvements in education almost never take place in the absence of professional development. At the core of each and every successful educational

improvement effort is a thoughtfully conceived, well-designed, and well-supported professional development component. Hence, although professional development by itself may be insufficient to bring about significant improvement in education, it is an absolutely necessary ingredient in all educational improvement efforts. (p. 4)

If rural school divisions are to continue to work towards the improvement of teaching and learning, it is important for them to consider both the role of effective PD in their improvement efforts, and the challenges they face in providing effective PD opportunities for their staffs.

Many educational theorists' writing on the topic of educational reform have discussed the importance of recruiting and developing high quality teachers as part of a strategy for improving educational systems (Darling-Hammond, 2009; Fullan, 2010; Hargreaves & Fullan, 2012; Hargreaves & Shirley, 2009; Reeves, 2009, 2010). PD plays a critical role in the development of teacher capacity, and as such, is vital to both the development of high quality teachers, and to educational improvement efforts. In addition, it has often been argued that the adoption of a professional approach to teaching is essential if educational change is to occur (Darling-Hammond, 2009; Hargreaves & Shirley, 2009). Such a view of teaching is based on the premise that teachers are capable professionals who understand their students, and who are equipped to make important decisions about teaching and learning. Investments in the development of teacher professionalism are required to make this ideal a reality. The development of teacher leadership is often cited as important to improvement initiatives, as well as the sustainability of change efforts (Crowther, Ferguson & Hann, 2009; Lambert, 1998; Reeves, 2008). In addition, the development of capital, whether it is intellectual capital, social capital (Crowther et al., 2009), professional capital (Hargreaves & Fullan, 2012), or otherwise, is also cited as critical to

educational reform. What all of these critical components (developing high quality teachers, developing professionalism, developing teacher leadership, and developing various forms of capital) have in common, is the fact that they must be developed.

In order for rural school divisions to engage in actively improving student learning, they must pay attention to the PD opportunities they provide for their teachers and administrators. In addition, rural school divisions must consider the challenges they face in endeavouring to provide effective PD for their staffs. Issues related to educational funding, geography, staffing, and context, pose serious challenges when it comes to the provision of PD in rural areas. An examination of these challenges is prudent if rural divisions are to overcome these issues, and improve teaching and learning within their local contexts.

Funding

In Canada, educational funding is considered a provincial or territorial responsibility, with the exception of military personnel and treaty status Indians (Wallin, 2008). Although this is standard across Canada, how individual provinces and territories fund education is not. Depending on the province/territory, funding for education can be entirely provided by the provincial government through general revenues, or provided through a combination of general revenues and locally and/or provincially levied property tax (Henley & Young, 2008). Both methods of funding education potentially pose challenges for rural school divisions in Canada.

In provinces in which educational funding is provided through a combination of provincial funding (through general revenue and/or provincially levied property tax) and locally levied property tax, rural school divisions enjoy the local autonomy afforded them in being able to make decisions about educational programming within their communities. When school divisions decide to implement local initiatives, they can increase mill rates within local settings

in order to cover the cost of such initiatives. As a result, rural school divisions that acquire funding in this manner may benefit in being able to make autonomous, local decisions. This advantage, however, also comes with significant challenges for rural divisions that are property poor (Howley & Howley, 2005). In many rural divisions, property values are lower than those in urban centres. There are also significantly fewer property owners to share the burden of local education taxes in smaller rural divisions. As a result, some rural school divisions experience limitations to the amount of money that is reasonably available to fund education locally, and as such, find their local autonomy compromised when they are unable to fund regular educational expenses such as resources, technology, and PD, on top of desired local initiatives.

In provinces in which educational funding is entirely provided from provincial revenue and/or taxes, rural school divisions face a different challenge. Dispersion of educational funds, while unique to every province or territory's funding formula, is generally based on a per student basis (Manitoba Education, 2009; Northern Alberta Development Council [NADC], 2010). This is also generally true in provinces in which funds are both provincially and locally generated. Rural school divisions, that have significantly fewer students to begin with, and that often face declining enrolments (Chalker, 2002; Suvorova, 2004; Wallin, 2008), are faced with decreases in educational funding that are beyond their control. As a result, many rural school divisions find themselves attempting to maintain quality educational programming with less money. In many cases, the viability of small rural schools becomes such an issue for rural divisions that they are forced to close schools, devastating the rural communities of which they were once a part (Manitoba Association of School Superintendents [MASS] & Manitoba Association of School Trustees [MAST], 2006; NADC, 2010).

Having to deal with the fiscal realities of less funding impacts rural school divisions in

many ways. In spite of receiving a much smaller transfer amount from provinces, and/or having limited tax bases and lower abilities to pay within their communities, rural divisions are still charged with the task of providing quality programming for their students. While costs per pupil are greater in rural areas (Harmon, Gordanier, Henry, & George, 2007), funds given to rural school divisions per pupil are often not, forcing rural divisions to be increasingly creative and resourceful in their operations (Wallin, 2008). High cost items such as transportation/bussing and teachers' salaries are often relatively fixed in rural divisions, taking up large portions of their divisional budgets, and increasing the educational cost per student. While some provinces include extra funding for small schools in the form of grants and funding formulas, these are often not enough to cover the extra costs associated with operations in rural divisions (MASS & MAST, 2006). In order to reduce costs, without significantly impacting the number of teachers in classrooms, rural school divisions are forced to make difficult choices about where to allocate funds. As a result, many rural divisions experience a lack of resources, as well as a lack of information and communication technology (ICT) in their schools (CCL, 2006; Mitchem, Wells & Wells, 2003). Professional development of teachers is also an area that is not fixed in rural budgets, making it vulnerable to cuts when divisions find themselves short of funding sources. If rural teachers are to continue to grow as professionals, they need access to professional resources for teaching, resources on effective teaching practices and strategies for improving student learning, ICT capabilities in order to access resources and network with other professionals, and opportunities to access new information in the field of education. More needs to be done to mitigate the harmful effects of underfunding in rural school divisions, if largely discretionary areas such as the provision of effective teacher PD are to receive adequate resources.

Porter et al. (2003) suggest that the size of a school division may have an impact on the

quality of professional development offered within the division. Although their work is focused in the United States, the findings may have relevance for Canadian schools as well. Porter et al. (2003) note that “large districts are generally more likely to manage their portfolios better and to provide higher quality professional development” (p. 31), and also that they “provide professional development activities of longer duration, with more opportunities for collective participation and active learning” (p. 31). This may be attributed to the fact that there are more curriculum specialists in larger divisions, or to the fact that larger divisions have access to more funding sources (Porter et al., 2003). Canadian rural schools do not have the same access to funding initiatives that large US school divisions have, nor do they have the curriculum specialists that large US divisions have (MASS & MAST, 2006). In addition, greater amounts of PD dollars must be spent on travel and subsistence costs in small Canadian school divisions, further stressing the PD dollars available. Divisional size and funding, thus, is a challenge in providing effective teacher PD in rural areas.

Geography

Geographic isolation is one of the greatest challenges faced by rural divisions in providing access to effective teacher PD. Many rural divisions find themselves significant distances from the urban centres where PD usually takes place. This significantly increases the cost of sending teachers and administrators out to PD. Whereas educators in urban divisions only have to worry about the registration fee for conferences and workshops, rural educators are forced to consider transportation, hotel, and meal costs as well as registration fees. In school divisions where there are limited PD funds available, these expenses are often incurred by teachers, forcing them to consider whether or not they can afford the cost of the PD personally (Tytler, Symington, Darby, Malcolm, & Kirkwood, 2011). In addition, geographic isolation

requires teachers to consider the time required for travel when attending PD in urban centres, including increased planning time for substitute teachers, increased travel time, and the time that is required for them to be away from their community and family (Tytler et al., 2011).

Internal PD opportunities are also impacted by the geographic conditions of many rural divisions. Bringing external presenters into small, rural school divisions comes with the additional costs associated with travel and accommodation for the presenter. In addition, many presenters come with price tags in the thousands of dollars, making them cost prohibitive for rural divisions with small numbers of teachers and limited financial resources. Depending on the geographic location of a rural division, even if it is unable to partner with another division relatively close by, the distances required for travel to a presentation are significant, and these costs must be incurred by rural divisions, or even by the teachers, themselves.

Local PD initiatives can also be impacted by geographic isolation. Many rural school divisions span large geographic areas, despite having relatively low populations. Recent movements towards amalgamation of school boards in some provinces have compounded this issue (NADC, 2010). As a result, rural divisions have experienced significant cost increases for bringing teachers together (even within a division) for collaboration, training, or workshops. Many of the PD models popular in educational literature are predicated on the notion of teachers within school divisions working collaboratively to improve student learning. When rural divisions have reduced budgets, and are not able to pay to transport their teachers across the geographical distances that separate them, such models are not salient. While ICT offers the potential capability of “virtually” bringing teachers together, it also brings with it additional challenges. All rural divisions may not be able to afford to connect large geographic regions with an infrastructure strong enough to establish reliable connectivity between schools. In

addition, fewer technicians and ICT specialists available in rural divisions make the provision of such infrastructure challenging.

Staffing

Recruitment and retention of teachers in rural schools is one of the greatest challenges faced by rural school divisions (CCL, 2006; Chance & Segura, 2009; Hardré, 2009; Lowe, 2006; MASS & MAST, 2006; NADC, 2010; Seltzer & Himley, 1995; Tytler et al., 2011). Many school divisions in Canada, especially more remote divisions, have difficulty attracting teachers to work in their schools. Teacher shortages in areas such as science and mathematics make it difficult for rural divisions to recruit high quality teachers (Wallin, 2008), and retaining them can be difficult when the allure of the city awaits them.

Green and Reid (2004) make the case that in Australia, focusing on the attraction, recruitment, preparation and renewal of teachers for country schools is essentially a matter of professional and rural-regional sustainability. In Canada, this case could also be made. As a result, attention must be paid to what can be done to improve recruitment and retention of teachers in rural settings. Lowe (2006) suggests that high-quality staff development programs have the potential to improve both recruitment and retention of rural teachers. By providing an environment in which rural educators experience increased job satisfaction and feelings of efficacy as a result of high quality PD opportunities, rural divisions may be able to attract, retain, and grow high quality teachers within their communities. Unfortunately, divisions that are not able to offer this to their teachers risk high staff turnover rates, and diminished consistency and sustainability in staff development initiatives.

Aside from recruitment and retention of teachers, availability of substitute teachers in rural divisions is another significant problem (Harmon et al., 2007; Manitoba Education, 2009;

Seltzer & Himley, 1995; Tytler et al., 2011), particularly for teacher PD. If an adequate pool of substitute teachers is not realized, the ability of teachers to leave their classrooms to engage in PD is compromised. The result is decreased availability of PD for teachers, as well as potential dissatisfaction with working conditions, leading to further teacher retention issues within the division.

Teaching loads are another area of concern for the provision of PD in rural divisions. Educators in rural divisions often must teach outside of their specialty areas (Harmon et al., 2007; MASS & MAST, 2006; Tytler et al., 2011), in spite of often experiencing a lack of curriculum supports (Harmon et al., 2007; Mitchem et al., 2003). This translates into high workloads and increased PD needs for teachers, while simultaneously making it difficult for teachers to leave their classrooms to engage in such development experiences. When teachers are concerned about the day-to-day survival of teaching new courses, it is often more work to prepare to be away from class for a PD day than it is worth. Rural teachers, thus, find themselves caught between the need for PD in areas for which they had no formal training, and overburdened by the workload involved in teaching these courses, making it difficult to leave their classrooms. In an article about the role of teaching principals in Alberta and Manitoba, Newton and Wallin (2013) describe the fact that teaching rural principals made decisions about their own teaching loads in one of three ways, one of which was to pick up whatever assignments no other teacher felt qualified to take on. The impact of this was that they were forced to teach outside of their specializations, compromising their sense of self-efficacy as well as their ability to engage in instructional leadership tasks. Situations in which teachers or teaching principals are forced to teach outside of their areas of specialization may be more prevalent in small rural schools, creating high workloads, an increased need for PD, and a barrier for teachers to leave

their classrooms to attend PD opportunities.

Professional isolation is one of the greatest barriers to the provision of teacher PD in rural school divisions (Howley & Howley, 2005; MASS & MAST, 2006; Seltzer & Himley, 1995; Tytler et al., 2011). Howley and Howley (2005) note that “educators tend to experience professional isolation in rural schools because teaching specialties do not enjoy critical mass in any but the largest of these schools” (p. 3). Without other teachers who teach the same subject or grade level in a school, teachers have limited capacity to form professional learning communities, or to generate collaborative projects. Cross-grade collaboration is possible, but potentially limited, for example, when a Kindergarten teacher is asked to work with a high school Physics teacher to improve student learning. Even more difficult, is the extremely small rural school in which there is only one multi-grade teacher in the building. Rural schools are forced to be much more creative in their PD practices in order to make common models feasible in their rural contexts.

Administration and leadership capacity pose significant challenges to both educational reform efforts and teacher PD in rural settings. Rural school divisions face issues surrounding small numbers of administrative candidates “often due to little administrative support and an overburdening of community expectations” (Wallin, 2008, p. 569). Rural principals incur heavy workloads, as there are simply fewer people to do the work of administration in rural schools. Rural principals must necessarily wear “many hats” in their positions:

Having to be generalists and straddling a line between the demands of teaching, leadership, and administration. The necessity of teaching multi-grade and ability levels concurrently and the absence of personnel such as assistant principals, business

managers, student counsellors, specialist teachers, and maintenance staff make the job more labor intensive. (Starr & White, 2008, p. 6)

As a result of such pressures, qualified principals can be hard to attract and retain, particularly in more remote areas. Starr and White (2008) note that:

There are many aspects to these concerns, including the side-lining of important educational matters to managerial tasks, feelings of isolation, rising stress levels, decreasing professional satisfaction, and unrealistic expectations of principals. Small rural school principals unanimously state they require additional human resources to enable incessant workloads to be accomplished. There is also concern that workload issues are creating succession problems by detracting potential leadership aspirants who see the principalship as requiring too much effort for too little reward. (p. 4)

While workload is a troublesome issue for the individual rural administrator (Newton & Wallin, 2013), far more concerning may be the impact that this has on rural school reform and teacher PD. Far too many principals are forced to deal with management and administrative issues that are pressing, leaving them little time to act as learning leaders within their buildings. As Starr and White (2008) suggest, “They are too busy just coping with the local, the everyday, the immediate, and have no time to participate in broader politics or contexts” (p. 4). The result, is lack of leadership in areas such as curriculum, learning, student engagement, teacher PD, and educational improvement. This may be amplified for rural teaching administrators, as they struggle with the dual roles of teaching and administration. Newton and Wallin (2013) note that “one of the most often cited challenges faced by these individuals was the effect their demanding roles can have on their personal lives” (p. 63). Heavy workloads come at a cost for rural administrators, personally, professionally, and organizationally.

It is well accepted in educational literature on PD, that PD should be guided by well-defined purposes and goals (Guskey, 2000), and that it should be focused on student thinking and learning (Whitcomb et al., 2009). If principals have their time taken up by immediate administrative issues, when are they able to spend the time needed to set specific goals and help their staffs focus on student learning? One key criticism of how schools in general (not just rural schools) deal with PD is that there is not enough follow-through once PD has taken place (Reeves, 2010; Tytler et al., 2011). Given the extraordinary demands placed on rural principals, it would seem that such follow-through would be even more difficult.

Superintendents in rural school divisions also face issues of heavy workloads and multiple hats to wear. Because of the relatively small numbers of middle-level administrators (assistant superintendents, directors, coordinators, consultants, and principals), “rural school leaders are involved in virtually every operational decision that takes place within their districts” (Forner et al., 2012, p 2), creating work conditions in which upper and middle-level administrators have little time to conceptualize and carry out broader educational plans or initiatives. In rural school divisions, often there are no other employees between a superintendent and the principals. With no assistant superintendents, directors of curriculum or learning, curriculum consultants, and the like, rural school leaders (principals and superintendents) often find that they are left alone to manage the business/managerial side of matters, as well as the learning side. According to Wallin (2009), rural senior administrators have to be generalists, and without a large team for support, rural superintendents can experience “workload stress, reactionary planning, burnout, lack of multiple perspectives for decision making, lack of resources, or attention to management versus leadership” (p. 43). Demands on rural senior administration can limit their capacity to develop goals for systemic improvement, as

well as their capacity to carry out improvement plans, which include the provision of effective teacher PD. Wallin (2009) also notes that rural superintendents, themselves, experience barriers in accessing PD opportunities, due to less sophisticated employment agreements and other geographic factors. Moreover, she notes that rural superintendents are more likely to have lower credentials in terms of formal educational qualifications than their urban counterparts. All of these factors contribute to the barriers that exist in accessing effective PD in rural contexts.

Contextual Differences

One of the greatest complaints leveraged against PD efforts in rural divisions, is that the PD does not relate to the context in which rural teachers teach (Harmon et al., 2007). Many PD opportunities provide points of view that originate in urban settings, or that are predicated on conditions that involve much larger schools, or more uniform classes. Hardré (2009) notes that teachers attending workshops often find that adapting new ideas encountered at the workshop to their local contexts is difficult. He suggests that “rural teachers need tools and strategies from professional development that are flexibly adaptive to the rural context, feasible with available resources, and locally meaningful” (Hardré, 2009, p. 4). When teachers are unable to find contextually relevant PD for their teaching contexts, it is difficult to affect educational improvement. This is further compounded by other challenges, such as the availability of funding, geographic conditions, and teacher isolation.

Another contextual issue that is seen in rural settings is that rural teachers do not always have the same view of professionalism as their urban counterparts. Howley and Howley (2005) note that “rural places, in general, operate in less formal modes than other places. Impersonality and social distance, key features of professional demeanor, are neither prized nor cultivated in the civic life of many rural communities” (p. 3). Howley and Howley (2005) go on to suggest

that despite their professional training, “rural teachers understandably retain the social practices cultivated by their upbringing and reinforced by their everyday experience” (p. 3). This difference is at the heart of rural-urban variance. What are celebrated in rural communities, often, are the relationships teachers have with their students, parents, and the community. While these are certainly strengths of rural schools, a culture of resistance to change can be fostered as teachers fight to hold on to the traditional values and beliefs that they hold dear. While not all rural communities are resistant to change, there is certainly something important in the fact that this could be the case in rural communities in which there are long lines of tradition, spanning multiple generations. In those communities in which traditional values and beliefs are privileged over new ways of doing things, rural teachers may perceive that they are focussing on what really matters, potentially blinding them to ways in which student learning could be improved. In many ways, this unique contextual issue can make the provision of teacher PD more difficult in rural areas, as leaders must convince teachers that trying something different might be seen as an opportunity for growth, not the loss of what has been traditionally valued.

In conclusion, it is important for rural divisions seeking to continue improving teaching and learning in rural Canadian schools to consider issues involving funding, geography, staffing, and contextual differences that pose challenges in providing effective PD opportunities for teachers. Moreover, it is essential that such rural divisions consider how these challenges might be overcome in individual local contexts. One of the most important questions facing rural school divisions in Canada is how they might draw on the positive, unique features that exist in their local contexts in order to improve education for their students. This requires the generation of a truly local solution that draws on the strengths of rural communities, and minimizes the challenges they face. Rural places are unique, and their differences necessitate the generation of

unique, contextual solutions in order for local schools and communities to benefit from educational improvement and change.

Models of Teacher PD and their Promise for Rural Divisions

While there are many types of PD discussed in educational literature, categorizing them is somewhat of a challenge. PD opportunities available to educators can range from individual opportunities designed to promote the development of subject-specific, pedagogical, or pedagogical content knowledge, to more collective approaches to PD involving pairs, groups, entire staffs, or entire divisions in a process of collaboration to achieve common goals, engage in mutual growth, and improve learning outcomes for students (Butler, Novak Lauscher, Jarvis-Selinger, & Beckingham, 2002; Croft, Coggshall, Dolan, Powers, & Killion, 2010; Falkenberg, 2010; Villegas-Reimers, 2003). PD opportunities can occur as a single instance, or can be ongoing; and the subject or content of PD can vary significantly between teachers, schools, divisions, or even within organizations. Some PD models are designed to address a context-specific problem, while others are part of broader improvement initiatives (Villegas-Reimers, 2003). In many ways, PD defies organization, as it is inherently contextually-based and unique to the individuals who participate in it (Villegas-Reimers, 2003).

In order to identify the current models of PD that exist in the scholarly literature, it is necessary to first examine what is meant by the term *model*. According to Sparks and Loucks-Horsley (1989), PD models are designs for learning that embody a set of assumptions about where pedagogical knowledge comes from, and how teachers construct that knowledge. Sparks and Loucks-Horsley (1989) identify five models of PD for teachers: (a) individually-guided staff development, (b) observation/assessment, (c) involvement in a development or improvement process, (d) training, and (e) inquiry. Guskey (2000) identifies seven models of PD, which

include the five discussed by Sparks and Loucks-Horsley, in addition to (f) study groups and (g) mentoring. In more recent literature, the models of which these authors speak are often referred to as *strategies* (Loucks-Horsley et al., 2010), which is partially due to the fact that there has been a movement towards development of more *complex* or comprehensive models that include several strategies for engaging teachers in the process of learning. For example, a model might be designed that includes mentoring for new teachers and a professional learning community (PLC) led by a coach. The members of the PLC might go to a workshop together, engage in classroom observations, and get together for discussion and examination of student work. Such a model would constitute a *complex* model, involving several other models or strategies as part of it.

For the purpose of this literature review, all of the approaches – activities, formats, techniques, strategies, models, or otherwise - have been considered as *models*. This is largely due to the fact that any individual strategy can constitute a model if it is broadly implemented. Further, the models have been broken down into three types: individually-guided models, collaborative models, and complex models. The distinction between the three types is based on the nature of the learning activity in which teachers engage – whether it is done in isolation or collaboratively – as well as the scope of the model – whether it primarily consists of one strategy or multiple strategies for teacher learning. While it was not possible to examine every model in the space provided, or to give tremendous amounts of information about any one model, a brief description of several are included. It is hoped that any other models that are not specified can easily be categorized into the framework provided.

Individually-Guided PD Models

Individually-guided models of staff development work from the assumption that teachers

know best what their PD needs are, and should take responsibility for addressing their needs as professionals (Burton, 2013). In such models, teachers set their own goals, and select activities in which to engage to help them accomplish the goals they have set (Villegas-Reimers, 2003). Individually-selected activities may include any number of opportunities such as: professional reading; taking university courses; participating in a university educational cohort; pursuing graduate degrees; participating in a leadership development cohort; submission of articles for publication; attending workshops, seminars, conferences, or presentations; participating in online learning experiences such as webinars or blogs; participating in qualification or certificate programs; engaging in practitioner research (Stringer, 2004); preparing and presenting on a topic of interest to staff; engaging in analysis of lessons; or self-analysis of videotaped lessons. Regardless of the activities or experiences chosen by an individual, the key feature of individual models is that they are conceptualized, engaged in, and evaluated by individual teachers. The intent of engaging in such activities is individual rather than collective growth, and as such, may be more or less focused on student learning.

Professional growth plans. Professional growth plans are one example of an individual PD model. Such plans have been mandated in many Canadian school divisions over the past decade or so, and several benefits have been described, including “greater authenticity and teacher commitment to their own PD; increased teacher focus and accountability for their own development; increased collegiality; and teachers’ self-affirmation” (Fenwick, 2001, p. 8). One of the primary characteristics of such plans is the requirement to generate written goals that teachers are accountable for working towards. Generally, a follow-up interview takes place at the end of a planning cycle in which teachers are required to report on their progress. The cyclical nature of professional growth plans necessitate that they are ongoing forms of PD, and

this combined with the self-directed nature of such models have led to their popularity.

Self-regulated learning model. It is important to note that individually-guided PD activities need not be completed in isolation, although they can be (Butler et al., 2002). In a self-regulated learning model, what is relevant is that individuals choose the types of activities in which they engage, whether the activities are individual or collaborative in nature, and reflect on their own understanding and growth. In a description of a self-regulated learning model, Burton (2013) suggests that it “is an articulated, cyclic model of learning processes which work together to help the learner see how they are building coherent knowledge as they proceed through multiple iterations of reflection” (p. 158). A teacher could choose to engage in a combination of individual learning activities such as taking courses, reading scholarly articles, or engaging in practitioner research in his/her classroom, as well as more collaborative activities such as being part of a professional learning community or working with a mentor, all as part of a larger self-regulated professional growth plan s/he has developed to improve a particular area of her/his practice. While technically an individual model, designed for an individual teacher’s growth, self-regulated learning models may incorporate both individual and collaborative activities in the process of professional learning.

Rural school divisions can benefit from the use of individual PD models in several ways. Because there are fewer administrative positions in general in rural school divisions, there are fewer people available to plan meaningful PD for rural staffs. By utilizing a model in which teachers are expected to take responsibility for their own PD plans, some of the burden can be taken off of rural administrators and divisional personnel. In addition, individual models promote the view of teachers as professionals, requiring teachers to consider both what a professional view of teaching is, and how they as professionals can have ownership over their

own learning. Rural divisions can also potentially utilize such models to promote and recognize teachers' efforts to engage in individual growth opportunities on an ongoing basis, as well as to foster the development of individuals in areas that interest them, so that they can add their own expert capacity at some point to the division's collective capacity.

Rural divisions should be cautious, however, about some aspects of individual PD models. Models such as professional growth plans require follow-up from teachers and administration if they are to be taken seriously. If administrators do not have the time or the skill to coach teachers through the processes of goal setting, planning, and evaluation, such models are likely to be unsuccessful. In addition, just because teachers have identified goals, does not mean that opportunities for them to grow in a particular area will necessarily be available (Tytler et al., 2011). While rural schools may have considerable expertise and capacity in some areas, there are bound to be other areas for which rural schools have limited expertise and capacity. When the goals of teachers exist within areas for which a school has limited expertise and capacity, external workshops, seminars, presentations, or courses may be the only real solution. In such cases, common rural dilemmas such as high transportation costs, increased time necessary for travel, decisions surrounding use of minimal PD funds, and lack of substitute teachers can continue to be an issue.

Collaborative Models

Collaborative models for PD engage two or more people in the process of PD together. While the level of collaboration varies with each model and the purpose of the PD, such models engage professionals in collective learning, as well as dialogue and discussion about new information.

Training. Training is a form of PD that typically involves a presenter or facilitator who shares his/her expertise with a group of educators. For this reason, it has been placed as an option in the collaborative models category. Although training is often aimed at disseminating information to individuals, there is an implied collective goal over-riding activities of this nature. Workshops, seminars, conferences, presentations, and even web-based tutorials and webinars are all common activities that would fall under a training model for PD, if they are attended by a group, rather than an individual. According to Guskey (2000), “training is the most efficient and cost-effective professional development model for sharing ideas and information with large groups of educators. It provides all participants with a shared knowledge base and a common vocabulary” (p. 23). Once a common knowledge base and vocabulary are established through training, many PD models engage other strategies for supporting implementation of new ideas into classroom practice. In this way, training can be a valuable part of an overall PD approach.

One of the common criticisms of training as a PD model is centred around the notion of transferability. “One-shot” workshops are considered ineffective in terms of impacting teacher practice and student learning by many (Bascia, 2001; Goldenberg & Gallimore, 1991; Harwell, 2003; Hunzicker, 2012; Learning Forward, 2011; Reeves, 2010). One of the reasons for this is that many teachers often do not have the time and support needed to implement new ideas after the workshop/training is done. Training, while effective at providing information about subject matter and pedagogy, requires follow-up support if it is to impact teaching practice (Darling-Hammond & McLaughlin, 2011).

Another key criticism of training as a PD model is the fact that it is difficult, if not impossible, to meet the all of the needs of a large group of teachers (Kenny, Seen, & Purser, 2008). Guskey (2000) notes that “the major shortcoming of training is that it offers few

opportunities for choice or individualization. Hence, it may not be appropriate for the varied levels of educators' skills and expertise" (p. 23). Attention must be paid to the needs of rural educators when training is utilized as a strategy for PD. Rural school divisions, however, may choose to utilize training because a particular strategy or particular content is considered valuable in supporting local initiatives. Such training allows teachers to share common experiences and develop common vocabulary around a specific topic or initiative. Attention should be paid, however, to engaging rural teachers in post-training development that meets their varied levels of skill and expertise, and that helps them apply new information to their own classroom contexts.

Another way that rural divisions may choose to utilize training within the broader PD structure, is to send representatives out to see presentations in other locations, and bring back the knowledge they obtain to their home division; this is also known as a cascade or train-the-trainer model (Villegas-Reimers, 2003). As already stated, internal knowledge and expertise in rural divisions can be somewhat limited due to the small numbers of educators that work within them. It is important for rural divisions to find ways to access information about best practices and change initiatives that are occurring outside of their divisions. It is equally important for rural divisions to find ways to help teachers relate such practices and initiatives to their own contexts.

Observation and assessment. Guskey (2000) suggests that "one of the best ways to learn is by observing others, or by being observed and receiving specific feedback from that observation. Analyzing and reflecting on this information can be a valuable means of professional growth" (p. 23). This is the essence of observation- or assessment-based PD models. Such models seek to improve teaching by providing feedback to teachers about their classroom practices. Observation and assessment models can take on many forms, such as peer

coaching, clinical supervision, and teacher evaluation (Guskey, 2000; Sparks & Loucks-Horsley, 1989; Villegas-Reimers, 2003). What differs between the models, largely, is who is doing the observing. In general, whether implemented through peer coaching, clinical supervision, or teacher evaluation, observation and assessment models include “a pre-observation conference, observation, analysis of data, post-observation conference, and (in some instances) an analysis of the observation/assessment process” (Sparks & Loucks-Horsley, 1989). All of these steps are generally repeated, generating a cycle of ongoing improvement for educators.

Aside from face-to-face observations, another type of observation model involves the use of records of practice (video, student work, study groups) to promote teacher learning as they collaborate to look at evidence of teaching practice (Higgins & Parsons, 2009). Van Es and Sherin (2010) describe the use of video in this manner, indicating that it provides “teachers with a window into each other’s practices and the opportunity to discuss a variety of issues about teaching and learning” as well as helping teachers “learn to notice and interpret key features of classroom interactions” (p. 156). The key benefit of using video to analyze teaching methods is that individual self-analysis can occur in conjunction with peer analysis or coaching, all within a community of colleagues. Of course, attention must be paid to the culture of such a community. A sense of vulnerability may be experienced by teachers, which can only be overcome if a culture of respect, collegiality, and trust is established within the community of teachers. Creating such an environment can enable the use of “critical friends” (Chance & Segura, 2009; Darling-Hammond & McLaughlin, 2011) to examine practice in an environment free of judgement and negativity.

Another way that observation and assessment can be used to improve teaching and learning is through supervision and assessment of teachers. One of the greatest criticisms of

“one-shot” workshops is that they have limited impact on teaching practice and student learning. This is often due to the fact that there is no follow-up to individual sessions, or accountability for teachers to transfer knowledge gained at such workshops to their classroom practices. By engaging simultaneously in PD and a strategy such as clinical supervision, accountability for new ideas can be fostered in schools. Dufour (1991) suggests “the primary goal of clinical supervision is to improve instruction by observing, analyzing, and ultimately changing the behaviour that takes place in the classroom” (pp. 74-75). When PD is accompanied by clinical supervision, there is a greater likelihood of changes occurring in classroom practice.

Observation and assessment models have significant benefits for participants and for schools in general. Increased accountability for engaging in ongoing change and growth, benefitting from the alternative perspectives of colleagues or administrators, learning to notice details about teaching and learning, and decreased isolation of teachers are all benefits of using an observation and assessment model of PD (Guskey, 2000). In addition, both the observer and the observed benefit from participation in this process (Sparks & Loucks-Horsley, 1989). Guskey (2000) notes that “The observer gains professional expertise by watching a colleague, preparing the feedback, and discussing common experiences. The one being observed benefits from another’s point of view, gains new insights, and receives helpful feedback” (p. 24). For rural divisions in particular, observation and assessment models provide a promising avenue for decreasing the isolation felt by rural teachers. Observation and assessment models can be utilized as part of a school-wide improvement strategy, and can be conducted across subject areas or grade levels, which is important for rural schools. Working on pedagogical skills through an observation and assessment model of PD can provide cohesion for what are otherwise very diverse teachers in a school or division.

In addition to benefits, observation and assessment models pose some challenges for rural school divisions. One of the greatest issues surrounding observation and assessment models is the issue of time. While this concern is not unique to rural places, finding the time to engage in ongoing observation is critical. In rural places, teachers and administrators, who already experience high workloads, may find it impossible to spend the time necessary for these models to flourish in their schools. Moreover, not all teachers and administrators necessarily have the capacity to do this well, which could compromise the success of such models. Small school administrators and their teachers may find it difficult to separate formal evaluation practices from PD observations, particularly because of the small staff sizes in rural schools, which is counterproductive to teacher learning. Finally, this method of learning may be intimidating and/or unnecessarily stressful for some teachers, particularly those who are new to the profession.

Mentoring and coaching. Somewhat similar to an observation and assessment model of PD, are mentoring and coaching models. According to Guskey (2000):

The mentoring model of professional development typically involves pairing an experienced and highly successful educator with a less experienced colleague. Regular opportunities are then provided for discussions of professional goals, the sharing of ideas and strategies on effective practice, reflection on current methods, on-the-job observations, and tactics for improvement. (p. 28)

The mentoring model is based on the idea that teachers participate in communities of practice (Lave & Wenger, 1991) in an increasing manner until they become full participants in the profession. Mentors perform the role of masters, helping newcomers to the profession develop the skills, knowledge, and ability to become full participants. Teachers being mentored engage in

a type of apprenticeship, as they learn the art of teaching for themselves. The activities in which mentors and mentees engage can vary. Observation of lessons, lesson study, collaborative planning, informal dialogue, and reading common scholarly literature are possible methods of providing guidance and opportunities for growth for both members of the partnership. Strategies for improving teaching and learning are selected based on the teachers' needs.

Coaching, like mentoring is largely about learning conversations that occur between a coach and the coachee (Knight & vanNieuwerburgh, 2012). The term coaching, however, has a slightly different connotation than that of mentoring. While mentoring implies that one member of a duo is more experienced and one is less, coaching does not necessarily make this assumption. While mentors seek to give advice to mentees, coaches try to help learners generate their own questions and come up with their own answers (Knight & van Nieuwerburgh, 2012). In some ways, coaches (while they have significant expertise in some areas) are more facilitators than advisors. In terms of PD, coaches seek to be agents of change in order to improve both students' and teachers' learning (Hull, Balka, & Harbin Miles, 2009). By supporting teachers in improving practice, coaches contribute to overall system reform as student learning is improved (Berg et al., 2014; Killion & Harrison, 2006).

In more recent years, a move towards finding an evidence-based approach to coaching and PD have seen the rise of a brand of coaching labelled as “instructional coaching”:

In instructional coaching (sometimes referred to as content-based coaching), teacher leaders, or coaches, facilitate and guide a school-based professional learning program for groups of teachers in specific content areas. These groups focus on the intersection of school and student needs and district reform initiatives with the goal of building a professional learning community that supports collective leadership, continuous

improvement of teaching practice, and, ultimately, improved student learning.

(Annenberg Institute for School Reform [AISR], 2003, p. 3)

Instructional coaching respects the professionalism of teachers and is grounded in a belief that coaching involves an authentic partnership between equals, not between an expert and novice (Knight & van Nieuwerburgh, 2012). Instructional coaches work with teachers to assess current practice and set specific and measurable goals for improvement. Instructional coaches then suggest “evidence-based practices the teacher might implement in an effort to meet the goal” (Knight & van Nieuwerburgh, 2012). Modeling, observation, and team teaching are all strategies a coach might use in helping teachers meet the goals they have set. Such strategies require the collection of data as evidence of improved teaching and learning, and are often cyclical in nature as teachers analyze data and set new goals for improvement.

Mentoring and coaching can benefit rural school divisions by decreasing teacher isolation and increasing teachers’ sense of efficacy in their work. Both of these may help rural divisions retain teachers and improve continuity of improvement initiatives. In addition, coaching has shown evidence of encouraging collaborative, reflective practice, promoting positive cultural change, encouraging the use of data to inform practice, promoting implementation of learning and reciprocal accountability, and supporting leadership across a school system (AISR, 2003). Mentoring programs may be useful tools for induction into both the teaching profession, and the rural community. In addition, mentoring and coaching programs may be an effective tool for combatting issues related to teachers teaching outside of their areas of expertise. By drawing on the internal capacity of rural school divisions, and by investing in the development of leaders interested in mentoring and coaching, networks, collaboration, and development of internal capacity can be fostered for relatively little cost.

One cautionary note for rural divisions seeking to implement mentoring or coaching programs into their PD model is that these strategies are simply not enough on their own to constitute broad system improvement (AISR, 2003; Guskey, 2000). Not all teachers will benefit from coaching/mentoring situations. Experienced teachers, in particular, still need opportunities to grow and have their professional needs met, while resistant teachers may never be reached through this strategy (AISR, 2003). Secondly, coaching/mentoring requires significant skill, and coaches/mentors require training if they are to be effective. It is not simply a matter of assigning mentors or coaches in a rural division. Investment in such training is imperative if coaches/mentors are to be successful in changing teacher practice and improving student learning (AISR, 2003). Finally, in rural divisions, there are simply fewer people to do the work required in a successful coaching implementation, which may lead to workload intensification for coaches/teachers. Any given teacher may have many hats to wear (e.g. teacher, acting principal, union representative, volleyball coach, community liaison, etc.), and adding instructional coaching to the list may be an unreasonable expectation. This, in addition to the fact that many schools do not have teachers teaching at the same level or in the same subject areas as novice teachers may make the coaching model difficult to implement in rural divisions.

Involvement in a development/improvement process through outside organizations.

When educators are brought together to create new curricula, develop common assessments, or find solutions to problems, opportunities for individual and collective growth emerge (Guskey, 2000). Such opportunities require the interchange of ideas between teachers (in the case of development of curricula or assessments) or stakeholders (in the case of solving community or school-related problems). Opportunities for growth exist as a result of the complex interactions that occur in such processes, as beliefs and attitudes are expressed, and as understandings and

solutions are negotiated between participants (Guskey, 2000). In the case of curricula and assessment development committees, often ten or twelve teachers are brought together from geographically diverse locations to work on the task of creating a new curriculum or a provincial assessment. Unique opportunities are formed, as teachers meet new colleagues, to which they have not previously had access. In addition, a complex process of negotiation takes place between committee members as they identify key concepts, practices, or outcomes (Guskey, 2000). In the case of school or community improvement initiatives, a similar process of negotiation takes place between stakeholders (parents, students, community members, administration, teachers, etc.), as they work together to solve problems (Guskey, 2000). Participation in such processes fosters individual and collective growth for those involved, and can be a valuable source of learning for rural teachers.

Partnerships between universities and schools for the purposes of professional development, research, or curriculum development are another possible area with the potential to foster teacher learning (Falkenberg, 2010; Guskey, 2000; Nelson, 2010; Villegas-Reimers, 2003). Such partnerships bridge the gap between theory and practice, arguably bringing them closer together. Exposing teachers to the theoretical underpinnings of teaching practice can provide an opportunity for reflection and growth, as can being involved in research projects (Villegas-Reimers, 2003). Partnerships with universities can provide additional personnel (in terms of leadership capacity) when researchers are involved in leading groups of teachers to learn and implement teaching strategies. Seeking out such opportunities can have significant benefits for school divisions, providing that universities/schools are interested in working in rural schools.

Rural school divisions can benefit greatly from promoting involvement in improvement

or development processes. Involvement in provincial curriculum development and assessment committees are of particular benefit to rural divisions because of their mandates to bring teachers from diverse geographic locations to the committee, as well as the fact that they are funded through provincial education departments, and therefore do not generally cost rural divisions anything to have teachers participate. Rural divisions can also benefit from supporting or initiating attempts to draw people together, locally, with the goals of community or school improvement. Such initiatives help build school-community relationships, and draw on the expertise of various stakeholders when looking at improvement (Nelson, 2010). The promotion of such opportunities fosters the development of collaborative and leadership skills in educators; furthermore, it protects and promotes the sustainability of rural communities.

Other opportunities also exist for educators in rural divisions through participation in teacher union activities or leadership councils. Teacher unions often have participation in union activities written into their collective agreements with school boards, making such activities “some of the last vestiges of contractually guaranteed professional development time” (Bascia, 2001, p. 4). These opportunities usually come with little or no cost to rural divisions, and often provide PD about teaching and learning, along with sessions about union matters (Bascia, 2001). Leadership or administrative councils also often provide members with PD opportunities as part of certification programs, for example. Rural school divisions can take advantage of outside organizations that have mandates to provide learning opportunities to teachers and administrators, and as such, capitalize on both the content-based PD available through them, and the networking opportunities they provide.

Aside from the potential benefits of encouraging participation in development/improvement processes, there are a few drawbacks to such participation. The

primary drawback is that while participants gain access to networks of people that they might not otherwise have, the direction of any PD provided is decided externally – that is not by the rural teacher or division. For this reason, the applicability of the PD could be compromised.

Moreover, the sheer number of initiatives in which teachers can participate is not infinite. There are limitations, reasonably, to the number of initiatives in which teachers can be involved before fragmentation and disconnect become an issue (Reeves, 2010).

Arts-based models. Arts-based models (for example those employing the use of music, drama, drawing, painting, dance, poetry, visual arts, literature, or any other art form) for teacher PD draw on learning theory about the multiple ways people come to know things individually and collectively (Ogden, DeLuca, & Searle, 2010). They have the potential to create real world situations in which connections can be made to the practice of teaching and learning, and can increase connectedness and sense of community (Ogden et al., 2010). According to Butterwick and Lawrence (2009) arts-based approaches to learning “can enhance learning and create spaces for transformation to occur” (p.35), and have the potential to tap into what is not yet at the conscious level. Whether utilizing theatre to help educational leaders understand the ethical dimensions of decision making (Cranston & Kusanovich, 2013), utilizing young adult literature to help teachers learn about the challenges faced by adolescents (Bach, Choate, & Parker, 2011), utilizing drama-based instruction to explore the relationship between elementary and secondary teachers’ sense of self-efficacy and pedagogical conceptual change (Lee, Cawthon, & Dawson; 2013), or utilizing a theatrical commons to broaden and deepen democratic engagement within marginalized populations in a school community (Sloane & Wallin, 2013), arts-based PD models provide an alternative to more traditional PD models. Such methods engage teachers both intellectually and physically with educational concepts, allowing them to make sense of new

ideas as a result of participation in the arts-based experience.

While arts-based models have potential for aiding in the growth of teachers as professionals, they may be somewhat difficult for rural divisions to employ. Many rural divisions have difficulty attracting specialized teachers such as those in the arts, let alone PD facilitators with a background in arts-based PD methods. Moreover, arts programs are often the first programs cut when school divisions find shortages in funding. In rural communities where this is the case, the privilege of artistry is removed for both rural students and teachers.

Collaborative inquiry groups. A collaborative inquiry model can be used both as a tool for promoting the self-regulated growth of teachers, and as an agent of meaningful, sustained change in classrooms (Butler & Schnellert, 2012). Collaborative inquiry groups engage teachers in cycles of inquiry “in which they develop a shared vision for student learning and use various forms of student data to identify gaps between this vision and student learning” (Nelson, Deuel, Slavit, & Kennedy, 2010). Attention is paid in collaborative inquiry groups to the “deep conversations” (Nelson et al., 2010) that occur between members, as well as fostering collegial, rather than congenial, conversations (Butler & Schnellert, 2012). The concept of collaborative inquiry has also been referred to by many as action research (Loucks Horsley et al., 2010; Stringer, 2004; Villegas-Reimers, 2003), and collaborative inquiry groups have operated under such labels as professional learning communities or PLCs (DuFour, 2005; DuFour & Eaker, 1998; Eaker, DuFour, & DuFour, 2002; McLaughlin & Talbert, 2006, 2010; Nelson et al., 2010), critical friends groups (Nelson et al., 2010), study groups (Guskey, 2000; Nelson et al., 2010), teachers’ networks (Darling-Hammond & McLaughlin, 2011; Villegas-Reimers, 2003), and communities of practice (Darling-Hammond & McLaughlin, 2011; Lave & Wenger, 1991; Little, 2002; McLaughlin & Talbert, 2010). According to McLaughlin and Talbert (2010):

You can use all sorts of different language around this – community of practice, collaborative practice, PLC – but it is a group of individuals who share a goal and work together to achieve the goal, assess their progress, make corrections, and hold themselves accountable for achieving their common goal. Typically, people think of *teachers* in learning communities. But [PLCs] can be principals across schools in a district. Central office can function as a professional learning community. And, of course, [PLCs can be] teachers in grade-level teams in elementary schools – or in high school subject departments, or cross-discipline teams working with the same set of students. Such groups are PLCs to the extent that they are doing joint work together and have norms of collaboration and mutually accountability. (p. 35)

Although there are variations on methods of conducting collaborative inquiry, generally it is thought of as a cyclical model involving collaborative planning, acting, observing, and reflecting (Loucks Horsley et al., 2010). The result, is that it supports teachers examining their teaching practices in a systematic, ongoing way, with the purpose of improving their practice (Loucks-Horsley et al., 2010). Collaborative inquiry models incorporate the use of teacher and student data as part of the learning process, encouraging teachers to identify areas for improvement and evaluate the outcomes of changes in practice. Such groups can exist within schools, across schools or divisions, as well as between schools and divisions, depending on the focus of the inquiry. Although the focus of different groups may vary, they are all guided by the goal of educational improvement of some form. In this way, they constitute what Reeves (2009) terms a “level five network” in which participants are value-driven by a moral imperative to improve student learning for all students.

The benefits of collaborative inquiry groups are numerous. Schmoker (2005) suggests

that “the use of PLCs is the best, least expensive, most professionally rewarding way to improve schools” (p. 138). Certainly, collaborative inquiry groups have the potential to engage teachers in ongoing, job-embedded learning at a fraction of the cost of bringing in big name speakers or sending teacher out to workshops and conferences. Cost, however, is not the only strength of collaborative inquiry. Such groups require teachers to identify goals, analyze student learning, make improvements to practice, and evaluate the changes that occur as a result of the improvements. They focus teachers on the business of teaching and learning within the context of their school lives, decrease isolation, and increase accountability. In addition, collaborative inquiry models recognize the professionalism of teachers, and place faith in them to find collaborative solutions to the problems surrounding student learning.

In spite of the strengths of collaborative inquiry models, it is well accepted that they require hard work and commitment (DuFour, 2005). McLaughlin and Talbert (2006) suggest, in a discussion of the merits of school-based learning communities, that:

School-based learning communities are difficult to establish and sustain. Lack of trust, time, and talent are the usual reasons. When teachers are unwilling to take the risks that go along with candid reflection, when they don't have many opportunities to come together over students' work, when they lack leadership or expertise at the school site, then community-building initiatives are hamstrung and commitment erodes during faculty or leadership transitions. (p. 11)

Collaborative inquiry groups require a culture of trust to be established, in which teachers are able to reflect on their own practice without fear of judgement (Whitcomb et al., 2009; Quick et al., 2009). In addition, such groups must be afforded time to engage in the activities of establishing goals, analyzing student work, designing interventions, and assessing results (Goos

et al, 2011; Quick et al., 2009). If adequate time is not given, interest and effort will fade, leading to the eventual passing of the model as yet another fad.

Rural school divisions have reason for both optimism and caution with regards to collaborative inquiry groups. Reduced costs, potential for improvement of practice, decreased isolation, and increased accountability and professionalism are all attractive benefits for rural school divisions utilizing collaborative inquiry groups. In addition, the local autonomy that such a model can afford teachers in engaging in initiatives that matter most to them as educators is very powerful. In light of the difficulties rural teachers sometimes have reconciling PD experiences with their own contexts, it may be prudent to consider collaborative inquiry as a strategy for engaging teachers in professional learning *within* their classroom contexts. This being said, however, there are some barriers that exist to their implementation in rural contexts. Small staff numbers, particularly in very small schools, make school-wide collaborative inquiry groups difficult to establish. In addition, small numbers of teachers in rural divisions make it difficult for highly specialized teachers to find a critical mass of teachers to create such groups in their areas of interest. As a result, rural school divisions must look at alternate ways of making collaborative inquiry work within their unique contexts. Cross-curricular learning groups within schools provide one option for engaging all teachers in participation. These can, however, fail to meet the needs of all of the teachers (especially in specialized areas). Bringing teachers together from different schools in a rural division is another option, although transportation costs can be a deterrent to this strategy. Nelson et al. (2010) note the twin constraints of money and expertise as being major constraints on the facilitation of collaborative inquiry groups. These constraints may be magnified in rural areas where transportation costs are high, and where limited expertise may be available for leading such groups. Ultimately, there is no perfect answer to the

geographic and logistical dilemmas faced by rural school divisions in utilizing collaborative inquiry groups for PD. Unique solutions to these dilemmas, based on individual contexts, are essential to their success.

While Information and Communication Technologies (ICT) are more about modes of delivery than a distinct model for PD, they bear mentioning due to their unique characteristics, and their ability to promote collaborative inquiry groups online. Kenny et al. (2008) suggest that PD facilitated through ICT can promote ongoing professional interactions/networks, increased accountability towards group members, community cohesion, and communities of practice that provide access to information and discussion otherwise not available. Similarly, Dede, Ketelhut, Whitehouse, Breit, and McCloskey (2009) note that online communities of practice can provide opportunities for reflection that are different from face-to-face settings; settings in which those teachers who tend to be silent at face-to-face sessions are able to “find their voice” (p. 9). Moreover, Dede et al. (2008) note the benefits of online teacher PD include the availability of PD for teachers at their convenience, and access to experts and resources that might not otherwise be available. ICT-facilitated collaborative inquiry groups have the potential to bring together geographically isolated teachers with colleagues who share common goals, and provide a venue for engaging in conceptualizing, planning, acting, and reflecting on their teaching practices and the resulting student learning. Bennet and Barp (2008) make the case for conducting peer observations online, allowing geographically distant teachers to conduct observations and provide feedback about classroom practice. For rural divisions, connections made through ICT between teachers have potential for building collaborative inquiry groups that might otherwise not be possible. Some of the potential drawbacks to ICT-facilitated PD or collaborative inquiry groups, however, are also cited in the literature on the subject. Teachers’

comfort level with ICT and the availability of active, effective facilitators are two potential areas of concern when utilizing ICT for collaborative inquiry (Kenny et al., 2008). In addition, constraints such as costs and demands on teachers' time can be deterrents to successfully supporting teachers in remote schools (Kenny et al., 2008). The technology must be available for teachers to use, and such technology comes with a price tag in any division. Moreover, teachers must have the time, desire and skills required to engage in such a process.

Complex Models

According to Guskey (2000), combining PD models may be the most appropriate way to develop a PD plan:

The appropriateness of any particular model varies depending on the goals, the content, and the context for implementation. A professional development plan based on a combination of models, however, can take advantage of the positive attributes of several models (Guskey, 1996c). The use of study groups, for example, might lead to a training program that could be followed by a series of inquiry/action research projects. Or, involvement in a development/improvement process might be followed by observation/assessment or mentoring. Combining models in thoughtful ways can provide a highly effective means to professional growth and improvement at both the individual and organizational levels. It also can help ensure that professional development efforts remain intentional, ongoing and systemic. (p. 29)

Complex models of PD seek to combine several individual or collaborative PD models into a larger, more comprehensive model that better meets the needs of teachers in their local context. Bascia (2001) suggests that teacher unions "must stop searching for the single, best professional development strategy and commit themselves to a policy of multiple strategies, while

acknowledging the inherent messiness and contradictions of such a plan” (p. 9). The same could be said for rural divisions. Perhaps the strongest PD model would be one that offers strategies and approaches to PD that meet the variety of needs contained within rural divisions. In some ways, the ability of complex models to meet the needs of a variety of teachers (in a variety of contexts), makes such models more attractive.

According to Fullan (2010), in order for system-wide reform to take place, divisions must foster the development of both individual capacity and collective capacity. Not only must educators improve their knowledge and practice, but they must also engage in strengthening the networks, relationships, and leadership skills that will add to the collective capacity of a school or organization. Complex models may provide a comprehensive strategy for building both individual and collective capacity in rural divisions. As a result, they may hold the strongest possibility for rural system reform.

While discussing all possible complex PD models is not possible in such a short space, two designs - the Transformative Professional Development (TPD) model, and design and evaluation models will be used to illustrate the nature of complex PD models in general. The models discussed involve selection of strategies for learning that are responsive to the needs of the educators engaging in the PD. While at a basic level, complex models need only combine several individual PD strategies/models, many complex models take it one step further, creating highly effective, context-specific learning opportunities for educators. An examination of the TPD model and design and evaluation models will highlight some of the characteristics of highly-effective complex PD models, and provide an opportunity for consideration of the potential benefits and challenges they hold for rural divisions.

Transformative Professional Development model. The TPD model was developed by Johnson and Marx (2009) as part of a three year project aiming to: increase the use of effective science instruction and improve student learning; create an effective learning/working environment, and; create a shared vision and concern for students and colleagues in an urban middle school (Johnson & Fargo, 2010; Johnson & Marx, 2009). Fundamentally, the study sought to “transform” the climate and outcomes of two urban middle schools experiencing low morale, low expectations of students, and trust issues, into a climate where relationships and trust were fostered, and teaching and learning were improved. According to Johnson and Marx (2009), “TPD is based upon the premise that through effective, sustained, collaborative professional development, climates of schools as well as beliefs and practices of teachers can be positively transformed over time” (p. 118).

The TPD model was co-constructed by teachers and the staff PD team that had been assembled to address concerns and implement the model. In this sense, the model emerged as the study progressed. Although some of the initial activities involving the exploration of issues and knowledge/beliefs, a focus on inquiry-based science teaching, exploration of multicultural education issues, and strategies for building literacy (many of the students spoke Spanish as their first language) were planned ahead of time, many of the decisions about PD activities were made in response to the perceived and articulated needs of the teachers. For example, the planners instituted a Spanish class to help teachers relate to students, as well as a book study on classroom management, when it was found that teachers were reluctant to engage in cooperative learning with students for fear of losing control of their class behaviourally. Teachers engaged in an extremely diverse set of experiences, including (in addition to the ones already mentioned): monthly meetings, focus groups, attending a conference together, completing home visits,

watching inquiry lessons be modelled by developers, creating inquiry-based lessons in groups, creating a common set of expectations and procedures for their classrooms, and mentoring. The PD opportunities were chosen based entirely on their potential to help achieve the goals established by the collective.

The TPD model is an example of a complex PD model that clarifies the nature of complex models. Complex models are based on theoretical underpinnings that are related to educational theory, but actively select multiple forms of individual or collaborative PD in order to achieve the goals of the PD. In the case of the TPD model, the traditions of transformative education (empowerment of participants, sense of agency, etc.), as well as collaborative learning theory and teacher PD theory, were drawn upon to create a comprehensive, pragmatic model that utilized multiple strategies to meet the needs of the teachers involved.

Complex models such as the TPD model have great potential for rural school divisions. As discussed earlier, many attempts at providing PD for rural teachers have been criticized for not meeting the needs of the teachers who participate. The TPD model encourages PD programs and models to be responsive to the teachers who are involved, and to select strategies based on their appropriateness for accomplishing the goals that have been set by the collective. Despite the fact that Johnson and Marx (2009) studied an urban middle school, the challenges faced by rural schools might also be addressed in such a manner.

A primary concern with attempting to apply the TPD model in rural divisions, however, is the availability of resources. Bringing teachers together this often, and for this length of time, could be costly to rural divisions. Even more troublesome, may be the problem of who would lead such a group. In the case of the urban middle school reform described by Johnson and Marx (2009), there was a PD team that planned with teachers. It is likely that rural divisions would

have (at best) one person to lead such an initiative, and they would do so, likely on top of teaching or working in some other capacity in the division at the same time. Rural divisions, that wish to develop such a model, would necessarily need to find ways to overcome this challenge.

Design and evaluation models. Design and evaluation models typically include a general process involving: (1) determining the desired outcomes and impact, (2) assessing the context, (3) developing the content and process for training, (4) evaluating the impact on teacher learning and practice, and (5) evaluating outcomes of the PD on student performance (Mitchem et al., 2003). These models incorporate *design* in the sense that the content and process for training or PD are determined by the desired outcomes, as well as the assessment of the context that has taken place. Needs assessments, government mandates, school or divisional goals, the culture of a school or division, historical information, and other contextual pieces of information may be used to determine the desired outcomes of a PD model, in order to design a learning process that is responsive to the participants, and relevant to the contexts in which they work. Such models incorporate *evaluation* in the sense that the effects on teacher learning are evaluated, as well as the effectiveness of the PD in fostering sustainable changes to teacher practice and student learning.

The PD design framework developed by Loucks-Horsley et al. (2010) is an example of a design and evaluation model. The framework looks at designing PD experiences based on knowledge and beliefs supported by research, the unique features of the local context, and critical issues that may influence the success and impact of the PD. The initial three phases of the model include committing to a common vision and standards, analyzing student learning and other aspects of the context, and setting goals for the PD. Once the goals are set, PD activities are planned and carried out, with careful attention being paid to the strategies selected. Such

strategies are selected based on the goals and needs of teachers and students, and attention is given to deciding which strategies will best help teachers and developers meet the goals. Again, following the activities, the results on teacher learning, changes in practice, and student learning are evaluated, and reflection and revision lead to a regeneration of the process, forming a cyclical model of design and evaluation.

For rural divisions, that have unique contexts and issues, design and evaluation models provide a process for the creation of uniquely local, rural models, that can improve learning for rural students, and meet the needs of rural teachers. Such models can take into account rural challenges that are related to context, and plan for issues that may be faced during the PD enactment. Design and evaluation models promote the generation of PD that is highly contextual and relevant to rural teachers - a welcome prospect. The one downside to this type of PD for rural divisions, again, however, is lack of resources, particularly in the form of staffing. Most divisions in rural areas do not have PD planners to engage in the process of creating responsive design and evaluation models for every initiative in the division. Rural divisions wishing to use such models, will necessarily need to find ways to overcome this problem through strategies such as the development of teacher leaders or coaches to help bridge this gap.

Conclusion

This chapter has summarized the literature reviewed for this research study. In reviewing the characteristics of effective teacher PD, eight characteristics were outlined that can provide guidance for school divisions, rural or otherwise, considering the effectiveness of their PD models, or even designing new structures for systemic improvement. In addition, four broad areas in which rural Canadian school divisions experience challenges to providing effective PD for teachers were identified. The challenges faced by rural divisions, while unique to each

context, provide a starting point for rural divisions considering implementation of a new PD model, or even evaluation of an existing one. The extent to which rural divisions are able to consider and plan for challenges related to funding, geography, staffing, and contextual differences is of critical importance in mitigating the challenges they face. Finally, the literature reviewed on existing models of teacher PD and their potential for rural school divisions provides a starting point for rural school divisions considering different PD structures. The discussion of the existing models in relation to rural contexts provides a unique, rural perspective in the consideration of how rural divisions might go about creating models of PD that lead to the provision of effective and meaningful PD for teachers, and that mitigate the challenges faced in providing effective PD locally.

Chapter 3 – Methodology

The purpose of this chapter is to outline the study's theoretical underpinnings and to describe the methods used for conducting the research study. The chapter includes: the conceptual and theoretical frameworks grounding the study, a description of the context of the study, the purpose of the research and the research questions that were addressed, the significance of the study, the reasons for choosing qualitative research (and single case study more specifically), a description of the ethics approval received and recruitment procedures, a description of the data collected and data collection procedures, a description of the data analysis and interpretation techniques, the delimitations and limitations of the study, a statement about the researcher's role and positioning in the study, and a discussion about the validity and trustworthiness of the study. Information on the study's findings is presented in subsequent chapters.

Conceptual Framework

Through my review of the literature, I have come to believe that in order for those who work in rural school divisions to develop local PD opportunities for teachers that are responsive to the professional needs of their teachers, and aligned with divisional goals and initiatives, they must consider the generation of context-specific PD models that draw on what is known about effective PD. By carefully selecting elements of existing PD models and sagaciously constructing models that leverage the unique features of rural contexts, leaders within rural school divisions can craft their own PD opportunities that minimize the challenges they face in providing effective PD for their teachers, and that build on the capacity and resources that exist within rural communities. Because rural school divisions vary greatly in location, size, availability of resources, and other factors that affect the provision of PD opportunities for the

staffs that work within them, it is impossible to develop a single model that would address the challenges faced by all rural divisions. Any attempt to mitigate the challenges to providing quality PD for rural staffs must be constructed at the local level with local strengths and challenges in mind. While such attempts may not be generalizable to other contexts (rural or otherwise), they may provide lighthouse examples from which others in rural leadership positions may construct understanding about how they might address the unique and varied challenges that exist within their own contexts.

The study outlined in this thesis is based on three primary propositions: (1) that rural divisions as organizations face challenges in providing meaningful PD for teachers and that teachers face challenges in accessing meaningful PD in rural contexts; (2) that rural leaders can construct local solutions to the challenges they face by leveraging the unique strengths that exist in their local contexts in order to conceptualize and implement PD models that mitigate the challenges they face and support teachers in meeting their instructional goals; and (3) that effective teacher PD, rural or otherwise, has generally agreed upon characteristics in the field of education that should guide the development of any PD model or opportunity in order to increase the likelihood of improving teaching practice and student learning outcomes. These three propositions form the conceptual framework on which the study is founded. The links between the literature reviewed for this study and the conceptual framework can be illustrated as indicated in *Figure 1* on the next page.

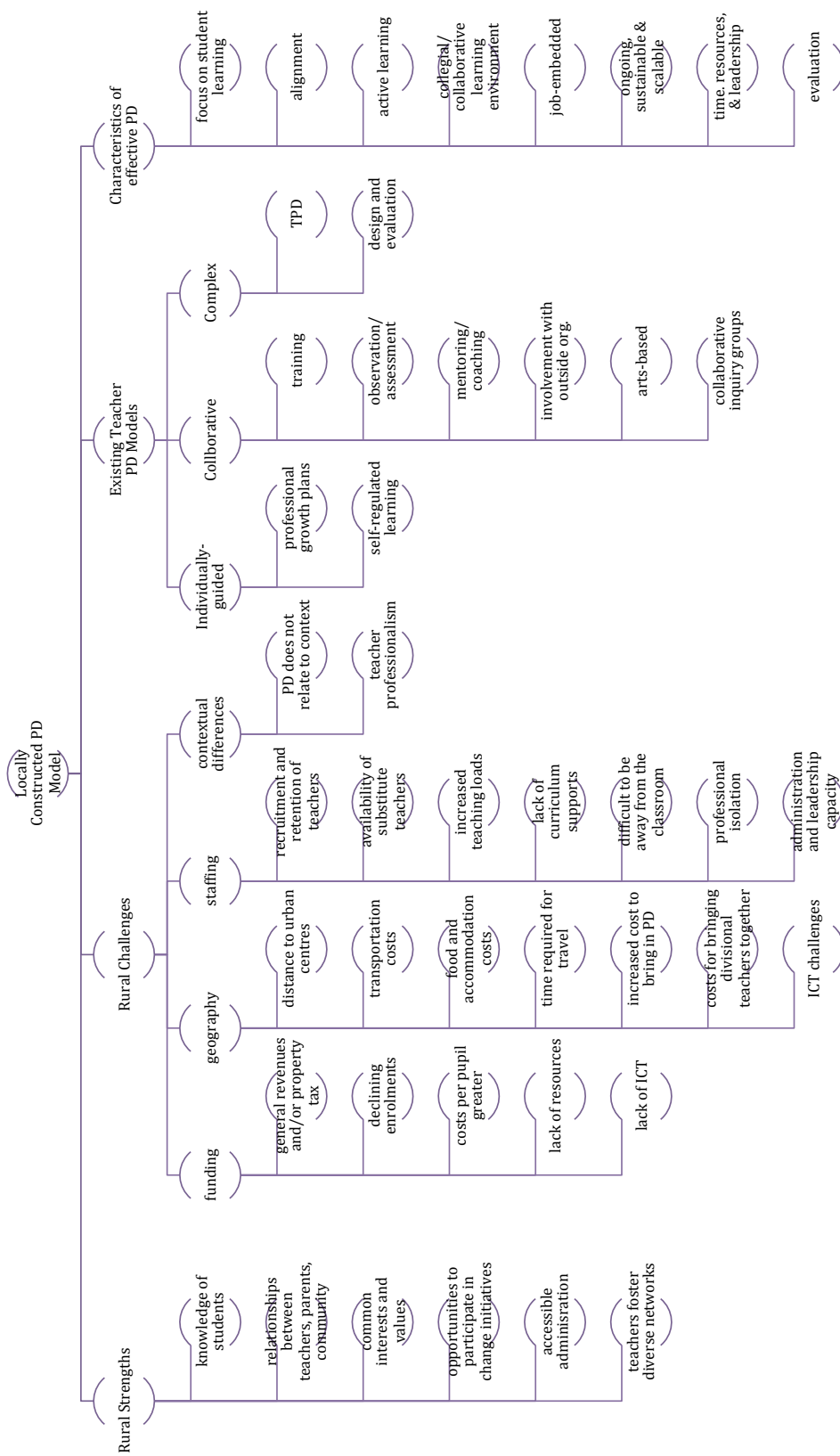


Figure 1. Links between conceptual framework and literature.

While the figure above is primarily hierarchical in nature, the relationship between a locally constructed PD model and the four main areas it must draw on is not. If rural school divisions are to create local models that minimize the challenges they face, they must both identify the challenges and draw on the unique strengths that exist within their contexts. Moreover, not all rural divisions have the same challenges or strengths. Locally constructed models must draw on what exists within the context. As a result, the figure above contains simply a suggestion of some of the categories of strengths and challenges that might exist within local contexts as identified in the literature on rural PD. While three categories of existing teacher PD models are evident off of the main category, this is simply evidence of the literature reviewed for this study. Many types of existing PD models exist and have potential for rural school divisions. By linking the literature reviewed for the study and the propositions that form the conceptual framework for the study, *Figure 1* visually depicts the four main considerations of rural school divisions when attempting to develop locally constructed models that mitigate the challenges they face in providing effective teacher PD: rural strengths, rural challenges, existing teacher PD models, and the characteristics of effective PD. As such, it is a useful tool for thinking about the specific model that is the topic of this thesis.

Theoretical Framework

The research study is grounded in social constructivist theory. While constructivism is generally accepted as a learning theory that suggests that individuals create new understandings as new ideas and phenomena come into contact with existing beliefs and knowledge (Richardson, 1997), social constructivism draws on the Vygotskian (1978) notion that social interaction is critical to the human learning process. Social constructivists view knowledge construction as more than an individual activity; they see it as a process that occurs

simultaneously in a social setting (Palincsar, 1998). As a result, those guided by social constructivist principles have increased interest in the culture and context in which learning or meaning making takes place, inclusive of the language and dialogue that take place within such settings (Richardson, 1999).

In education, teacher professional development is often viewed from a social constructivist perspective. In such a view, teachers are seen as learners who construct individual understandings of new phenomena as they engage in activities, dialogue, and reflection that allow new ideas to interact with their existing beliefs, attitudes, and understandings (Richardson, 1997, 1999). All of this occurs in a social context that is inseparable from the individual learning that occurs (McCullagh, 2012; Pitsoe & Mailia, 2012; Richardson, 1997, 1999). Learners co-evolve, and in addition to individual understandings that emerge through the complex interactions that occur, collective understandings are constructed that are also unique to the interactions and contexts in which they take place (McCullagh, 2012; Pitsoe & Mailia, 2012). Implicit in this view of teacher learning is the assumption that new understandings constructed through teacher PD experiences will then inform the future actions of teachers, allowing them to improve teaching practices and student learning outcomes (McCullagh, 2012; Richardson, 1999).

Because social constructivists view knowledge as constructed as opposed to transmitted (Cobb & Bowers, 1999; Postholm, 2012; Richardson, 1999), attention is paid to situational and contextual variables that promote learning. A social constructivist teacher PD model recognizes the importance of language and dialogue in the learning process (Cobb & Bowers, 1999; McCullagh, 2012; Palincsar, 1998; Richardson, 1999), the importance of reflection and dissonance/disequilibrium (Fosnot, 2005; McCullagh, 2012; Patton, Parker & Neutzling, 2012; Postholm, 2012; Richardson, 1999), and the establishment of a collaborative, safe learning

environment in which one is free to make mistakes (Patton et al., 2012). All of these recognitions impact how teacher PD experiences are planned, particularly in terms of the learning environment. As teachers engage with new ideas that potentially create dissonance or rub up against existing beliefs and understandings, teachers are provided with opportunities to explore, think about, and talk about the new ideas in relation to their existing understandings. This sense making allows for both individual understandings and collective understandings to emerge within the social context.

According to Pitsoe and Maila (2012), a social constructivist view of teacher PD requires “a dramatic shift in professional development focus, away from the transmission model of teaching towards one that is much more complex, situational/contextual and interactive” (p. 324). This is true for both the teacher in his or her classroom, and for the teacher as a learner. Such a view recognizes that teaching is a complex activity (McCullagh, 2012; Richardson, 1999), and the art and importance of leadership/facilitation (Patton et al., 2012; Pitsoe & Mailia, 2012; Richardson, 1999). Just as teachers strive to engage students in experiences that will create dissonance, dialogue, reflection, and ultimately new understandings, so too do facilitators of teacher learning. Facilitators of teacher PD must understand the contextually unique, complex environments in which teachers work, and create opportunities for teachers interact with new ideas.

In order to promote active engagement with new ideas, the content of teacher PD should be directed by participants, coming from the bottom up (Patton et al., 2012, Pitsoe & Mailia, 2012; Postholm, 2012; Richardson, 1999). Rather than something that is “done to them,” teacher PD from a social constructivist perspective requires teachers to see PD as a lifelong, inquiry-based and collegial activity (Pitsoe & Maila, 2012). It is not a single event that ends, but rather is

made up of continuous cycles of inquiry and discovery about teaching and learning conducted within various communities of learners over one's career.

Social constructivist models of teacher PD draw on situated learning theory that considers learning as participation in the social practices of a given community (Cobb & Bowers, 1999; Lave & Wenger, 1991). From this point of view, teacher PD consists of communities of practice that simultaneously evolve as the individual members of the community learn and grow. Even the concept of teacher PD, therefore, is a fluid, emerging construct that continually evolves through the participation of members of a community of practice (Pitsoe & Mailia, 2012; Richardson, 1999).

Social constructivism contributed to the study in two fundamental ways. The first was that it served as a lens through which to examine the locally constructed rural PD model. As a researcher, I was interested not only in the model's ability to mitigate challenges faced by the division and its teachers in accessing meaningful PD, but also in the effectiveness of the model in supporting teachers' professional growth in the area of mathematics instruction and student numeracy. The extent to which the model was effective was something that could be looked at from multiple perspectives, but how or why it was effective required some theorizing on my part as a researcher. Social constructivism, as a learning theory, most aligned with my own beliefs about the learning process, and as such, provided me with a lens through which I could look at the effectiveness of the rural PD model.

I chose to look at the model through a social constructivist lens by examining literature on social constructivism and distilling the learning theory down into three fundamental areas or constructs that contained six fundamental principles that I could use to examine the data in the study. The three fundamental areas I identified as essential constructs in social constructivist

theory were: social context, social interactions, and human engagement. Within these fundamental areas or constructs, I also identified six principles of social constructivist theory that contribute to learning: the dynamic nature of social context, the individual learner as situated within social contexts, social interaction as required for individual construction of meaning, collective generation of meaning, assistance by more competent others, and human action as mediated through tools. I have chosen to delay the expansion and discussion of these constructs and principals until Chapter 7 of the thesis, in part to eliminate the need for repetition, and in part to keep the discussion of the constructs and principles closer in proximity to where they are relevant in the study – in answering the third research question. These constructs and principles provided a lens through which the effectiveness of the model could be examined, and ultimately became a useful tool for analysis.

The second way that social constructivist theory contributed to the study was by informing the methodology used for the study. Teacher PD, rural PD, rural challenges, and effective PD are all socially constructed, dynamic phenomena. In order to examine such phenomena, multiple perspectives, the context in which they exist, and their changing and emergent nature must be considered. The case study methodology used for the study allowed for in-depth examination of context and multiple perspectives. Moreover, the collection of data from a two-year period allowed for examination of the changing and emergent nature of the locally constructed model. Social constructivism informed not only the PD model and the examination of its effectiveness, it also informed the methodology used for the study itself.

The Context of the Study

The Rural School Division

The research outlined in this thesis took place in a single rural Manitoba school division. With approximately one thousand students and approximately ninety teachers, the division was one of the smallest in the province. Despite the fact that the division had only a thousand students, it contained fourteen schools ranging from single digit student populations to just over two hundred students. Of the fourteen schools in the division, two were public high schools, five were public elementary schools, and seven were Hutterian schools. More information about the division is provided in the findings section of the thesis (see Chapter 5).

PD within the Division and the Move Towards a New Model

The school division had provided PD in the past for teachers in many ways. Financially, there were three main forms of PD funding in the division: the Joint PD Committee, the central PD fund, and school PD funds. The Joint PD Committee, which was partially described in Chapter 1, was a voluntary committee that was made up of a PD rep from each public school in the division, a Hutterian school representative, the superintendent, and the student services coordinator. It was termed a “joint” committee because it was essentially a partnership between the local teachers’ association and the school division to plan local PD opportunities for teachers. The local teachers’ association contributed \$3000 of their members’ dues to the committee’s operating budget, and the division contributed \$3000 plus other discretionary PD funds to the budget as needed to fund PD opportunities. The Joint PD Committee was responsible for planning two divisional PD days per year, which typically involved either bringing in a guest speaker or developing a workshop format day in which several sessions were available to

teachers at one location. The Joint PD Committee planned everything from location setup, to lunch, to thank you gifts for those running sessions, all of which was done on a volunteer basis. The Joint PD Committee also provided some funding for individual teachers engaging in summer PD through an application process.

In addition to the work of the Joint PD Committee, teachers also accessed PD by attending external workshops or conferences in larger urban centres. Typically these events occurred in larger urban centers like Winnipeg or Brandon, but occasionally teachers attended out of province workshops or even out of country workshops. The division made use of professional growth plans, requiring teachers to set their own professional goals each year. Teachers were then responsible for finding and accessing relevant PD opportunities that would help them achieve their goals over the course of the year. At the end of the year, they were required to report on their progress towards achieving their goals to their school principals, and principals reported more broadly to the division on the progress made by teachers in their schools. When teachers identified a workshop or conference that they felt would help them meet their professional goals, they requested funding and release time to attend the conference from their principals. This funding then came from school budgets, and amounted to about \$300 per teacher in the school. In some circumstances, when it was seen as beneficial to send a group of teachers (a team from a school or across several schools) to a particular event, the division used central PD money, which was money retained by the division for PD purposes that was separate from school PD budgets or the Joint PD Committee, to completely or partially fund primarily special initiatives.

Collaboration between teachers was also a form of teacher PD that was utilized by the division. Although the division did not have formal PLC structures in place, principals in local

schools could arrange release time for teachers to work together. Even across schools, principals could release teachers to work collaboratively with other teachers on a project. In addition, from time to time, small initiatives, usually sparked by pockets of teacher interest, engaged teachers in collaborating on projects together. These could be funded by school budgets or by central PD budgets as well.

In addition to the previously mentioned forms of existing teacher PD, the division ran a formal mentoring program for new teachers to the division, pairing them up with an experienced teacher with a similar teaching context, to help them get off to a successful start. The division also ran a leadership development cohort for two years in order to work on building teacher and administrative leadership capacity within the division. Both of these initiatives were funded by the central PD money retained by the division for special initiatives.

What was termed as in-school PD also occurred in the division on two separate divisional PD days. These days were planned by the principal and/or a school PD committee in each school, and the days allowed for teachers within each school to engage in collaboration or PD together. Schools engaged in a variety of activities during this time. Some schools had teachers plan their own activities for the day, some brought presenters into their school buildings, some principals led goal setting and planning days, and some schools ran book clubs. A variety of activities occurred on these days, and at times, schools even planned joint events that had staffs at two or more different schools merge to engage in PD together.

In Manitoba, there are five provincially-mandated PD days for teacher PD. These days are scheduled and managed by each school division. The division that is the subject of this research chose to use one of the days to allow teachers to attend an annual provincial PD day in October. On this day, special area groups in local teachers' associations schedule several events

throughout the province. In Winnipeg, the day is called Special Area Groups of Educators (SAGE), while in Brandon, the day is called Learning Information for Teachers (LIFT). Additionally, other smaller towns/cities have hosted activities on this day. This provincial PD day, along with the two divisional and two in-school PD days made up the five provincially mandated PD days in the division. These days required no substitute teacher costs, due to the fact that the schools in the division were shut down for these days. As a point of note, mileage was not paid for divisional PD days or SAGE/LIFT, but registrations for the provincial PD day were paid by the division.

The above description of PD opportunities for teachers is likely quite common for many rural school divisions in Manitoba. Conditions were ripe for change in many ways in the division when the idea of a new PD model was discussed. The local school board had noticed that a lot of PD money was being spent on travel to urban centres, including meals, hotel, mileage, and registrations. In addition, the topic of how to help teachers within the division collaborate more often and more effectively had been discussed on many occasions, due to the fact that small staffs, and large distances between schools made collaboration difficult for many teachers. While the Joint PD Committee had worked very hard to plan terrific opportunities for teachers, they could not meet the needs of all teachers in the division with a “one size fits all” approach. In general, there was interest in how things could be done differently and/or more effectively. As was previously described in Chapter 1, a unique PD model was collaboratively designed for the division in order to mitigate some of the challenges the division faced due to its rural context. The initiative was focused on mathematics instruction and student numeracy skills, a priority that was stated in the divisional goals. The new PD model was named the Numeracy Cohort, and sought to bring together teachers across the division to work on the

common goal of improving mathematics instruction and student numeracy skills. It involved the bringing together of more than a dozen K-12 teachers from all areas of the division (including nine of the fourteen schools) to regularly meet to inquire into effective teaching strategies for supporting student learning through the use of action research. The initiative began in the 2012-2013 school year, and designed to be revisited on a year-to-year basis. A detailed description of the PD model is included in Chapter 4.

Research Purpose and Questions

The purpose of the research study reported upon in this thesis was to examine the impact of a PD model that was designed specifically to mitigate local challenges to the provision of teacher PD. The study was designed to examine the PD model's effectiveness in terms of both mitigating the challenges faced by the rural division in providing meaningful teacher PD, and supporting teachers' professional growth in the area of mathematics instruction and student numeracy. The study was also designed to look at the PD model through a social constructivist lens in order to determine how such principles contributed to teacher professional growth. As such, the following three research questions were identified for the study:

- 1) To what extent (if at all) is the specific locally constructed PD model utilized in the rural school division able to mitigate the challenges faced by the rural division and its rural teachers in accessing meaningful PD?,
- 2) To what extent (if at all) is the model effective in terms of supporting teachers' professional growth in the area of mathematics instruction and student numeracy?, and
- 3) How do social constructivist principles contribute to teacher professional growth through the locally constructed rural PD model?

Significance of the Study

This research study contributes to the field of rural education on several levels. At the local level, it provides feedback to the local school division about the model in terms of its effectiveness in meeting the needs of the teachers involved, and its effectiveness in mitigating challenges to accessing PD within the rural context. On a provincial level, the study provides information to the Ministry of Education about the challenges facing rural school divisions in providing teachers with meaningful PD opportunities, as well as the challenges rural teachers face in accessing PD opportunities. Moreover, the study provides an example from which the Ministry may draw when considering provincial PD models, funding models, levels of support, and change initiatives. Nationally and internationally, the study serves as a lighthouse example of a grassroots effort to improve teacher PD in a rural context. The fact that the model was conceptualized collaboratively between a classroom teacher and a superintendent is, in itself, significant in terms of its status as true grassroots change. The study may be of interest to researchers and theorists who are studying topics such as rural education, professional development, social constructivist elements in teacher PD, educational change initiatives, and equity issues in education. Perhaps more importantly, the study may be of interest to other rural teachers, principals, or school division leaders concerned about improving access to effective teacher PD, or implementing change initiatives in other rural contexts.

Not much has been written about rural PD, especially in Canada. If rural divisions are to be empowered to create local solutions to challenges they face that draw on their unique strengths and contexts, examples must exist in the literature from which they may draw. This research provides one such example. Through an examination of challenges faced by the division, it opens up a discussion about rural challenges to providing effective teacher PD. By

painting a rich picture of the complexities involved in attempting to mitigate the challenges faced in the division, it offers a possibility for rural, grassroots change. And by examining the effectiveness of the PD engaged in through the model, it offers a rural perspective to the fields of literature on effective teacher PD and social constructivist teacher PD. The research is, at last, something published within a Canadian context about teacher PD within rural Canadian school divisions, something that simply does not currently exist. For these reasons, the study's contribution to the literature in the field is significant.

Choosing Qualitative Research

According to Creswell (2007), “we conduct qualitative research because a problem or issue needs to be explored. This exploration is needed, in turn, because of a need to study a group or population, identify variables that can then be measured, or hear silenced voices” (pp. 39-40). As previously discussed, there is a need to explore unique local solutions to challenges rural school divisions and teachers face in providing and accessing meaningful, effective teacher PD. Through such an exploration, knowledge can be constructed about the nature of the challenges rural divisions and teacher face, as well as ways in which local solutions can be found.

Typically, qualitative research is utilized when research is best conducted in a natural setting, where complex contexts can be examined over time (Creswell, 2007; Marshall & Rossman, 2011; Miles, Huberman, & Saldaña, 2014). Qualitative researchers are interested in understanding the meaning people construct through their lived experiences (Merriam, 1998), and seek to examine multiple views of reality (Marshall & Rossman, 2011). In qualitative research, the researcher is viewed as the key instrument for data collection and analysis, making

sense of multiple forms of data, and analyzing them inductively to establish emergent themes, ideas, and meanings (Creswell, 2007; Merriam, 1998).

Qualitative research was chosen for this study due to the nature of the problem on which the study is founded. Rural teacher PD is a complex phenomenon that exists within a complex context. It cannot be studied with a simple survey or by examining numerical data alone. Analyzing such a phenomenon requires an understanding of the complex context that surrounds it, as well as the construction of knowledge from multiple viewpoints and data sources. Rural teacher PD means different things to different people, and an understanding of it must be constructed through the consideration of as many viewpoints as possible. Qualitative research is best suited to such circumstances, and allows for in-depth analysis of complex situations. Moreover, it is suited to the social constructivist understandings in which the study is grounded. In order for an understanding of solutions to the complex problems facing rural school divisions and teachers regarding access to effective teacher PD to be constructed, qualitative research, rich in its consideration of multiple viewpoints and complex contexts, was a logical fit.

Choosing Single-Case Study

A single-case study is a suitable methodological choice for an in depth study of a single unit or bounded system (Creswell, 2007; Flyvbjerg, 2011; Merriam, 1998; Stake, 1995). Moreover, case studies are intensive, evolve over time, and focus on context (Flyvbjerg, 2011). In this research project, I chose to investigate a particular PD model in terms of three critical elements: its ability to mitigate the challenges faced in accessing PD in the rural division, its effectiveness in supporting the teachers' professional growth in mathematics instruction and supporting student numeracy skills, and the extent to which social constructivist principles contributed to teacher professional growth within the model. The PD model in the Manitoba

rural school division was a single unit of study in a particular context – a single case. In order to answer the research questions identified, a single-case study was a reasonable methodological choice. I was not interested in comparing the PD initiative in the particular school division under study to other PD initiatives in other school divisions, due in large part to the vital role that context plays in the development of locally generated initiatives of this sort. Moreover, my interest in conducting the study was to obtain a rich and vivid description of one initiative, inclusive of its strengths and challenges in order to give voice to rural divisions/teachers, and to provide an example from which other rural divisions/teachers could draw. My goal was to examine a unique example of real rural teachers in a real rural context (Cohen, Manion, & Morrison, 2011) that linked rural educational theory with rural educational contexts, potentially helping them inform one another. For these reasons, a single-case study was my methodological choice.

According to Yin (2009), there are five types and accompanying rationales for utilizing single-case designs: the *critical case* in which a case can be utilized to test a significant theory, the *unique case* in which a rare case can be used to study a phenomenon, the *average case* in which a case is chosen based on its applicability to other contexts, the *revelatory case* in which the researcher has access to a situation previously not accessible to scientific research, and the *longitudinal case* in which change over time can be examined. The case chosen for the research outlined in this paper had elements of several of these types of cases within it. First, the rural division was very small, making it potentially similar to many small rural school divisions, and yet unique in that it was smaller than most. Second, the rural division was specifically interested in creating a PD design that addressed some of the challenges faced by the size and location of the division (as well as other factors), making it a critical case in the sense that its design directly

related to theory about rural education challenges, and revelatory in that it had the potential to reveal the struggles inherent in rural contexts. Finally, the case was also revelatory in that it was something clearly unique to the field of literature on the subject that was not previously available. The fact that a school division had created a PD model that attempted to mitigate challenges faced to providing effective teacher PD had tremendous potential for shedding light on rural PD as an issue, as well as the potential to start a conversation about how such challenges could be mitigated within rural contexts.

Intrinsic case study. Stake (1995) identifies three types of case studies: intrinsic case studies, instrumental case studies, and collective case studies. Creswell (2007) further clarifies these categories as the single instrumental case study, the collective or multiple case study, and the intrinsic case study. According to both Creswell (2007) and Stake (1995), the *intrinsic case study* is utilized when the goal of the research is not to learn about other cases or about some general problem, but rather when there is interest in learning about a particular or unique case. In such studies, the case is pre-selected in that the case to be examined is clear because of a general interest in finding out more information about a typical or unique case on a particular subject (Stake, 1995). In this study, the case was pre-selected in that it was a unique case in which a small rural division had implemented a uniquely locally constructed PD model in the interest of improving teaching practice and student numeracy skills. What made the case unique was that the design of the PD model had been created in response to the context that existed within a small rural division. While other cases may exist in which small rural divisions have created PD designs for this purpose, the design created in this small rural division was worthy of study in its own right due to the fact that it had been created locally and with the consideration of challenges facing rural PD provision for teachers.

Units of analysis. Within the mode of a single-case study design, multiple units of analysis were used to answer the research question. According to Yin (2009), even though a single organization or program is being studied, multiple units of analysis may be used when attention is to be paid to more than one area of interest within a bounded system. In the case of this study, the three parts of the research question lent themselves to analysis of the PD model or design from four different perspectives (see *Figure 2* below).

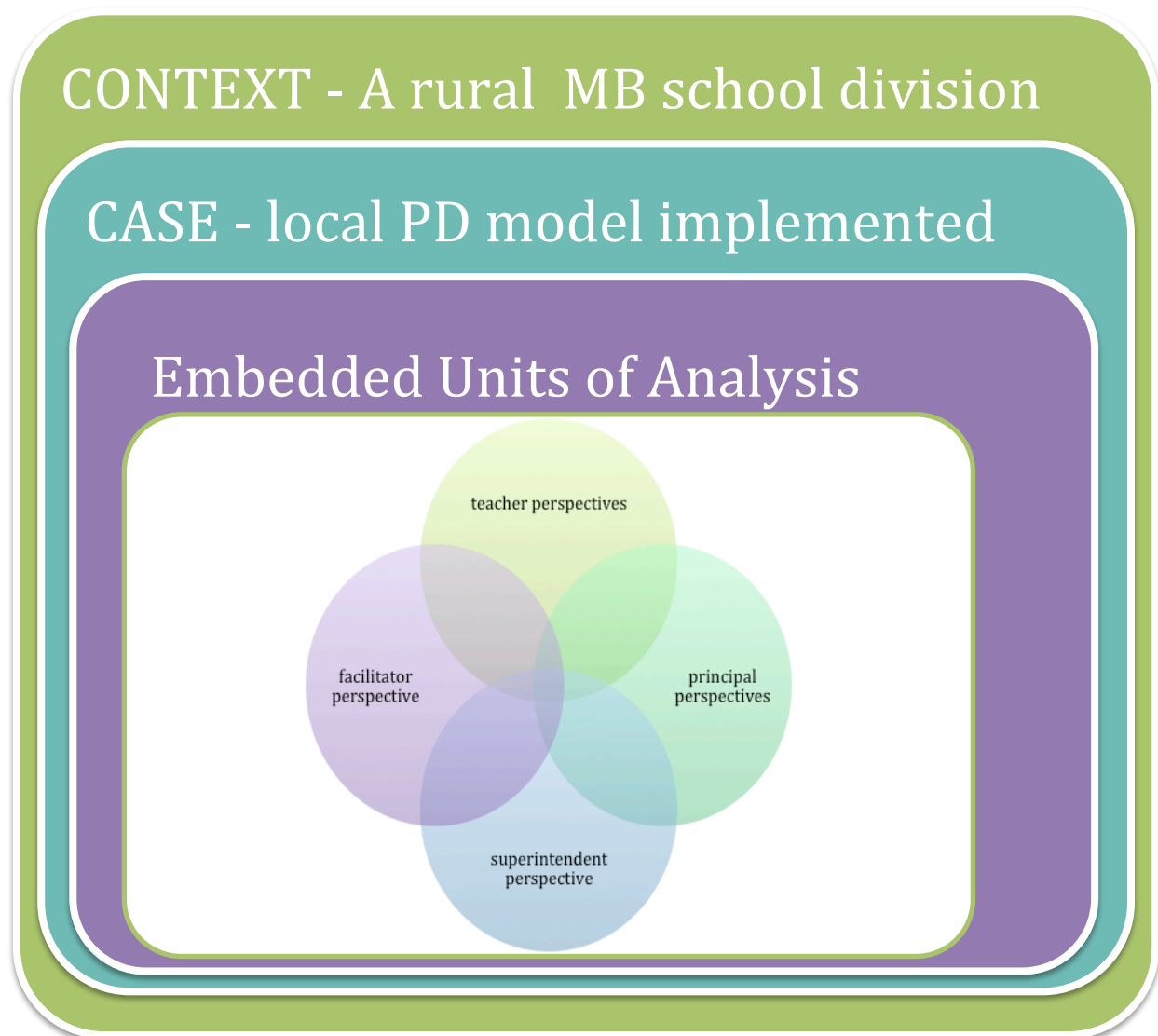


Figure 2. A single case study with embedded units of analysis.

The consideration of four perspectives (superintendent, principals, teachers, and the facilitator) was critical to the case in that it allowed for a deeper understanding of the model's effectiveness to be developed. By considering the perspectives of the superintendent, principals, teachers, and the facilitator, many aspects of the model could be considered when determining the model's effectiveness in terms of mitigating challenges and supporting teachers' professional growth. In addition, consideration of multiple perspectives allowed for a more balanced understanding of the effectiveness of the model, including strengths and challenges as expressed through multiple perceptions.

Ethics Approval and Recruitment

Approval for this research was granted by the University of Manitoba Education/Nursing Research Ethics Board (see Appendix H). All participants received the opportunity to provide consent to participate through letters of informed consent and consent forms. Approval was also requested (and received) from the school division to conduct the research. Pseudonyms have been used for all participants and the name of the school division has not been identified in this document.

The following individuals were recruited to participate in the study: the twelve teachers (6 pairs of teachers) involved in the divisional Numeracy Cohort during the first year of operation, the two teachers who joined the cohort in the second year of operation, the superintendent of the school division, and the principals of the teachers involved in the Numeracy Cohort. All but the teacher who left the Cohort after the first year of operation chose to participate in the study, making a total of thirteen teachers. The superintendent and six out of eight of the principals also chose to participate in the study.

Each group of research participants were chosen for their potential contributions to the research study. As the primary person responsible for PD funding and the overarching PD structure in the school division, the superintendent was interviewed regarding the choices made by the division in the creation of the PD model and project. As the people most directly impacted by the PD opportunity provided through the Numeracy Cohort, the fourteen teachers/Cohort members were asked to be participants in the study, contributing various data to the study, including interviews, a focus group discussion, and artifacts from Cohort activities (these are outlined in the next section). Finally, the principals, the key intermediaries between the division and the Cohort teachers, were asked to participate in a focus group discussion regarding the PD model, the impact of the model on their own provision of PD within the local schools, and their perceptions of the process and the success of the PD model.

Data Collection

Multiple forms of data are generally collected in case study research (such as interviews, observations, documents, records, and physical artifacts) in order to provide extensive material from which a detailed description of the case might emerge (Cohen et al., 2011; Creswell, 2007; Merriam, 1998; Yin, 2009). The study outlined in this thesis collected multiple forms of data over a period of one month (June, 2015). *Figure 3* (below) outlines the types of data that were collected as part of the study. Essentially two forms of data were collected as part of the study: secondary and primary. Secondary data included data that existed already from the ongoing activities of the Numeracy Cohort, and that was accessed with permission from the division and participants for use in the study. Three main forms of secondary data were collected: teacher interviews, facilitator notes, and artifacts generated through Numeracy Cohort activities. Primary data, or data that were generated specifically for the purpose of this research study, included an

interview with the superintendent, a principal focus group discussion, and a teacher focus group discussion.

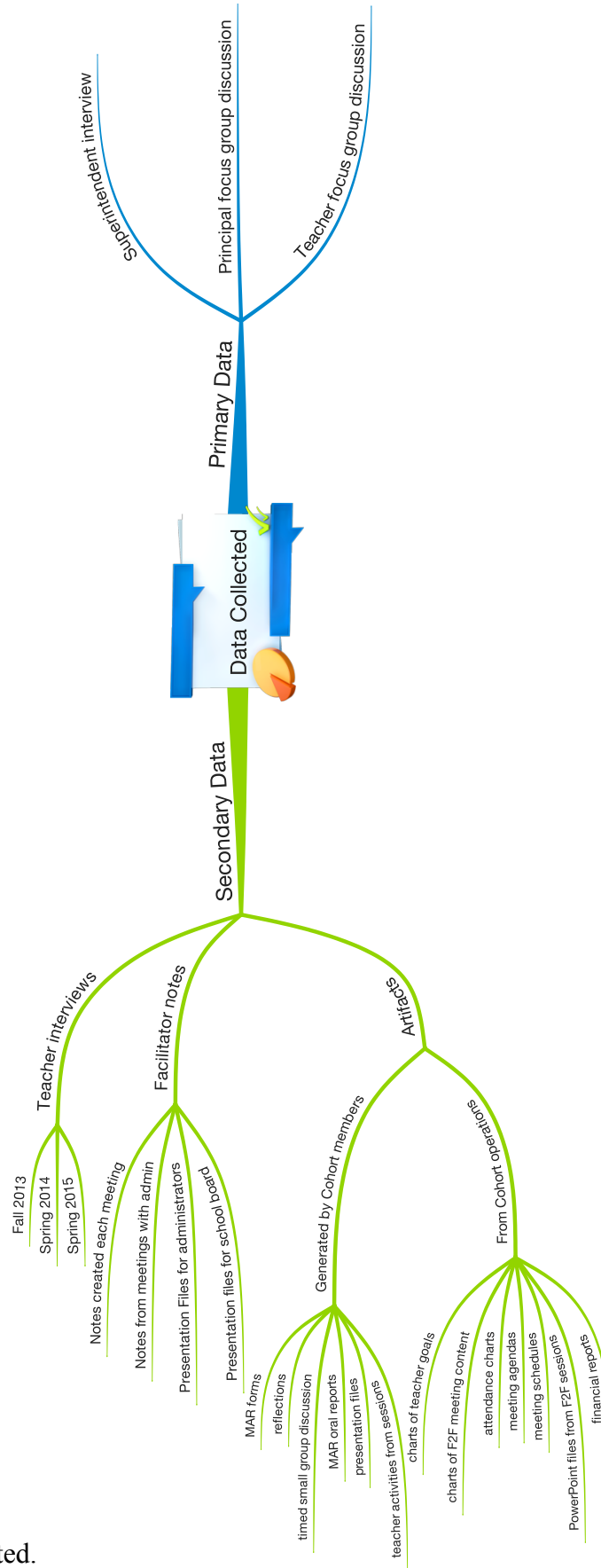


Figure 3. Data collected.

Secondary Data

Teacher interviews. The first form of secondary data that was collected were audio files and notes from teacher interviews. Semi-structured interviews with Numeracy Cohort teachers were conducted three times over the course of two years (Fall, 2013; Spring, 2014; Spring 2015) with Cohort members and their partners (where possible) as part of the planning process for the Numeracy Cohort initiative. These interviews were conducted by me as part of my role as the project facilitator prior to the first face-to-face meeting and at the end of each year of Cohort activities. Their purpose was to gather information about the Cohort teachers for planning, and to gather information regarding the effectiveness of the initiative. The semi-structured interviews made use of several questions (see Appendix A), but were flexible, allowing teachers to expand their thoughts in other directions. Audio recordings and notes were made from each interview, and permission was requested from the teachers and the division to use both the audiotapes and the notes made from the interviews as part of this research project.

Facilitator notes. The second form of secondary data that was collected as part of this research project was the set of facilitator notes created by me in my role as facilitator of the Numeracy Cohort over the two-year project. These notes included reflective notes made after each Cohort meeting, reflective notes made after meetings with administration, and presentation files made for sharing information about the Cohort with administrators and the school board. Although the original purpose of the facilitator notes was to reflect on the process as a facilitator, as a secondary data source, the facilitator notes allowed me to examine the perspective of the facilitator of the Numeracy Cohort as a researcher. This perspective was invaluable as it contained information about challenges that existed as the model was implemented, as well as evidence of the model's effectiveness as experienced by the facilitator of the Cohort.

Artifacts generated by Cohort members. Artifacts generated by Cohort teachers during the two year initiative were collected for use in this study as a third form of secondary data. These artifacts included Mini Action Research (MAR) forms (example in Appendix E), written and oral (recorded) reflections, recordings of discussions, oral reports about MAR projects, presentation files created by cohort members to present their individual and collaborative work, and individual or collaborative responses to activities engaged in during Cohort meetings (Snowball Activity, Tweets, Report Card Activity, goal setting activities). Although the formats of these items are significantly different, they offered a unique perspective to the study; the artifacts provided evidence of teacher growth and the model's effectiveness as products of the PD process. In addition, some of the artifacts added depth to the teacher perspective expressed through the teacher interviews and teacher focus group discussion.

Artifacts from Cohort operations. The final form of secondary data collected for research purposes included artifacts collected from Cohort operations. This data, which was created by the division and/or facilitator of the Cohort, included charts of teacher goals, charts of face-to-face meeting content, attendance charts, meeting agendas, meeting schedules, presentation files from face-to-face sessions, financial reports about the Numeracy Cohort budget, and divisional budgeting information. This data source provided important information about the work in which the Cohort was engaged as the model unfolded, including how it was funded, who attended, what topics were decided upon for sessions, what goals teachers set for their work, and how the structure evolved.

Primary Data

Superintendent interview. The first form of primary data that was collected for this study was a semi-structured interview that was conducted with the superintendent of the division

in June, 2015. The interview was recorded and transcribed for analysis. While a list of questions was provided ahead of time, the interview was conversational in format, allowing for discussion of related or even unrelated topics. The purpose of the interview was to access the superintendent's perspective as the leader and primary spokesperson for the division about challenges faced by the division (and its teachers) in providing (and accessing) effective teacher PD, the division's goals with regards to the PD model, considerations the division took into account as the model was created, the effectiveness of the PD model in meeting its goals, and social constructivist elements of the model (see Appendix B).

Focus group discussion with principals. The second form of primary data that was collected for this research project was a focus group discussion conducted with divisional principals in June, 2015. The focus group discussion was recorded and transcribed for analysis. As the key intermediaries between the divisional initiative and the participating teachers, the principals in the division had a unique and important perspective. As a result, the focus group discussion allowed me to consider the perspective of principals with regards to challenges faced by the division, principals, and teachers; the ability of the model to address these challenges; the effectiveness of the model, and the contributions of social constructivist elements to teacher professional growth within the locally constructed model (see Appendix C). The decision to do a focus group discussion, as opposed to separate interviews of principals, was guided by the theory on which the study was founded. It allowed knowledge to be collaboratively constructed during the interview.

Focus group discussion with teachers. The final form of primary data that was collected for this research project was a focus group discussion conducted with Numeracy Cohort teachers in June, 2015. The focus group discussion was recorded and transcribed for analysis. Teachers

had been interviewed previously, and the interviews had been accessed as secondary data for research purposes (as well as artifacts they had created as part of their Cohort involvement). The focus group discussion allowed me to directly address the research questions (see Appendix D), thereby allowing the teachers to collaboratively construct understanding, and contribute directly to responding to the research questions.

Data Analysis and Interpretation

Data analysis and interpretation that occur in studies with many forms of data can be difficult and time consuming. In the case of this study, the sheer volume of data, paired with the multiple formats of data that were collected, proved to create a challenge in the data analysis and interpretation phase. According to Marshall and Rossman (2011), “interpretation brings meaning and coherence to the themes, patterns, and categories, developing linkages and a story line that makes sense and is engaging to read” (p. 219). In order to bring meaning and coherence to the elements that emerged within the data, the data first had to be organized and coded. Only then, could analysis and interpretation of the data occur.

Organization, Transcription, and Coding

I used NVivo, a brand of Qualitative Data Analysis (QDAS) software (Bazeley & Jackson, 2014) for organizing, coding, and analyzing data for this study. Once I collected the data, I imported it into an NVivo project, using folders to organize the data into primary and secondary data. Under these two broad categories, I further divided the data into the subcategories of data described in *Figure 3* above.

Once I imported the data into the NVivo project, I transcribed primary data using the transcription capabilities of the software. This included the superintendent interview, principal

focus group discussion, and teacher focus group discussion. I did not transcribe the teacher interviews, which were secondary data in the study, for analysis. The reason I made this choice was due to the fact that I had already (in my capacity as Numeracy Coach) summarized each interview, directly quoting teachers when I felt their words were particularly illuminating. In addition, I had the audio files to refer to when I wanted further clarification or to hear the specific words of teachers again. I performed all of the transcription for the primary data in the study, allowing me to become intimately acquainted with the data. In addition, prior to coding, all of the secondary data sources were reviewed, including listening to interviews and reviewing the notes that were made from each of the interviews, in order to become intimately acquainted with all of the data.

Coding took place in two cycles by myself as a single coder. During the first phase, *theory-generated* (Marshall & Rossman, 2011) or *a priori* codes were created from the research questions and literature review that had been conducted (see Appendix G). Primary data (superintendent interview, teacher and principal focus groups) and some secondary data (teacher interview notes and facilitator notes) were coded using these a priori codes, while remaining open to additional, or emergent, codes in the process. This process might be referred to as a combination of what Saldaña (2009) describes as *hypothesis coding* (p. 123) and *initial coding* (p. 81), using both a priori and emergent codes in the first cycle of coding. Following the coding of all primary data and some secondary data (teacher interview notes and facilitator notes), I felt that a reorganization of the coding structure was needed. At this point, codes, categories and structures were reviewed and revised. Appendix G contains the code book outlining both a priori and emergent codes produced during first cycle coding, as well as the categories as they were reorganized at the end of the first cycle of coding. The second cycle of coding involved going

through and revising codes that had changed through the revision process as well as coding the rest of the relevant, un-coded secondary data.

During the coding process, analytic memos (Marshall & Rossman, 2011; Saldaña, 2009) were also used. According to Saldaña (2009), analytic memos can be used to reflect on and write about: the researcher's identification with the participants or phenomenon; the study's research questions; the researcher's code choices and their operational decisions, emergent patterns, categories, themes and concepts; the possible networks among codes, patterns, categories, themes, and concepts; an emergent or related existing theory; any problems with the study; any personal or ethical dilemmas with the study; future directions for the study; analytic memos generated thus far; and the final report for the study. With this in mind, analytic memos were utilized throughout the coding process. At the end of the second cycle of coding, the analytic memos, themselves, were also coded for analysis.

Analysis and Interpretation

According to Miles et al. (2014), three flows of activity exist in qualitative data analysis: (1) data condensation, (2) data display, and (3) conclusion drawing/verification (p. 12). In the first stage, data condensation, data are simplified from full text, cumbersome data into chunks and codes to make them easier to work with and to minimize the chance of missing key pieces of information. The second stage of data analysis involves displaying data in various forms such as matrices, graphs, charts, or networks. Such displays "assemble organized information into an immediately accessible, compact form so that the analyst can see what is happening and either draw justified conclusions or move on to the next step" (Miles et al., 2014, p. 13). The final stage of data analysis, involves drawing and verifying conclusions. While these parts of

qualitative data analysis appear to be linear, it is important to note that they are iterative and continuous in nature, and do not operate in a completely linear fashion.

This description accurately portrays the process of data analysis and interpretation that took place in this study. As mentioned, the first flow of activity (data condensation) took place as data were imported into Nvivo, transcribed, and coded in two cycles of coding. Once the data were coded and condensed, analysis was divided up by the research questions that guided the study: (1) To what extent (if at all) is the specific locally constructed PD model utilized in the rural school division able to mitigate the challenges faced by the rural division and its rural teachers in accessing meaningful PD?, (2) To what extent (if at all) is the model effective in terms of supporting teachers' professional growth in the area of mathematics instruction and student numeracy?, and (3) How do social constructivist principles contribute to teacher professional growth through the locally constructed rural PD model? *Figure 4* below outlines the data sources that were analyzed in order to construct answers to each of the research questions.

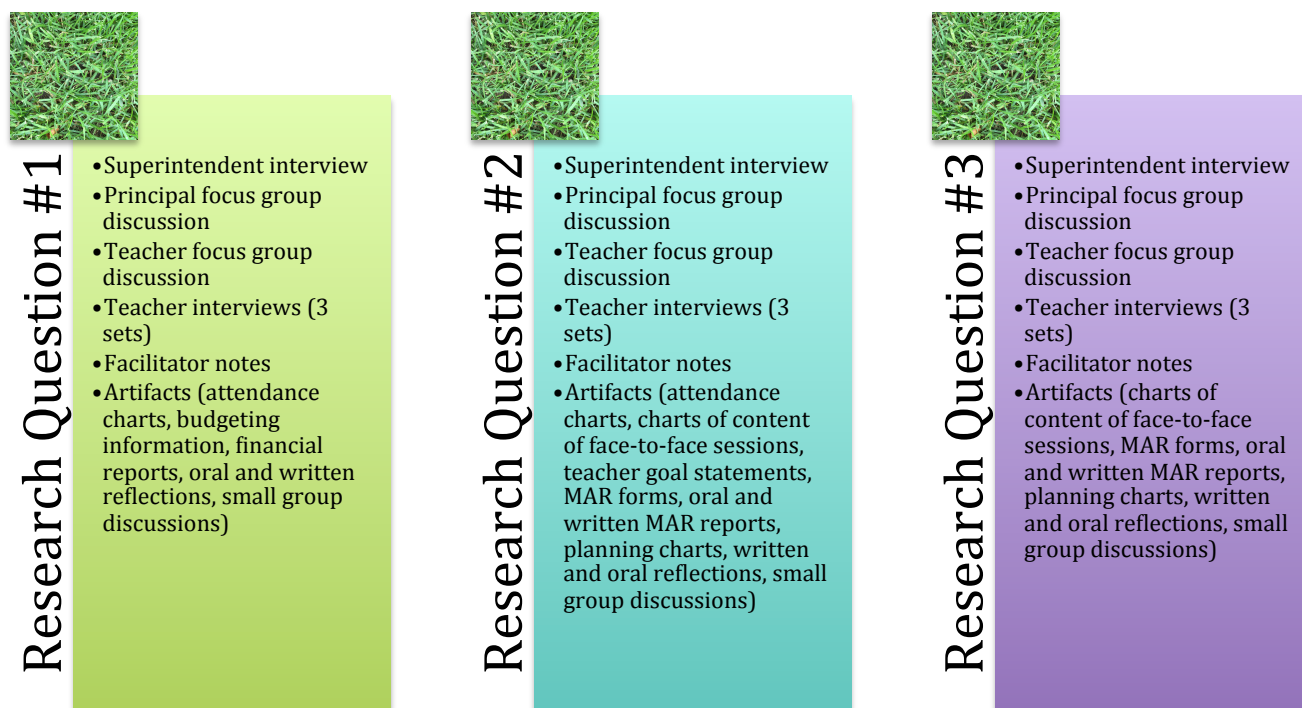


Figure 4. Data sources broken down by research question.

For each of the research questions, data display and conclusion drawing (Miles et al., 2014) were completed separately, drawing on different subsets of data within the larger data set.

Delimitations and Limitations of the Study

The research study is delimited to a single rural school division through its single case study design. As previously mentioned, single case study design was chosen due to the unique nature of the locally constructed model implemented in the rural school division involved in the study. Further constraints, due to the fact that I was the sole researcher in the study, also necessitated delimiting the study to a single rural school division. A second delimitation in the research study is that the study involved only teachers in the division who were members of the Numeracy Cohort, as opposed to all of the teachers in the division. This choice in study design

was linked to the research questions; the locally constructed model was the primary subject of interest in the study.

In addition to delimitations, the research study also has several limitations. The lack of generalizability of this study is one of its most obvious. According to Marshall and Rossman (2011), however, “although no qualitative studies are generalizable in the probabilistic sense, their findings may be transferable” (pp. 76-77). Marshall and Rossman (2011) also indicate that in addressing this limitation, it “reminds the reader that the study is bounded and situated in a specific context. The reader, then, can make decisions about its usefulness for other settings” (p. 77). Ultimately this is my hope as a researcher; I hope that the reader of this study will understand the context in which the study took place and compare it with the contexts in which they find themselves interested, thereby enabling them to see the potential for elements of the PD model described in this study for future initiatives in their own contexts. While the study is not generalizable in any sense, elements of it might be transferrable to other contexts. For example, other teachers or administrators in another rural division that experience issues surrounding the fact that they have many very small schools within their division might look at some of the ways the division in this study addressed some of those challenges, thereby allowing them to envision how they might overcome the challenges they are facing within their local context. It is this potential for transferability that is the strength of this study, not generalizability.

While much of the literature on PD indicates that significant changes in practice take three to five years to take place (Hunzicker, 2010a), the study investigates both the locally developed model that has been implemented, as well as its effectiveness in terms of addressing the challenges faced by rural divisions/teachers in providing/accessing meaningful PD opportunities and meeting the needs of rural teachers within their local contexts within the first

two years of implementation. As a result, caution must be exercised in making statements about the long-term effects of the model. While the study cannot make claims regarding the long-term effects of the model on minimizing challenges to providing and accessing effective PD or the long-term effects of the model on teacher practice, the study still has much to offer the educational field. Even though the study does not meet the three to five year mark, two years is a significant length of time over which to look at the success of the model both in mitigating challenges faced by the division and its teachers, as well as teacher perceptions of the model's success in meeting their goals for improving mathematics instruction and increasing student numeracy skills.

Guskey (2000) indicates that in evaluating the effectiveness of PD, five critical levels of PD evaluation should be considered: (1) participants' reactions, (2) participants' learning, (3) organization support and change, (4) participants' use of new knowledge and skills, and (5) student learning outcomes (pp. 79-81). While all of these levels of evaluation were included in this study, it is important to note that limitations exist due to the self-report involved in the structure of the research study. Teachers reported on their own reactions and learning, and their perceptions of how changes in their practice impacted student learning. No student data were collected or analyzed for two important reasons. The first was the issue of manageability. The amount of data collected for this study was already very large. Collecting additional data from students in a way that could provide sufficient evidence of an impact of the PD model on student learning would have been resource-wise and logistically too difficult. The second reason for not collecting student data was the research questions themselves. I was interested in looking at information about the ability of the model to mitigate challenges faced by teachers and the division to accessing and providing effective PD. I was also interested in social constructivist

elements and their contributions to the PD's effectiveness, as well as the model's effectiveness in helping teachers meet their professional learning goals. While their goals were likely to improve student learning, the primary focus of the research was on the teachers, rather than the students.

Statement About Researcher's Role and Positioning

I was the sole researcher for this study. As previously mentioned in Chapter 1, I also participated in the development of the PD model, as well as being employed by the division as the Numeracy Coach (PD facilitator). It is important that I am explicit regarding these facts. The dual roles I played in the PD model design and implementation, together with the role of researcher, provided both opportunities and challenges in relation to this study. As such, these implications must be discussed.

The multiple roles I experienced prior to, and in conducting the study, provided significant opportunities that might otherwise not have been possible. Had I not been involved in the generation and facilitation of the PD project, the PD project likely would not have happened. Moreover, even if it had occurred, it is unlikely that another researcher would have known about the model in time to study it. A unique opportunity existed precisely because of my involvement in both the generation of the PD model and through my facilitation of the learning experiences for teachers. In rural contexts, as discussed in Chapter 2, it is not uncommon for teachers and administrators to wear multiple hats if things are to get done. These hats might include teaching, coaching, community participation, involvement in committees such as grad or PD committees, union involvement, and many, many others. As previously mentioned, very little has been written about challenges in rural education or rural PD. If research like this is to be conducted, someone must "wear this hat," even for a brief period. As a rural educator and leader interested in these issues, it made sense to use the knowledge I had attained as a PhD student to try to

improve things within my own context. As an educational researcher, it makes sense to me to “wear this hat” also, in order for others to benefit from the work that has been done in this rural context.

Research literature abounds with examples of research in which the designer of interventions such as PD models later conducts research on the implementation of the intervention. This was true in several of the models I reviewed in my literature review in Chapter 2. For example, van Es and Sherin (2010) designed a PD model based on video clubs, implemented, and researched the effectiveness of the design afterwards. Similarly, Johnson and Marx (2009) developed the TPD model “in response to the challenges faced by Latino and ELL children in urban-centred schools” (p. 118), later researching its effectiveness in a study. In any project in which the researcher is part of the design of an intervention, care must be taken to mitigate potential biases inherent in the multiple roles researchers operate under.

Throughout the design and conducting of this study, I was very aware that the multiple roles I operated under had the potential of generating bias on my part as a researcher. Of course I wanted to see the model succeed as one of the designers of the PD initiative. Moreover, as the facilitator of the PD opportunities, I hoped to be successful in meeting the needs of the teachers involved. I was critically aware that both of these points could lead to biased findings of the study when I put on the hat of researcher. As a result, I was careful to bracket off my role of researcher from my other roles. Data were not collected until the end of the second year, and transcription, coding, and analysis did not start until my role of Numeracy Coach had ended. This was, in part, made easier than expected by the resignation of my position(s) and the acceptance of new employment at the end of May, 2015. Moreover, the distance (both in terms of time and position) that I experienced through the acceptance of a new position at Brandon

University allowed me to more deeply analyze data from the study, and to more broadly consider the implications of the findings in relation to the field of rural education and rural professional development. In addition to separating the multiple roles I was involved in as much as possible, I also considered many perspectives in the design of the study, partially to aid in triangulation of data, and partially to minimize bias and false perceptions on my own part due to my multiple roles. Teacher, principal, superintendent, and my own facilitator perceptions were considered, separate from my own thoughts as a researcher, increasing the likelihood of contradictory viewpoints to be raised and decreasing the likelihood of unfounded or biased viewpoints to be reported. All of this strengthens the findings of the study.

One final issue surrounding the multiple roles I faced as a teacher leader/model designer, facilitator, and researcher was located in the relationships I had with the participants in the study. Because they knew me as a colleague and the designer and facilitator of the initiative, I was aware that potential was there for teachers, the principal, and even the superintendent to hold back information they felt could be critical of the initiative due to the fact that they had positive relationships with me, or even to falsely report positive things for the same reason. While negative comments due to poor relationships with me didn't seem to be a problem, any interference personal relationships might have had with data and the findings of the study were potentially problematic. In order to minimize the likelihood of this occurring, I was very careful to word things in such a way as to encourage both positive and negative feedback (see Appendices B-D), asking for strengths and challenges, or using wording like "to what extent" when talking about success of the model. In addition, I often framed conversations with participants as an opportunity for feedback or as an opportunity to contribute to the future of the initiative or future initiatives, thereby changing the nature of the conversation from critical to

constructive. In analyzing data for the first two questions, I was very thorough in seeking corroborating evidence of all aspects of effectiveness, being aware that this area was one of potential bias on my part and an area where relationships with participants may have impacted their statements.

It is also important to note, that although I have indicated a few negative aspects regarding the implications of having relationships with participants as something other than a researcher (e.g. facilitator, colleague), there are many positive aspects to such relationships as well. In many cases, participants may have been more open in interviews and focus group discussions because of the positive and trusting relationships that existed with me in spite of the research. This may have actually added to the richness of the qualitative study. In any case, while it is possible to change hats, it is not always possible to change who is wearing them.

Glaser (1978) describes the importance of theoretical sensitivity in research, and although his work is primarily in the field of grounded theory, the concept of theoretical sensitivity is important in all qualitative research. The qualitative researcher is tasked with understanding and giving meaning to data, which she does through interactions with literature in the field, professional and personal experiences, and the process of data analysis. In the case of this study, the personal and professional experiences I brought to the study as a researcher, together with analyzing literature on the subject of rural teacher PD and conducting the study, allowed for the development of significant insight into the data in the study (or theoretical sensitivity). For this reason, despite the challenges I experienced with multiple roles in the context, I was the best person to conduct the study.

Validity and Trustworthiness

In order to enhance the internal validity and trustworthiness of the study, triangulation of data sources was utilized. Multiple sources of data from four embedded units of analysis were collected and analyzed, allowing for findings to be substantiated through multiple sources. Because the embedded units of analysis included four different perspectives (facilitator, superintendent, principals, and teachers), I was able to determine the strength of several findings. If particular themes emerged from multiple perspectives, the strength of the theme was increased. In addition, if a theme emerged from only one viewpoint, it may have been interesting in that it came up from several teachers, for example, but not from any of the administration. Alternatively, if something emerged from only one viewpoint, and could not be confirmed by any others, it may not have been valid. Having multiple viewpoints/units of analysis and such a large volume of data increased the internal validity of the study.

In addition to triangulation of data sources, the internal validity of the study was enhanced through the collection of data created over a two-year period. The volume of data collected from teachers over the two-year period, in particular, increases the study's validity. By collecting interviews that were conducted three times over two years, and by adding to this the artifacts created by teachers over the two years and a focus group discussion at the end of the two years, validity of the study findings was increased. Along with being able to compare the perspectives of the principals and teachers, the statements of teachers at different points in time could be compared. Continual conversations over the two-year period about challenges faced by teachers and the effectiveness of the PD model in terms of meeting their goals (see Appendix A and Appendix D) provided a form of member-checking as well. Review of the interviews conducted and the questions related to both rural challenges and the model's effectiveness

allowed me to review and revise my findings based on the views expressed by participants. Finally, preliminary findings were shared with the principals and superintendent early in the analysis process, inviting thoughts and feedback about the study's findings.

External validity, according to Merriam (1998), refers to the extent to which findings are generalizable to other situations. In the case of this study, external validity or generalizability is difficult to enhance, given that it is a case study of a particular situation. According to Merriam (1998), one method of enhancing generalizability in qualitative research is the use of *rich, thick description* in order to provide the reader of the finished product with enough description “to determine how closely their situations match the research situation, and hence, whether findings can be transferred” (p. 211). My intent as a researcher was to examine the PD model designed and implemented in one rural school division in terms of its effectiveness in two areas (mitigating challenges and supporting teachers' professional growth), as well as the contributions of social constructivist principles to teacher professional growth through the model. The PD model, itself, was designed to draw on the strengths of one rural school division, and is necessarily unique to the context in which the research took place. Through the use of thick, rich description, however, those who read the study are able to determine the extent to which their own contexts are similar to the context of the division in the study, and the extent to which elements of the locally constructed PD model could be effective within their own contexts.

Chapter 4 – The Locally Constructed Rural Teacher PD Model

The findings for the research study are contained in Chapters 4 through 7. While Chapters 5, 6, and 7 each provide findings and discussion for the three research questions guiding the study, this chapter (Chapter 4) provides information about the locally constructed rural teacher PD model that was the subject of the study. In order to discuss the extent to which the model was effective in various ways, I felt it was first important to describe the key elements of the model. Since the model was multifaceted, such a description then allowed me to refer to key parts of the model in my discussion of the research questions, without having to describe them throughout my discussion about the research questions themselves.

In order to develop a description of the key elements of the locally constructed rural teacher PD model, a variety of data sources were utilized. Teacher interviews and facilitator notes provided significant information about the structure of the PD model over time. In addition, artifacts from Cohort operations also provided valuable information about the model. These artifacts included charts outlining the content of face-to-face sessions, attendance charts, meeting agendas, meeting schedules, PowerPoint files from face-to-face sessions, financial reports, and the MAR forms used by Cohort teachers. Altogether, these data sources provided critical information about the structure and elements of the Numeracy Cohort model.

As previously mentioned, the rural PD model constructed by the local school division in the study was designed both to mitigate the challenges faced by the local school division and its teachers with regards to providing and accessing meaningful PD, and to support teachers' professional growth in the area of mathematics instruction and student numeracy. Eleven key features of the Numeracy Cohort model can be identified. *Figure 5* (below) outlines all eleven of the features.

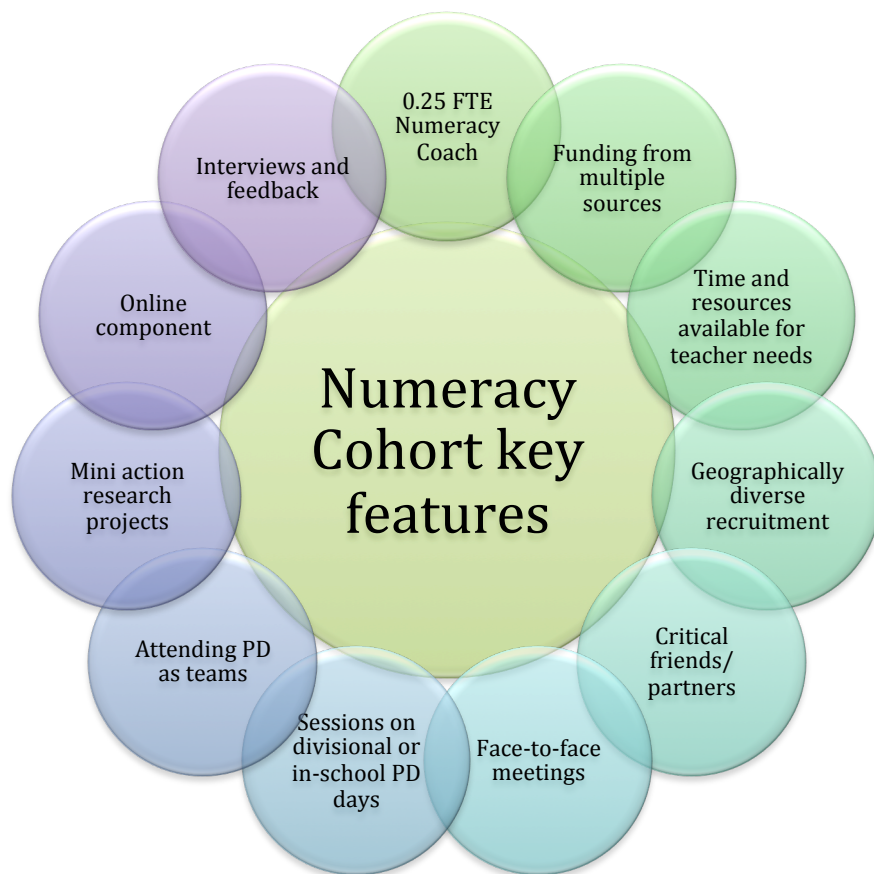


Figure 5. Key features of the Numeracy Cohort model.

Although many of these features will be further described in the findings of the study (See Chapters 5 to 7), they are outlined here to provide an overview of the structure of the PD model. All eleven of the features were incorporated into the locally constructed PD model because they either contributed to the mitigation of challenges faced in the division with regards to providing meaningful teacher PD, or they were elements of what is referred to in the literature as effective teacher PD. Together, they make up the foundation of the locally constructed PD model known as the Numeracy Cohort.

0.25 FTE Numeracy Coach

As previously mentioned, the rural division in this study created a 0.25 FTE position for leadership of the Numeracy Cohort (known as the Numeracy Coach). As the Numeracy Coach, I was responsible for facilitation of all aspects of the initiative, including overall planning and facilitation of face-to-face meetings, working with teachers on MAR projects, and budgeting and finance considerations. The position was quarter time, with the other three quarters of my position remaining as a classroom teacher in the division.

As indicated in Chapter 2, one of the challenges rural divisions face with regards to providing effective PD has to do with leadership capacity. In addition to simply having fewer formal leadership positions, the “many hats” that administrators must wear within rural contexts create heavy workloads (Forner et al., 2012; Newton & Wallin, 2013; Starr & White, 2008; Wallin, 2009), thereby limiting the leadership capacity of rural administrators in the area of PD. Given that leadership is integral to the effectiveness of PD initiatives (Learning Forward, 2011; Timperley, 2008), local solutions to limited leadership capacity must be found in rural divisions if PD initiatives are to get off the ground. In the case of the school division in the study, the creation of a 0.25 FTE Numeracy Coach position provided capacity for planning, facilitation, financial management, and advocacy, all of which are critical to the success of professional learning opportunities (Learning Forward, 2011).

Funding from Multiple Sources

The rural school division in the study (like many rural school divisions) experienced issues related to declining funding due to declining enrolment (Chalker, 2002; Suvorova, 2004; Wallin, 2008), higher costs per pupil (Harmon et al., 2007), and the small scale of their budget(s). As a result, the division had to be increasingly creative and resourceful in its

operations (Mitchem et al., 2003; Wallin, 2008). In order to support the initiative, funding was secured from a variety of sources including: grants, budgetary/local levy increases, reallocation of existing financial resources, and reallocation of existing non-monetary resources. Although the financial model for funding the initiative is described in detail in the findings in Chapter 5, it is important at the outset to indicate this important feature of the model's design. In addition to the Numeracy Coach position, funding for the initiative provided approximately \$12,000 as an operating budget for Cohort activities, approximately \$6,000 for the Cohort to attend an external workshop as a team, and an undisclosed amount from school PD budgets in the form of resources and release time requested by teachers.

Time and Resources Available for Teacher Needs

Literature in the field of effective teacher PD suggests that adequate support is necessary in terms of time and resources in order for PD to be effective (Bredeson, 2002; Goos et al., 2011; Learning Forward, 2011; Quick et al., 2009; Timperley, 2008). The financial model for the initiative provided release time and funding for resources for teachers as they engaged in their MAR projects. This funding was accessed either through the Numeracy Cohort budget or through teachers' school PD budgets. Teachers used this time to get together beyond the planned Cohort face-to-face meetings for individual or collaborative MAR projects. They also purchased materials that they needed for their classrooms such as materials for math workstations or books about mathematics teaching and learning.

Geographically Diverse Recruitment

Teacher isolation, both geographic and professional, has been identified as a challenge in rural contexts (Howley & Howley, 2005; MASS & MAST, 2006; Seltzer & Himley, 1995;

Tytler et al., 2011). As previously mentioned, the division in the study contained fourteen schools: two public high schools, five public elementary schools, and seven Hutterian schools. While the two high schools in the division and three of the elementary schools were large enough to allow for some collaboration between teachers (with similar grade levels and subject matter), the remaining two elementary schools and seven Hutterian schools were very small, having only one to four teachers in them. As a result, traditional school-based PLCs (DuFour, 2005; DuFour & Eaker, 1998; Eaker et al., 2002; McLaughlin & Talbert, 2006, 2010), if they had been implemented in the division, would have further isolated the teachers in the smallest, most geographically isolated schools in the division. Accordingly, the school division created a hybrid PLC or collaborative inquiry group (Nelson et al., 2010) across the division (a divisional cohort) that allowed *both* the very small school teachers in the division, and teachers from the larger schools in the division, to benefit from opportunities for collaborative inquiry. Teachers were recruited from as many geographic areas of the division as possible, and as many schools as possible. While having a teacher from every Hutterian school participate was not possible due to the fact that most were the only teacher in their school, and that there simply were not enough substitute teachers to make that happen, it was possible to have at least one teacher from every other school involved, with two Hutterian teachers participating. The result was the development of a Cohort of teachers that was as geographically diverse as possible within the division, with nine of the division's fourteen schools being represented. Table 1 below outlines the schools and number of Cohort teachers that participated from each school in the division over the two-years studied.

Table 1

Cohort Teacher Make Up

School	Cohort Teachers 2013-2014	Cohort Teachers 2014-2015
Elementary 1	2	3
Elementary 2	2	2
Elementary 3	2	2
Elementary 4 (very small)	1	1
Elementary 5 (very small)	1	1
Hutterian 1	1	1
Hutterian 2	1	1
High School 1	1	1
High School 2	1	1
Total	12	13

Critical Friends/Partners

The use of critical friends or partners in teacher PD has been described as effective both in terms of ensuring teachers have a colleague close to them with whom they can collaborate in larger cohorts of teachers, and in terms of providing opportunities to look at and reflect on new ideas, strategies, and practices (Darling-Hammond & McLaughlin, 2011; Goos et al., 2011). In the Numeracy Cohort model, teachers were nominated with a critical friend or partner in the hopes of both reducing teacher isolation and promoting collaboration, particularly for the teachers in very small schools, high schools, and Hutterian schools. In the largest elementary schools, two teachers were nominated as critical friends or partners. In the high schools, Hutterian schools, and very small elementary schools, teachers partnered with another teacher in a different school. In total, the recruitment of 12 teachers involved 6 critical pairings. Teachers were interviewed with their critical friend or partner from the beginning of the process (wherever possible), and opportunities for critical friends to collaborate on MAR projects were encouraged.

Face-to-Face Meetings

A critical component of the Numeracy Cohort model was the inclusion of face-to-face sessions for which teachers were released from their classrooms through the use of substitute teachers (called guest teachers in the division). The inclusion of face-to-face meetings during the workday of teachers is supported by the literature on effective teacher PD that suggests that effective teacher PD is job-embedded (Hunzicker, 2010a; Hunzicker, 2010b; Whitcomb et al., 2009). The face-to-face meetings allowed teachers to get together as an entire Cohort to build community, work collaboratively, or inquire into new strategies and discussion about mathematics instruction. The face-to-face sessions were held centrally within the division at the division office (to minimize the amount of travel required for teachers), and took place five times the first year and four times the second year of Cohort operation.

Sessions on Divisional PD Days or In-School PD Days

In addition to the four to five planned face-to-face sessions each year, the divisional PD day in January was accessed each year to have an hour-long session with Cohort teachers as one of the workshop sessions offered. This session was used as a time to report on MAR projects that had been conducted. In-school PD days were also accessed for bringing in presenters and for the Cohort to host a PD day for other teachers in the division. Table 2 (below) outlines the sessions that occurred over the two-year period that was the subject of this research.

Table 2

Numeracy Cohort Meetings and Sessions

Year	Face-to-face sessions	Teacher-directed activities and collaboration	Other
2013-2014	Sept. 25 Oct. 30	Teachers encouraged to take time “as needed” to complete their MAR projects.	Sept./Oct. - Introductory Interviews

	Dec. 4	<ul style="list-style-type: none"> 3 teachers visited another classroom teacher implementing math rotations 	Nov. 22 – PM - Workstation workshop at Brandon University [in-school PD day]
	Jan. 31 [session at divisional PD day]	<ul style="list-style-type: none"> 1 teacher took time (2 days) to create a math assessment and to look at the results following implementation 	Apr. 25 – AM - Guided Math workshop with math consultant [in-school PD day]
	Feb. 12	<ul style="list-style-type: none"> 2 teachers took 2 days to look at continuity between earlier grades and their own as well as to create strategies for intervening with struggling students 	May 12/13 - UDL Workshop (Brandon University)
	May 21 (lunch & presentation to admin. council)		May/June – Concluding Interviews (1 st year)
		Summer 2015 - Fall 2016 – 2 teachers attended Math Recovery workshop	
2015-2016	Sept. 23	Oct./Nov. – 2 days to be used at teacher discretion for learning and collaboration:	100 Day – 4 teachers organized a student activity day at one of the elementary schools
	Oct. 21 (with presenter in PM)	<ul style="list-style-type: none"> Nov. 4/7 - BER Workshop on workstations - (3 attended with 4 teachers meeting for follow-up day a couple of days later) 	Apr. 24 – Cohort lead a session for 30 other teachers in the division [in-school PD day]
	Jan. 30 [session at divisional PD day]	<ul style="list-style-type: none"> Oct. 9/10 - MY problem solving workshop (4 teachers attended and met for follow-up day the next day) 	June – Concluding Interviews (2 nd year)
	Mar. 3	<ul style="list-style-type: none"> Nov./Dec. - 3 teachers visited another Math Recovery teacher and then met on another day to organize their own Math Recovery programs and resources 	
	Jun. 2	<p>Another day offered in second half of the year at teachers' discretion.</p> <ul style="list-style-type: none"> Middle Years group of 4 got together to reflect on math projects implemented with students and design a new project 	

As is evident in the table, a combination of face-to-face sessions, sessions at the divisional PD day in January each year, and in-school PD days used for presentations combined in such a way that Cohort teachers met with each other most months of the school year.

Both the use of face-to-face meetings and the use of divisional or in-school PD days to meet as a cohort throughout the year are supported by literature on effective PD that suggests that the establishment of a safe, trusting, collegial, and collaborative learning environment are important characteristics of effective PD experiences and communities (Darling-Hammond & McLaughlin, 2011; Harwell, 2003; Quick et al., 2009; VanDriel & Berry, 2012; Whitcomb et al., 2009). In order to develop a community of professionals that was able to engage in collaborative inquiry together, relationships had to be built within a context of professional learning. As such, face-to-face contact was extremely important, as was the inclusion of community-building activities at the meetings. The ongoing, extended PD experiences provided by the Numeracy Cohort also provided time and space for teachers to engage in the active work of discussion and reflection about student learning that are critical to the effectiveness of PD models (Porter et al., 2003; Quick et al., 2009). While funding and geographic considerations such as the time and cost of travel for teachers to attend sessions had to be considered, the inclusion of job-embedded face-to-face meetings and sessions on divisional and in-school PD days provided both an ongoing PD experience, and time and space for the establishment of a safe, trusting, collegial, and collaborative community in which teachers could grow professionally.

Attending PD as Teams

Table 2 (above) outlines, in addition to what has already been mentioned, times when Cohort teachers attended external PD opportunities together. In May of the first year (2013-2014), the entire Cohort was invited to participate in a two-day Universal Design for Learning

(Katz, 2012) workshop at Brandon University together. Although this was the only external PD opportunity that all teachers in the Cohort were invited to attend as a team, several small collaborative groups attended external PD sessions or conducted classroom visits outside the division over the two-year period. The smaller groups of teachers that attended workshops together grew out of the MAR projects in which teachers were engaged. In particular, Cohort teachers who engaged in the MAR projects collaboratively elected to access release time and money to attend workshops focused on the goals of their MAR projects together. In some cases (particularly during the second year), teachers also accessed release time immediately after attending a workshop together to put into practice what they had learned (in relation to the MAR projects in which they were engaged).

This feature of the Numeracy Cohort model was something that emerged over time in the model in response to teacher feedback. Teachers indicated both a need for specific project-related information and time to put newly acquired information into practice in the ongoing feedback they provided. As a result, the number of face-to-face sessions was decreased in the second year, and teachers were provided with two days to attend a workshop and have a follow-up day, to engage in a classroom visit with follow-up, or to have collaboration time with their collaborative partners. This emergent feature of the model connects to both literature in the field on effective PD and to literature on rural challenges with regards to PD in several important ways. Having the opportunity to attend external PD as a team and engage in follow-up together promoted active learning on the part of teachers (Darling-Hammond & McLaughlin, 2011; Porter et al., 2003; Quick et al., 2009), alignment of the PD with the individual goals of teachers (Darling-Hammond & McLaughlin, 2011; Higgins & Parsons, 2009), and the establishment of a collaborative learning environment in which teachers could learn and grow (Darling-Hammond

& McLaughlin, 2011; Learning Forward, 2011; Timperley, 2008). It also decreased professional isolation, a critical challenge that existed for teachers in the rural school division (Howley & Howley, 2005; MASS & MAST, 2006; Seltzer & Himley, 1995; Tytler et al., 2011). Finally, the way that this feature of the Numeracy Cohort emerged over time supports the literature in the field that suggests that attention must be paid to teachers as learners (Timperley, 2008) and that their “needs, concerns, and interests” (Hunzicker, 2010b) have to be considered in order for PD to be effective.

Mini Action Research (MAR) Projects

One of the key components of the Numeracy Cohort was the inclusion of what were called Mini Action Research (MAR) projects. Teachers were invited to identify an area of their practice on which they would like to work (or a particular problem they had experienced to address) and to engage in some sort of action towards the area or issue. Forms were used to record teachers’ plans (see Appendix E), and included sections for observation and reflection about the action that was carried out. Some teachers chose to engage in the MAR projects individually, while others engaged in the projects collaboratively, thereby initiating a collaborative inquiry project with their critical friend or a grade level group. Time was provided for planning at some of the face-to-face sessions, and external workshops, release time, and resources (as already mentioned) were made available to teachers, depending upon their projects and needs.

The use of action research as a form of active teacher professional growth is well documented in literature in the field of teacher PD. Action research can be used to actively engage teachers in the improvement of their teaching practice through the examination of student data (Wideman, DeLong, Morgan, & Hallett, 2003), and can be conducted individually or in

small groups (Loucks-Horseley et al., 2010; Villegas-Reimers, 2003). According to Villegas-Reimers (2003), action research can be an effective teacher PD model for three reasons: “it is inquiry-based, and allows teachers to investigate their own worlds; it is aimed at the improvement of teaching and learning in schools; and it leads to deliberate and planned action to improve conditions for teaching and learning” (p. 108). The MAR projects in which Numeracy Cohort teachers engaged were included in the PD model for these reasons.

Significant literature in the field of PD is dedicated to the collaborative inquiry process, and while there is significant discrepancy around the terminology used around groups of educators coming together in the interest of improving practice and student learning (see Chapter 2), this method of engaging in teacher professional growth is widely accepted as an effective form of teacher PD (Bredeson, 2002; Butler et al., 2002; Butler & Schnellert, 2012; Hunzicker, 2010b; Learning Forward, 2011; Loucks-Horseley et al., 2010; Nelson et al., 2010; Timperley, 2008; Villegas-Reimers, 2003; Whitcomb et al., 2009). In the case of the Numeracy Cohort, teachers collaboratively engaged in inquiry-based MAR projects with the goal of improving practice and student learning outcomes. In terms of effectiveness, the inclusion of action research or collaborative inquiry in the Numeracy Cohort model provided opportunities for teachers to focus on student learning, align the PD opportunities provided with their own goals as educators, and engage in active learning within a collegial and collaborative learning environment. As previously described in Chapter 2, these are all established characteristics of effective teacher PD.

Online Component

Because the Numeracy Cohort teachers only met about once a month, and because the teachers were almost all in different schools, an online component was included in the Numeracy

Cohort model in order to give teachers a platform on which to communicate between face-to-face sessions. A SharePoint site was effectively set up in the following structure for this purpose:



Figure 6. Online structure.

As is evident in *Figure 6* above, the online component of the model provided space for shared knowledge to be stored, such as a common definition of numeracy, the ongoing goals of the Cohort as a whole, and information about the contexts in which the Cohort teachers worked. It also contained places to reflect on teacher backgrounds, the process and whether it was meeting their needs, and on their MAR projects. Blogs were included for discussion about successes

(Let's Celebrate) and areas of support needed (Lean on Me), and a spot was included for posting resources for sharing with others.

The use of ICT for teacher PD holds tremendous promise for rural divisions in terms of connecting geographically isolated teachers and promoting collaboration and community (Cruise, 2012; Kenny et al., 2008; Vrasidas & Glass, 2007). Moreover, the use of blended teacher PD models, meaning a combination of face-to-face sessions and online interaction has been described as a sustainable model for providing ongoing PD for teachers (Vrasidas & Glass, 2007). The Numeracy Cohort model incorporated such a blended design in order to decrease costs, increase contact time between teachers, promote reflection, and bridge geographic distances. The online component of the model added opportunities for dialogue, collaboration, and reflection outside of the face-to-face sessions in which teachers participated, thereby promoting both the active learning of teachers, and the development of a collegial, collaborative learning environment.

Interviews and Feedback

A variety of methods of obtaining feedback from teachers were built into the model. Because the model was designed to be responsive to teachers, I needed feedback (as a facilitator) from the teachers about their professional needs and the extent to which their needs were being met. As a result, I interviewed the teachers at the beginning and end of the first year, and again at the end of the second year of the Numeracy Cohort's operation (see Appendix A for questions). In addition to the interviews, teachers also engaged in discussion and written feedback at face-to-face sessions. I used the feedback from teachers to plan face-to-face sessions and to make changes to the structure of the model, itself, in a continuous, iterative, cycle. As previously indicated in Chapter 2, feedback from teachers, particularly for the ongoing and

continuous improvement of professional development initiatives is an important characteristic of effective PD programs (Loucks-Horseley et al., 2010). As such, several opportunities for feedback, reflection, and evaluation of the model, itself, were built into the design of the Numeracy Cohort model.

Conclusion

The Numeracy Cohort, as a teacher PD model, incorporated several key features that were designed to mitigate the challenges faced by the rural division and its teachers with regards to providing and accessing meaningful teacher PD. It also included several components linked to established characteristics of effective teacher PD in the hopes of supporting teacher professional growth in the area of mathematics instruction and student numeracy. In the remaining chapters of this thesis, the extent to which the model was effective is discussed: Chapter 5 examines the model's effectiveness in mitigating challenges related to the accessing and provision of meaningful teacher PD, Chapter 6 examines the model's effectiveness in terms of supporting teacher professional growth in the area of mathematics instruction and student numeracy, and Chapter 7 examines how social constructivist principles contributed to teacher professional growth through the model.

Chapter 5 – Mitigating Challenges through the Rural PD Model

The purpose of this chapter is to present findings and provide discussion about the first research question: To what extent (if at all) is the specific locally constructed PD model utilized in the rural school division able to mitigate the challenges faced by the rural division and its rural teachers in accessing meaningful PD? In order to address this question, it was necessary to identify the challenges faced by the division and its teachers with regards to the provision and accessing of effective PD, to identify how the division's model attempted to mitigate these challenges through its design, and to examine the extent to which the model was successful in mitigating the challenges faced. The four categories of challenges faced by rural divisions from the literature review in Chapter 2 (funding, geography, staffing, and contextual differences) were used both as a priori codes in analyzing data to answer this question, and as the structure around which this chapter was built. Each of the categories was examined separately in order to describe the extent to which the PD model was able to mitigate the challenges faced by the division and its teachers. A discussion about the importance of these findings is included at the end of the chapter.

Funding

Funding was a significant challenge faced by the division in this study. Table 3 below outlines the revenue sources for the division over a three-year period as was indicated in the FRAME budgets submitted by the division to the province (Manitoba Education and Advanced Learning, 2014; Manitoba Education and Advanced Learning, 2015; Manitoba Education and Training, 2016).

Table 3

Divisional Revenue

Year	Provincial Government	Municipal Government-Property Tax	Other School Divisions	Other Sources	Total Revenue
2012-2013	\$9,092,709	\$4,335,525	\$29,900	\$96,072	\$13,554,206
2013-2014	\$9,095,723	\$4,356,368	\$28,600	\$45,058	\$13,525,749
2014-2015	\$9,143,752	\$4,239,202	\$33,900	\$23,228	\$13,440,082

As the table indicates, the division's total revenue was in a gradual state of decline prior to the study and during the implementation of the PD model. This was due in large part to declining enrolment. While the amount of revenue decline is small, it should be noted that many of the costs associated with operation of the division were increasing. As is evident in Table 4 below, transportation costs, teacher salaries for regular instruction, and instructional and support services were increasing while divisional revenue was on the decline (Manitoba Education and Advanced Learning, 2014; Manitoba Education and Advanced Learning, 2015; Manitoba Education and Training, 2016).

Table 4

Divisional Expense Categories

Year	Regular Instruction	Transportation	Operations and Maintenance	Instructional and Other Support Services	Cost per pupil
2012-2013	\$7,933,939	\$1,127,155	\$1,545,206	\$443,796	\$12,344
2013-2014	\$8,022,180	\$1,188,734	\$1,563,749	\$505,507	\$12,685
2014-2015	\$8,185,758	\$1,149,044	\$1,532,131	\$519,208	\$13,016

While declining funding is a reality for many rural school divisions in Manitoba, when one considers that costs are continually increasing due to inflation, the magnitude of this problem becomes clear. While funding appears to increase in Table 3 above, it does so only by 0.56% over the three-year period. The costs of regular instruction, however, increased by 3.17%, the

cost of transportation increased by 1.94%, and the costs of instructional and other support services increased by 16.99%. Even at a very basic level, the costs per pupil were rising much faster than the provincial funding. While the average cost per pupil in 2012-2013 was \$12,344, it was \$13,016 in 2014-2015, an increase of 5.44%. This division, like many others, had to make difficult decisions about where to cut funding, and many of these decisions were based on what could be cut. Many more of the decisions were based on the priorities of the division, including teacher PD. The division in the study placed significant priority on system improvement and teacher PD, as is indicated in the large increases in funding for instructional and other support services, the area of FRAME budgets that includes support for teacher PD. Had the division not had this priority, this area could have decreased under the funding conditions the division was facing. Another noteworthy point about the divisional budget is the large proportion of the division's budget allocated for transportation. According to the 2013-2014 FRAME budget (Manitoba Education and Advanced Learning, 2015), school divisions in Winnipeg and Brandon spent between 1.4 and 3.1 percent of their budgets on transportation of pupils, while the division in this study spent 8.8 percent of its budget on pupil transportation. This means that the division had 7.4 percent less of its budget available for other things than the largest urban school division in the province, something that strained the availability of funds for new initiatives in the division.

Declining enrolment is a reality for many rural divisions (Chalker, 2002; Suvorova, 2004; Wallin, 2008), this division being no exception. Using budgeting information available through the data in this study, Table 5 below indicates the number of students enrolled and full time equivalent (FTE) teaching positions in the division over a three-year period. It also outlines the

provincial dollars provided for PD and the budgeted and actual amounts spent for PD over the same three-year period.

Table 5

Divisional Teacher, Enrolment, and PD Funding Data

Year	FTE Teachers	Student Population from Sept. 30 th Previous Year (funding basis)	Provincial Dollars Provided for PD	Total Dollars Spent by Division on PD
2012-2013	88.015	1098	\$50,462**	\$110,511 (\$118,115 budgeted)
2013-2014	89.75	1077	\$49,395**	\$95,104* (\$117,560 budgeted)
2014-2015	90.11	1059.5***	\$48,737**	\$118,470 (budgeted)

Note. *Numeracy Coach's salary @ 0.25 FTE (approximately \$20,000) not included in this amount. ** Numeracy Grant or other grants are not included in this amount. ***0.5 of a student refers to a half-time Kindergarten student

Over just the three years in the table, student enrolment declined by 38.5 students, or 3.51%.

Interestingly enough, the FTE teachers increased by 2.095 FTE or 2.38%. As previously mentioned, provincial funding, while appearing to increase, did not do so at the rate of inflation.

This meant that although costs were higher in the division, the funds available to cover costs were not. This is evident in the division's reported numbers regarding PD dollars provided by the province. Due to declining enrolment, the amount of money provided each year for teacher PD declined as it was calculated on a per student basis. In just the three years outlined in Table 5, this decline amounted to a 3.42% reduction in funding for PD. Decision-makers in the division were forced to make difficult choices about how to reduce costs. The budgeted numbers for teacher PD provide evidence of the commitment the school division had to providing effective PD for teachers. Despite declining provincial funding for teacher PD, the division held the line

in its teacher PD budget at the \$118,000 mark, a number that was 2.34 to 2.43 times the amount provided by the province. This meant that over half of the money spent on teacher PD annually was, in fact, drawn from discretionary funds (as opposed to provincial funds). The percentage of the PD budgeted funds provided by discretionary funds as opposed to provincial funds increased from 57.3% in 2012-2013 to 58.9% in 2014-2015. The school division's commitment to teacher PD is evident in the budgeting decisions that were made in the face of declining enrolment and provincial funding.

The interview with the superintendent of the school division in this study provided further information about potential inadequacies in the funding formula used in the province. One of the key issues with the provincial funding formula, according to the superintendent, was the lack of consideration for the costs associated with the distances rural teachers had to travel to attend PD sessions. In his interview, the superintendent said the following:

First of all, there's a huge gap between rural and urban school divisions and southern and northern school divisions in terms of the dollars that are received and how far those dollars will go in a particular environment because of distances. If we do send people to Winnipeg for a very worthwhile conference, it will cost us a lot more than the people who live in Winnipeg to send that team. And if we do get our group together for a meeting, it will cost us more than it will in the city because we will be paying mileage for those people to attend, whereas in the city, people might be just driving, you know, two minutes extra to the site that they're going to.

In addition to mileage costs, accommodation costs for rural and northern school divisions also have the potential to impact how far PD dollars received from the province will go, creating an

inequitable situation for those divisions operating in rural or northern contexts. According to the superintendent, the funding formula used by the province did not make up for the differences in costs associated with teacher PD and other things such as bussing and small school operating costs. Despite having some mechanisms in place to account for the differences in costs, the province's funding formula did not go far enough to make it an equitable situation. In his interview, the superintendent suggested:

The province-, it's by formula. I would like to see a differentiated formula. I would like to see a formula that takes into account your distances and your sparsity. Now what they'll say is "Well we do, we give you a sparsity grant," but it's supposed to address all things from bussing to school sizes to, you know, PD. It certainly isn't adequate to address PD. I would say that none of-, not a dollar of the sparsity grant goes to professional development.

A similar thought was expressed by principals about the small schools grant some of them received. While grants such as the sparsity and small schools grants provided some relief for the challenges the school division faced, the general feeling was that they did not go far enough to offset the actual increased costs associated with operation of the school division, particularly in relation to teacher PD. The school division in the study spent between \$12,344 and \$13,016 per pupil over the three-year period from 2012-2013 to 2014-2015. In comparison to urban divisions that typically spent a thousand or two thousand less per student, it was evident that the costs of educating rural students were significantly higher in the rural division in the study. (Manitoba Education and Advanced Learning, 2014; Manitoba Education and Advanced Learning, 2015; Manitoba Education and Training, 2016). The result of this discrepancy was perceived inadequacies and inequities in the funding model utilized within the Manitoba context.

The absence of discussion about provincial funding in the focus group discussion with principals is noteworthy. The majority of conversation about funding challenges focused on increasing the number of dollars available through local means, and reallocation of existing resources. Very little was said about the challenges of decreased provincial funding for PD due to declining enrolment, or about school or divisional budgets that weren't keeping pace with inflation. As is evident in the numbers provided, it isn't that these things were not challenges for the division. There was a shortage of money in local school budgets that posed challenges for principals on an ongoing basis. They did not seem to link this shortage with provincial funding, however, in the focus group interview. One possibility for why principals did not mention provincial funding as a challenge in the division may be due to the fact that the division had held the line on PD funding, pulling money from discretionary sources to bolster the PD budget line.

This was something the superintendent was very proud of, noting in his interview:

Five years ago, there wasn't very many dollars above the provincial grant that was put into professional development. In fact, at times it was very tight in terms of even making sure the provincial grant was being spent was what I would say from looking at the FRAME documents prior. As we moved to this model and continually made an argument to the board about the need for this, we were able to secure more and more dollars from the local grant and devote it towards professional development. And again, sometimes that was a re-shifting. We even managed to increase professional development funding in a year where we didn't raise the local levy, just by re-shifting resources and using some of the surpluses that were there to make sure that we were focused in that area.

Due to the fact that the division contributed significantly more money to the area of PD over the previous five years, principals likely did not feel the burden of decreased provincial funding for PD as intensely as they would have if the division hadn't made the choice to hold the line on the PD budget despite declining provincial funding for PD. To a large extent, the division had mitigated this challenge prior to the study being conducted.

Mitigating funding challenges through a creative new financial model. Starting up the Numeracy Cohort initiative required careful consideration of funding challenges. Since holding the line on the PD budget was already a significant task, ways of creatively accessing sufficient funding and resources for the new project had to be found. This was done in several ways as is evident in *Figure 7* below.

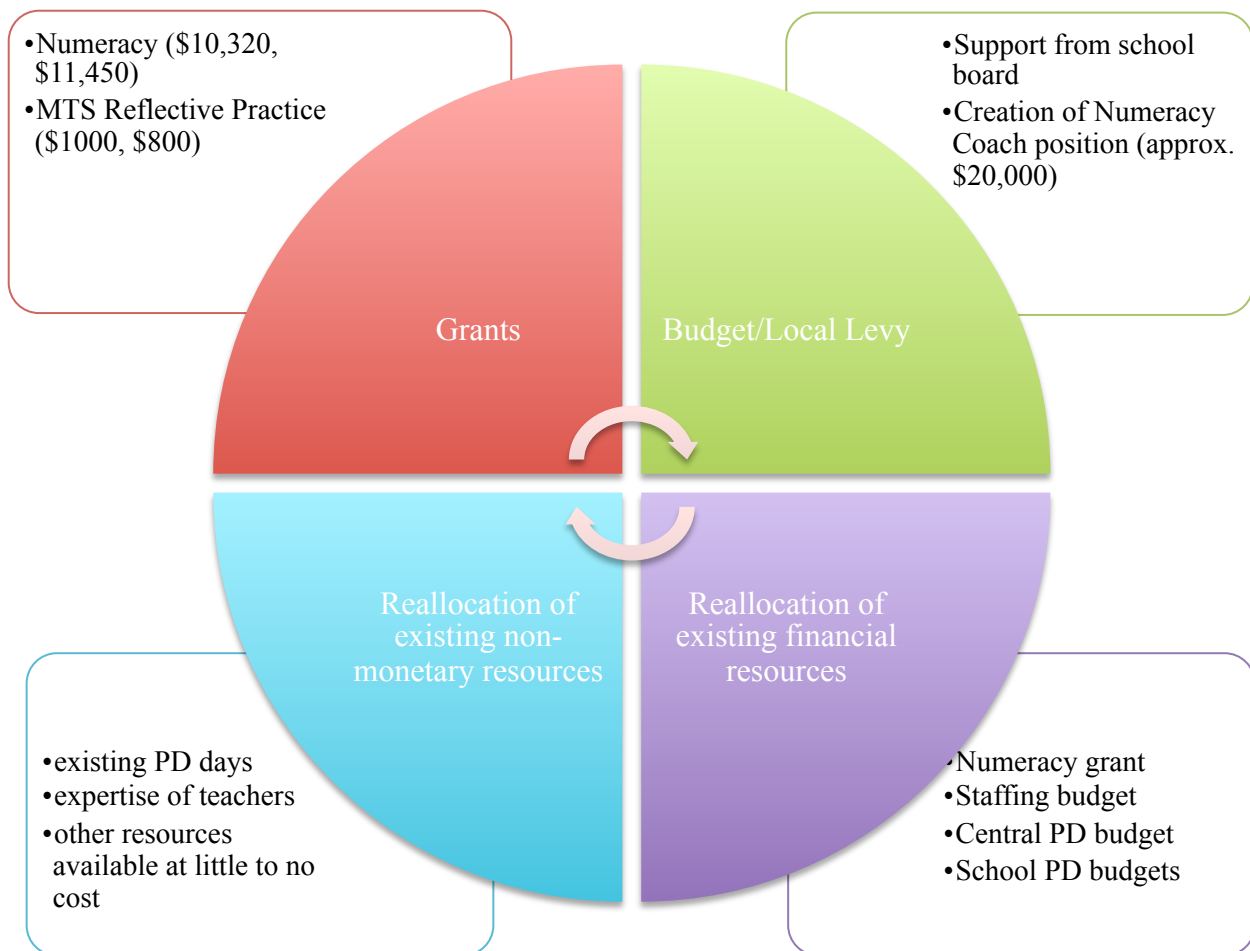


Figure 7. Funding and resources for Numeracy Cohort initiative.

The financial model above provided funding for the Numeracy Cohort initiative, and includes evidence of how the initiative was subsidized using both financial and non-monetary resources. The financial model, itself, provides the most significant evidence of the mitigation of financial challenges in the interest of developing a new PD model for the division. In order to secure funding for the Numeracy Cohort, resources were accessed in four ways: through grants, through the local municipal levy, through reallocation of existing financial resources, and through accessing and reallocating existing, non-monetary resources. Each of these categories helped to

mitigate some of the funding challenges experienced in the division to some extent; however, the strategies weren't above causing challenges of their own in all cases.

Accessing grant money. Accessing grant money was critical in funding the Numeracy Cohort initiative. Without the numeracy grant provided by the province, it is doubtful the initiative could have taken shape as it did. While the grant had been available the previous year, this money was reallocated to fund the initiative as the Numeracy Cohort began. The provincial numeracy grant amounted to \$10,320 in 2013-2014 and \$11,450 in 2014-2015, and provided the bulk of the operating budget for the new PD model. Moreover, a Manitoba Teachers' Society Reflective Practice Grant was applied for by the Numeracy Coach and awarded for the amounts of \$1000 the first year, and \$800 the second year. The grant money obtained from both sources provided an annual operating budget of approximately \$12,000 for the Numeracy Cohort. This budget covered primarily costs associated with face-to-face meetings, although it was also used for other discretionary expenses such as purchasing materials or resources for Cohort teachers. Since the approximate cost of each face-to-face meeting was \$2000 (including mileage costs, substitute costs, and coffee and lunch expenses), it was possible to fund five face-to-face meetings per year for Cohort teachers, while reserving approximately \$2000 for discretionary use (for resources and other costs).

Increasing funds through the local municipal levy. Aside from provincial funding and grants, local divisional funding was also sought to support the Numeracy Cohort initiative, particularly in the area of hiring a Numeracy Coach. At a cost of approximately \$20,000, creating the Numeracy Coach position required the school board to either reallocate money from other areas of the budget, or to increase locally levied property taxes in order to fund the new 0.25 FTE position. In his interview, the superintendent related some of the challenges that had to

be overcome in order to garner school board support for the initiative. Raising the local taxes was something the board had been concerned about, according to the superintendent. They had tried to be fiscally responsible, not raising taxes to a greater extent than their neighboring school divisions. In order to make the move to increase taxes, the members of the school board needed to understand the value of the initiative, and perhaps of teacher PD more generally. The superintendent described how support had grown for teacher PD at the school board level over time in his interview:

I think the board, at times, when they saw professional development and they saw money being spent on mileage, hotel, and a Friday session, they weren't impressed. They viewed it-, and then they didn't hear about anything coming of it. They saw a teacher go to that and well what really came of it? What they were looking for was well what's happening when we have a group of teachers who get involved in something and I'll use an example of the Daily 5. And that was a group of teachers who before we were spending more on professional development, on their own initiative, started getting involved in Daily 5 and then as time went on, we started to support them. We had them come to a presentation to the board about what Daily 5 was all about. We supported them on going on an international conference to San Antonio to learn more about it. Then they came back and they did a summer institute for other teachers in the school division. They continued doing presentations. The board visited classrooms where Daily 5 was being practiced and it built a commitment to that idea. And the board, realizing that if they invest in professional development, that if they invest in the right people, and keep focus, it can be more than just sending a person away for a

day. There's a re-investment that is made by those teachers when they come back and they invest in themselves and their colleagues, their time and their energies to make something happen that's positive for students.

There had been some talk at the board level about the money being spent on mileage and hotel, and a Friday session that amounted to a “day off.” Perceptions of waste existed, and some board members felt that not much was coming out of the investments made in this type of PD. More recently, there had been a couple of examples of teachers going to sessions even out of the country and then coming back to the division to do summer institutes or other sessions for other teachers with their newfound information. The superintendent suggested that this sort of work allowed the board to see the potential for PD to make a difference as teachers reinvested their own time and effort into helping other teachers and their students. Finally, board members had heard complaints from parents about teachers being out of the classroom too much for student learning to be effective. The desire to have teachers in their classrooms as much as possible with their students impacted the level of support expressed by the school board members, and thereby the funding provided through the budgeting process.

Reallocation of existing financial resources. In addition to finding new funding sources for the Numeracy Cohort initiative, another important way funding challenges were mitigated by the school division was through the reallocation of existing funds. Funds were reallocated in primarily four ways. The first, as already mentioned, was the reallocation of the numeracy grant resources to an account for operation of the Numeracy Cohort. This provided the basis for funding the initiative. The second way funds were reallocated, was through the staffing budget. While the exact numbers and breakdown are not evident in the data, it is clear that the Numeracy Coach position was funded through a combination of both new and existing funding accessed

through the staffing budget. In essence, some of the twenty thousand dollar position was reallocated through staffing, and staffing numbers were increased and funded through the local levy or the re-shifting of resources in the larger divisional budget. A third way that funds were reallocated to provide resources for the Numeracy Cohort initiative was through the accessing of Central PD funds to send the team of Numeracy Cohort teachers to a two-day workshop together during the first year of operation. The workshop was on Universal Design for Learning, a concept that combines principles of inclusive education and quality cross-curricular educational planning (Katz, 2012). Since the cost for all teachers was nearly six thousand dollars, Central PD money was sought to fund this additional development. Central PD money, as previously mentioned, was money that had been put aside specifically for the purpose of sending teams of educators to larger scale events, among other divisional initiatives. The final way that the reallocation of existing financial resources took place for funding of the initiative was through the accessing of school PD budgets by Cohort teachers. The teachers were encouraged to request funding from their school PD budgets to attend workshops related to their MAR projects, to provide extra release time for them to meet with other teachers, or to purchase books or supplies related to their projects. While the approximately twelve thousand dollar operating budget was used for five face-to-face meetings per year and a few other expenses, the ongoing work of the Cohort required alternate resources to be found. School PD budgets were one such source.

While the Numeracy Cohort initiative was successful in reallocating financial resources from a variety of areas, accessing such resources was not without its own challenges. Accessing resources from the Central PD Fund worked the first year, but as that money was used for things like sending teams to all kinds of workshops, it was only available the one year for the Numeracy Cohort to access. Utilizing school budgets to fund the individual goals of teachers as

supplementary funding, however, created significant challenges throughout the initiative. These challenges appeared to be exacerbated by the Numeracy Cohort, rather than caused by it. The funding of individual teacher PD through school budgets was a problem, to varying extents, at the beginning of the project, as was evident in the interviews conducted with Cohort teachers in the fall of the first year. Some of the problems that teachers cited with regards to accessing financial support from school PD budgets included inconsistencies between schools and principals, difficulties accessing PD funds later in the year as opposed to earlier in the year, competitiveness between teachers wishing to access funds, and not wanting to ask for PD opportunities that were too expensive or far away. The extent to which these problems existed for teachers varied, and seemed largely tied to principal support. In most schools, teachers were able to access school PD dollars with relative ease. Significant issues surfaced in just two of the schools in the study. In these schools, limited budgets contributed to teachers being unable to access PD money, and in some cases being teased or made to feel guilty for using too much PD money or using other teachers' PD money. Several of the teachers in the study indicated that they worried about how others perceived their accessing of school PD dollars, worried that other teachers would harbor resentment towards them for accessing school PD money. These challenges, as mentioned, appeared to exist prior to the Numeracy Cohort initiative due to the division's method of allocating PD dollars in a pool to each school for teachers to access, but the added strain put on these dollars by the initiative exacerbated the issue.

One of the side effects of the challenges faced by the added strain on school PD budgets was the shifting of the Numeracy Coach role to include not only facilitation, but also negotiation, particularly between teachers and principals. Due to the fact that teachers needed to ask for school and principal support to meet outside of the scheduled face-to-face meetings held for the

Cohort, and due to the fact that schools had limited PD budgets amounting to only about three hundred dollars per teacher, there were several instances where I, as the Numeracy Coach, had to request for principals to approve requests made by Cohort teachers to attend workshops or to be released to work with other Cohort teachers on joint projects. This was a source of frustration for teachers and for me as the Numeracy Coach, which is evident in the facilitator notes and interviews that were collected as secondary data for the study. The facilitator notes provide evidence of many telephone, face-to-face, and email conversations with principals about the use of school PD dollars for Cohort teachers. It is evident that a lot of time and energy was spent negotiating the release of these funds.

Caution is necessary when looking at the feedback about funding, particularly with regards to school PD budgets. In addition to the frustrations expressed surrounding the accessing of school PD budgets, there was significant feedback from principals and teachers about the positive side of funding the majority of the Numeracy Cohort through divisional (as opposed to school) budgets. Several teachers expressed that they felt they had access to more PD and more PD money because of the Cohort. Very small school teachers and principals in particular seemed to appreciate the accessibility the divisional initiative afforded by funding through divisional budgets. Interestingly enough, while it might seem logical that very small schools would have had the most difficulty funding extra release time for Cohort teachers from school budgets, this was not the case. It should be noted, however, that in one of the very small schools, the teaching principal was actually the participating Numeracy Cohort teacher. This likely gave him more flexibility with budgets, and obviously didn't require the negotiation skills of the Numeracy Coach.

Reallocation of existing, non-monetary resources. The final way that funding challenges were mitigated for the Numeracy Cohort initiative was through the reallocation of existing, non-monetary resources. This was done in primarily three ways: utilizing existing divisional PD days, drawing on the expertise of teachers for PD, and accessing outside resources available at little to no cost. As previously mentioned, the division had two divisional PD days, two in-school PD days, and one provincial PD day that were already mandated by the province. For these days, schools were shut down, and no substitute teacher costs were required for teachers to engage in PD sessions. The Numeracy Cohort used three in-school PD days the first year of operation, and one in-school PD day the second year of operation to provide time for Cohort teachers to get together. They also met in a shorter hour-long session each year at one of the divisional PD days in January. On this day, the Numeracy Cohort was a session amongst many others for which teachers could sign up in a workshop-style PD offering. Utilizing this time for Cohort teachers to meet increased Cohort teacher contact time from five face-to-face sessions per year, to eight or nine opportunities to meet each year. When combined with the PD session teachers attended as a team in the first year, and other smaller meetings that occurred between teachers working collaboratively, teachers were involved in Cohort activities most months of the school year.

Utilizing in-school and divisional PD days was not without its own challenges, however. Despite the fact that utilizing the days allowed teachers to meet at a time when they didn't have to plan for substitute teachers, and despite the fact that such days avoided the hefty two thousand dollar price tag associated with teacher-released Cohort face-to-face sessions, the issue of conflict between competing PD initiatives came up a few times over the two year period. In these instances, teachers either wanted to, or were obliged to by their principals, attend a PD

session that was occurring at the same time as Cohort sessions had been planned. Even though the Numeracy Cohort had decided to meet on an in-school PD day, other schools in the division were also hosting their own PD events. In some cases, speakers or presenters came in to talk to school staffs, and principals wanted the majority of their teachers to be in attendance for the presentation. In some cases, teachers knew of another session that was helpful to them in their own classroom context, and wished to attend another session. These situations of conflicting PD opportunities posed a significant challenge for the Numeracy Cohort. In order for Cohort sessions to be productive, a critical mass of teachers had to attend. As such, lack of attendance was a concern. While the Numeracy Cohort managed to maintain a critical mass of teachers at all sessions that ran, competing PD opportunities in the division due to the design of the PD model certainly were a challenge that had to be overcome.

On top of the challenge of competing PD opportunities, utilizing in-school PD days created another significant challenge for very small schools in particular. In very small schools, when in-school PD days occurred, there were often only two or three teachers in attendance. Taking one teacher away to participate in Cohort activities effectively hollowed out the staff of the school so much that it was not possible for those left to have an effective in-school PD opportunity. In several cases, very small school staffs were invited to join the Numeracy Cohort, particularly when the activities planned for the day were seen as beneficial to the other teacher(s) in the school(s). When they were not of benefit, other opportunities were sought for meaningful connections to be made with isolated teachers in other schools that were hosting in-school PD.

The second way that funding challenges were mitigated through the reallocation of existing, non-monetary resources was by drawing on the expertise of teachers for PD. This was done both by visiting the classrooms of other teachers, and by having Cohort teachers share their

information with other teachers. Teacher visits occurred both within the division, and in two cases, outside of the division. The purpose of the teacher visits was to see teaching strategies and methods in practice. By visiting the classrooms of other teachers engaging in innovative numeracy strategies, Cohort teachers were able to see the potential such strategies had for their own contexts. These teacher visits required only release time and, in some cases, travel costs. Relatively speaking, they were inexpensive PD opportunities directly related to mathematics instruction, and drew on existing teacher capacity within the division, as well as outside of it.

Near the end of the second year of the Numeracy Cohort initiative, the teachers in the Numeracy Cohort ran a daylong PD session on an in-school PD day for elementary teachers. Forty teachers were in attendance, and Cohort teachers were able to share their learning with other teachers. This provided valuable PD to other teachers in the division who had not participated in the Numeracy Cohort, and was well received. One issue that arose out of hosting the day, however, was that of increased workload for the Numeracy Cohort teachers. Despite the fact that they were given a bit of time to collaborate and prepare for the day, and despite the fact that they were encouraged to access funding to be released to further prepare if needed, asking teachers to do this amounted to a gross enlargement of existing responsibilities and workload. None of the teachers accessed additional time, and although the teachers didn't mention this in their interviews, there were several references to concerns about this in the facilitator notes.

The third and final way that existing, non-monetary resources were accessed for the benefit of the Numeracy Cohort initiative was through looking for existing outside resources that were available at little or no cost to the division. Contact was made with consultants at Manitoba Education, as well as with faculty at Brandon University for information, contacts, and workshop

facilitation. Many other organizations have mandates to provide support to schools and school divisions, and accessing such supports has the potential of providing significant resources for small initiatives like the Numeracy Cohort. In addition to accessing contacts and information from Manitoba Education, a faculty member at Brandon University provided two workshop experiences for teachers in the Numeracy Cohort. I also sought out opportunities to bring expertise into the division by drawing on a personal and professional connection with a mathematics consultant in another division. In essence, I arranged to present on a topic of my expertise for his teachers in his division, in exchange for his presenting on a topic of his expertise for my teachers. I described the success of this exchange in my facilitator notes at the time:

As a side note, partnering up with [consultant's name removed] is really an important move with regards to sustainability of our model. Bringing him in cost us \$0. I went and presented to his teachers about inquiry in high school math and he came here to do this. We briefly talked about how we could do this again next year – I could go talk to his teachers about backward planning or even doing guided math in high school. This has tremendous potential for rural divisions – drawing from other rural divisions' initiatives and strengths – I hadn't really thought of this. If our division has me as a facilitator – they invest in me and [consultant]'s division invests in him, we have double the capacity to lead teachers together perhaps. When I looked at drawing on the strengths of local places this is one of the things small rural divisions can do. Networks of people become so very important.

This “expertise-sharing” provided great value to the Numeracy Cohort teachers as he engaged them in a half-day session on using Guided Math in their classrooms. While this sort of strategy

is limited by the expertise and connections available, it did provide added value to the initiative at little to no cost to the division.

Discussion and implications related to funding. In terms of funding challenges, data in the study verified much of what literature in the field had indicated, including: challenges related to declining enrolment (Chalker, 2002; Suvorova, 2004; Wallin, 2008); higher costs per pupil (Harmon et al., 2007) due in large part to transportation costs associated with bussing students to school and sending teachers out to external PD opportunities (Lyons, 2008; MASS & MAST, 2006); and issues related to a provincial funding formula that does not effectively take into account the geographic and financial differences in rural divisions (MASS & MAST, 2006). The verification of these findings within a Canadian (and Manitoban) context provides valuable information to both rural divisions seeking to start new PD initiatives, and to the Ministry of Education in Manitoba about issues related to the existing funding model.

The size of the rural division in the study, and the small scale of its financial budget necessitated creativity on the part of the division to get the Numeracy Cohort up and running. In the interview conducted with the superintendent, he noted the following:

I think that's a strength of rural divisions. We've had to, as I said earlier, sometimes what we consider a weakness becomes a strength. Because rural divisions have challenges, and they have limited funds, they have to really figure out, they have to really problem solve, they have to really - that twenty-first century ingenuity that comes into thinking outside the box and changing something to make it better. Because really the bottom line is there's not going to be a lot more money. There could be a little bit more money. We can increase this

and do that. We can refocus, but you really have to think differently. Rural school divisions have a great history of doing that.

The financial model employed by the rural school division in this study provides evidence of the ingenuity the superintendent was speaking of, as well as a concrete example of the creativity that is required for rural school divisions to overcome the unique contextual challenges that they face (MASS & MAST, 2006; Wallin, 2008). Through the use of grants, the local municipal levy, reallocation of existing financial resources, and reallocation of existing non-monetary resources, the financial model was able to mitigate the majority of funding challenges faced by the division with regards to implementing new PD initiatives.

In addition to the ingenuity evident in the funding model used for the initiative, data in the study also illuminated challenges related to funding a PD initiative in this manner. The potential for challenges related to funding part of the initiative through budgetary increases or increases in locally levied property taxes were evident in comments made by the superintendent about school board support for PD. Reluctance to raise local property taxes, perceptions of waste, perceptions of minimal outcomes related to PD, and concern about teachers being away from classrooms too much all had the potential to decrease school board support for PD initiatives, thereby impacting what was available through divisional budgets. The challenges experienced by the school division in this study support the notion that while the inclusion of locally levied property tax as a funding source provides more autonomy for rural school divisions in many cases, there is an inescapable tension that exists between lowering local tax rates and expanding educational programming (Henley & Young, 2008; MASS & MAST, 2006). While the Numeracy Cohort was supported both in principle and financially by the school board in the study, the tensions noted in the study are important both in terms of provincial funding

models, and in terms of considerations for other rural divisions seeking to support and fund PD initiatives.

Aside from challenges around school board support, there were also other challenges that emerged related to the financial model that funded the Numeracy Cohort initiative. The reallocation of existing non-monetary resources (such as using existing PD days, drawing on the expertise of divisional teachers, and bringing in outside expertise available at little to no cost), as well as the reallocation of existing financial resources (such as the Central PD money and school PD budgets) drew on other areas of human and financial resources, causing several of the additional challenges described in this chapter. The study illustrates that there are limitations within small school divisions with regards to how much reallocation can take place without negatively impacting other budget areas or burdening people within or outside of the division by requiring extra travel, time, and energy. These are important considerations for other rural divisions seeking to implement such PD initiatives.

Geography

Identifying challenges related to geography. Geography, like funding, was a significant area of challenge for the school division in the study. The division was approximately 3400 square kilometers (82 km X 41 km), and was geographically distanced from Winnipeg and Brandon, the two urban centers where many PD sessions were held. Significant distances separated schools within the division with the two largest towns necessitating 90 km round trip travel, and the furthest towns or school locations necessitating 186 km round trip travel. As a result, significant travel costs were incurred when teachers attended PD outside of the division, and when teachers engaged in PD within the division (although to a lesser degree). Data collected in the study provided specific information about the geography-related challenges

faced not only by the rural school division in providing teacher PD, but also by the teachers in the division wishing to access effective PD. Three distinct areas of challenge emerged from the data in the study with regards to geography in the division: challenges related to travelling to external PD, challenges related to bringing PD into the division, and challenges surrounding teacher collaboration. Each of these will be discussed in separate sections.

Travelling to external PD. The geographic location of the school division in the study was an important consideration when teachers chose to travel to PD outside of the division. Attending external PD opportunities in Winnipeg (the largest urban center in the province) necessitated 245 to 404 km of travel, creating significant costs for the division, or in situations where the division did not pay for travel, significant investments of time and money for teachers. Examination of the data in this study illuminated several subcategories of challenges related to traveling to PD outside of the division: cost to the division, cost to teachers, time for travel, comfort with driving, and awareness of PD opportunities. Each of these subcategories shed light on the geographic challenges that existed within the rural context.

Cost to division. As is likely the case with many school divisions, rural divisions included, sending teachers out of the division to external PD opportunities was an integral part of the teacher PD structure that existed in the school division. As previously mentioned, the majority of external PD opportunities were located in one of the two major urban centers in Manitoba. Attending PD opportunities in the largest major urban center, Winnipeg, necessitated that mileage of approximately \$100 to \$170 be paid for every vehicle travelling to the workshop. Given the distances involved, teachers also had to either stay in a hotel or leave very early in the morning (and get home very late at night) to attend a PD workshop in Winnipeg. Costs for mileage, hotel, meals, and registration for a workshop in Winnipeg could easily add up to \$500

to \$1000, particularly if hotels were used, or if the workshop was more than one day in duration. During the principal focus group discussion, principals raised the issue of the cost of sending teachers out to external PD opportunities. They explained that while the school PD budgets provided approximately \$300 per teacher for PD, costs for attending workshops (with mileage, hotel, meals, and registration) could be well over \$500. This put a significant burden on school budgets. Substitute teachers, while accessed from different budgets, further added to the cost of teacher PD in the division. In comparison to urban divisions that could typically send teachers to a similar workshop in Winnipeg for only the cost of a substitute and registration, the rural division in the study incurred additional costs for mileage (and sometimes hotel and meals).

Cost to teachers. The cost of travelling to external PD opportunities for individual teachers was another challenge that emerged from the research data. Teachers mentioned covering mileage costs, in particular, as something that was expected of them in some cases. Attending divisional workshops and the province-wide PD day in October were two examples that were provided by teachers in which they were expected to pay for their own mileage. None of the teachers shared examples of having to pay for hotel costs, although it could be possible that they either elected to drive in early in the morning, or stay with family members who lived in urban centres in the event that they were denied coverage for hotels. It is also possible that they may not have asked for coverage for hotels due to the fact that they felt they could minimize costs in one of these two ways on their own. Both driving in early and staying with family were mentioned by teachers in regards to minimizing costs for travel to external PD opportunities.

There were several instances in the data in which teachers referred to the fact that they did not ask for funding to attend PD due to the fact that they knew it was too expensive, particularly in cases where the PD was out of the province or even the country. Flying to PD

opportunities was deemed to be too expensive and out of the question for most teachers. As a result of the high costs of flights and hotels, many teachers said they simply did not ask for funding to attend. They knew the answer would be “no.” This challenge, although related to funding, is also related to the costs to teachers associated with travel to external PD opportunities. While the teachers knew there was not sufficient funding to pay for mileage, flight, hotel, and registration costs for these big-ticket events, they also knew that they, personally, would have to pay for part (or all) of the costs associated with the PD opportunity. The fact that they chose not to ask for funding (and also not to attend) could indicate not only their understanding and sense of funding challenges in the division, but also their unwillingness or inability to incur such costs on a personal level.

One final area teachers mentioned as a possible personal cost to attending PD sessions was incurring additional daycare costs when the hours of daycare were extended due to the time required to travel to external PD opportunities. While this did not seem to be a large issue, it is worth mentioning as a potential cost to teachers on top of other items such as mileage, hotel, flights, and registrations.

Time for travel. In addition to the financial costs for divisions and individual teachers in relation to travelling to PD opportunities outside the school division, time for travel was also a significant challenge for teachers. Travelling 245 km to 404 km to Winnipeg round trip also meant that teachers had to be in their vehicles for at least two and a half to four hours when attending a workshop in Winnipeg, for example. Expenditures of such time had the potential of impacting childcare arrangements, family commitments such as sports and recreational activities for teachers or their children, and even everyday life if overnight hotel stays or very early departures were necessary. One teacher noted:

I also find the cost, financially, like personally to be high sometimes because you've got to find maybe a sitter or somebody to come and take care of your kids if you've got to be away. Um, I know a lot of people have daycare that have to pick up their kids at a certain time. Mine have gotten a little bit older and it's not as much of an issue, but then nobody's there to take them to baseball, or hockey. So that the time it takes to travel just to Winnipeg, or to find someone to take care of the kids or to run them to activities or get them from daycare is quite a, quite a problem. It really hampers the things . . . It really makes you pick and choose, like okay I can really only maybe do this one thing.

This excerpt accurately describes some of the impact the time for travel associated with geographic location had on the personal lives of teachers in the division who wished to attend external PD opportunities. Time spent on the highway, travelling to such opportunities, sometimes came at a cost to teachers and their families, forcing rural teachers to choose which PD opportunities they could attend.

Along with impacting the personal lives of teachers at home, time required for travel to external PD opportunities also had the potential of impacting teachers involved in community or extracurricular commitments. One of the principals noted the following during the focus group discussion:

Well, a rural teacher is essentially a teacher, a parent, a coach, a - you name it. They're everything, so if they're it all-, like in small schools especially, and high schools, like, we're all, I'm classifying us all as small schools here, time, distance, let's take the financial aspect out of this. You know if I have a teacher that finds a PD that they're interested in, I will give them dollars from my PD to go if that's

what needs to happen. The distance and time, and when we go to a PD now in Winnipeg, it's just not- we can't just go for the day and then come home and maintain a regular life. Alright, that's what the Winnipeg teachers don't understand. They go to an event; they go home at four. We don't. We're either there for the night or we're on the highway for three hours.

This recognition of the many hats worn by rural teachers and the impact that can potentially occur when a teacher has to be away from the school or community for PD is a noteworthy point, as is the suggestion that the impact of attending PD is more significant in rural places than in urban contexts. Rural teachers in the division who were coaches or members of the local hockey board (for example) had to make arrangements to be away from the community to attend PD in an urban centre. Practices had to be cancelled or times had to be changed for meetings due to the time required for travel. This posed challenges for both teachers engaged in voluntary community- or school-based activities, and by extension, for those impacted by their absence.

Comfort with driving. Another challenge associated with travelling to PD outside the division pertained to the comfort level teachers had with driving. If teachers were uncertain about the location of a workshop, or concerned about their safety due to such issues as inclement weather, challenges were experienced in accessing meaningful PD. During interviews and focus discussions with teachers, this issue was raised several times. One teacher expressed her discomfort with driving in Winnipeg on several occasions. She even stated that she would not sign up for PD in Winnipeg unless she knew of another teacher who was already going, and who could drive. In addition, a new teacher to the division expressed that he did not know how to get virtually anywhere in Manitoba when he began working with the Numeracy Cohort. Although directions can be given, and locations can be shared, issues surrounding safety and weather are

not so easily mitigated. Manitoba winters can be harsh, and travel to external PD opportunities can be difficult, or even impossible in some cases. Snowstorms, icy roads, or even fear for one's safety, can impact teachers' ability to access PD. Teachers involved in the Numeracy Cohort mentioned all of these as factors contributing to both their decisions to attend PD outside of the division, and their actual ability to attend workshops or other activities for which they had registered.

Awareness of PD opportunities. Finally, awareness of external PD opportunities was a challenge raised by teachers in the school division under study. While some teachers indicated that they blamed themselves for not looking hard enough, the issue of knowing when and where PD opportunities were available was evident in the comments of several teachers in its own right. Obviously it is difficult to attend external PD opportunities if a teacher does not know about them. With fewer formal leadership positions and a smaller network of teachers in the rural school division, providing information about PD opportunities, particularly outside of the division, was a challenge at times.

Bringing PD into the division. While bringing presenters or facilitators into the division had the potential to decrease the costs associated with sending large numbers of teachers to external PD opportunities, bringing PD into the division had its own set of challenges. These challenges included needing to be applicable to all teachers, the cost of bringing in presenters or facilitators, the cost of travel within the division, and issues related to weather and safety. Each of these is described in a separate section.

Applicability to all teachers. In order to make the endeavor of bringing someone into the division worthwhile, presenters or facilitators necessarily had to have information that was applicable to a variety of teachers in the school/division. The topic of such presentations had to

be applicable to teachers at all grade levels and across all subject areas, particularly when a divisional PD day was held with a speaker or presenter. As such, divisional presentations had to be more general in nature, making them somewhat distanced from the specific classroom contexts of teachers.

Cost of presenter or facilitator. A second challenge associated with bringing PD into the division had to do with the cost of bringing in a presenter or facilitator. Along with the fee charged for services, the division in the study faced additional costs for flights, mileage, and hotels when bringing presenters or facilitators in to conduct sessions in the division. This was due, in large part, to the additional distances required for travel to the division.

Cost of travel within the division. Another challenge that was evident with regards to bringing PD into the division was the cost of travel within the division to the location where the PD was taking place (if it was to be PD accessed by teachers in several schools). Although significantly less than going to external PD, attending division-sponsored PD events also required travel for teachers to the venue. Due to the fact that PD events often included all, or nearly all, of the teachers in the division, mileage was generally not paid. Even though the division tried to hold events in the northern and southern areas of the division on an alternating basis, teachers in the most remote areas of the division repeatedly had to incur the mileage expenses personally for travelling to divisional events.

Weather and safety. Despite the fact that the distance required for travel was reduced for teachers when PD was brought into the division, issues around inclement weather and road safety were still a challenge even for PD provided within the division. One teacher noted that sometimes the roads within the division were actually worse than the provincial highways into urban centres during inclement weather. At least half of the division's teachers had to travel to

any given PD session in the division, and where there is travel, the possibility of unsafe roads is always an issue. In addition to road safety concerns for teachers, inclement weather also had the potential of impacting the travel plans of presenters or facilitators, themselves. Flight cancellations, road closures, or unsafe driving conditions were challenges for presenters attempting to travel to the division in the study. In the case where divisional PD days were planned, failure of a presenter to attend the day had the potential of cancelling the PD opportunity altogether. For this reason, the school division attempted to book presenters at times of the year in which a snowstorm was not likely.

Teacher collaboration. Although teacher collaboration would seem to be a logical alternative to both traveling to external PD and bringing presenters or facilitators into the division in terms of reducing costs and issues related to travel, even collaboration between teachers in the division had challenges associated with it.

Mileage and weather. Because many teachers did not have other teachers with whom they could collaborate in their own schools, teacher collaboration necessarily involved travel for many teachers. Issues related to mileage costs and weather/safety, although reduced by having teachers collaborate in the division for professional growth, could not be completely avoided.

Extra planning. In addition to issues around mileage costs and safety/weather, teachers raised the issue of extra planning as a challenge for accessing teacher collaboration as a PD opportunity. For the most isolated teachers in the division, collaborating with a colleague required first finding another colleague in another school who had similar goals or a similar teaching context with whom to collaborate. While teachers in larger schools could likely find such a colleague through informal conversations on a daily basis, teachers who had very few (or no) other teachers in their buildings had to engage in extra planning to foster collaborative

partnerships. Teachers also noted that extra planning was required to determine when and where they could meet with a colleague, as well as what tasks in which they would engage. All of this planning occurred on top of planning for a substitute teacher in order to be absent from their classes.

Addressing challenges related to geography through model design. In developing the locally constructed PD model, geography was a significant consideration. The entire model was, in part, designed to bring teacher PD opportunities into the division, rather than relying on teachers travelling to outside PD where costs for travel were often as expensive as registration fees and substitute teacher costs. In this way, the model was one big attempt to mitigate geographic challenges, drawing on local strengths to make teacher PD happen within the local context. To overcome the issues surrounding travel within the division, meetings were held centrally, ensuring that teachers had minimal travel time and costs associated with travel. The division office, located roughly in the center of the division, provided a space that could be accessed free of charge, and that minimized mileage costs as well as time required for travel for teachers. In addition, mileage was paid to teachers, even though PD was within the division, to ensure that the cost of travel was not a barrier to teacher participation.

Another way that the model was designed to mitigate challenges related to geography was by recruiting teachers from as geographically diverse contexts as possible. As mentioned previously in Chapter 4, six pairs of teachers were recruited to participate in the Cohort from a total of nine of the fourteen schools in the division. Moreover, four of the twelve teachers on the Numeracy Cohort were from some of the most geographically isolated schools in the division. Despite the fact that collaboration may have been easier if all of the teachers had critical friends

or partners within their own schools, specific efforts were made to ensure representation from those schools that experienced the most significant geographic isolation.

One final way that the school division attempted to mitigate geographic challenges through the development of the local PD model was to incorporate a component of online connectivity. Although teachers were funded to meet face-to-face five times throughout the school year, and although there were other opportunities to meet on existing PD days or release time funded through local school budgets, school division planners felt that incorporating an online platform would allow for teachers to communicate between meetings and events virtually. Online or blended learning was not an area that had been used in the division with much success in the past, but it had been talked about to some extent as a possible solution to some of the challenges the division faced geographically.

Mitigating challenges related to geography. Having described the geographical challenges faced by the division and its teachers with regards to teacher PD, specifically in regards to travelling to PD outside the division, bringing PD into the division, and collaboration with other teachers, I now turn to looking at the extent to which the Numeracy Cohort PD model was able to address them. As previously mentioned, the PD model did a number of things in an attempt to mitigate the geographic challenges faced in the division, including: bringing PD into the division to teachers, holding meetings centrally in the division to minimize time and costs, paying teachers for mileage to attend sessions, creating a Cohort that is was geographically diverse as possible, and including a component of online connectivity. Individually, and collectively, these elements of the model design were able to mitigate some of the challenges both the division and its teachers faced with regards to PD.

The very concept of relying on divisional resources to host teacher PD opportunities and collaboration was able to mitigate many of the geographical barriers faced by the division and its teachers, particularly those that revolved around traveling to PD outside the division. Costs associated with traveling to urban centres were replaced with much smaller travel costs, as teachers needed to travel a maximum of 96 km (round trip) to attend the meetings that were held centrally within the division. Four of the teachers did not need to travel at all due to the fact that the division office (where sessions were held) was in the same town as two of the schools. Another teacher never billed for mileage due to the fact that he lived very close to the division office. Even if all of the teachers attended a meeting at division office in the second year (when there were 14 in attendance), mileage costs were a maximum of \$288.12 (686 km). This only happened if teachers did not car pool, which a few often did. Considering that mileage for one teacher from the furthest point in the division to Winnipeg for an in-service was 404 km, or \$169.68, this was a significant cost reduction with regards to mileage. Apart from mileage, the Numeracy Cohort PD model provided further decreases in costs when compared with costs associated with travelling to PD outside the division. With no registration, hotels, or flights, the sessions came with a very low price tag. In fact, if substitute teachers are removed from the equation (since they are also required for traveling to urban-located PD) the cost of each session was under \$500 for thirteen teachers to attend.

One of the key decisions made by the school division surrounded paying mileage to teachers to attend the face-to-face sessions held for the Numeracy Cohort. This decision bears specific mention because it was contrary to what had been division policy, at least in some circumstances. As mentioned, mileage had not been traditionally paid for teachers to attend the two divisional workshops that were held twice a year. Although the division tried to alternate

the location of these so that teachers at each end of the division were closer to one of the two workshops, teachers that didn't reside in one of these two primary towns essentially always had to travel to the divisional PD days at their own cost. In paying mileage for all teachers to attend the centrally-held face-to-face sessions for the Numeracy Cohort, it was hoped that none of the teachers would have this unfair situation. Evidence collected in the study suggests that the decision to pay mileage to all teachers was effective in mitigating the financial barriers associated with teachers incurring their own costs for mileage. Teacher attendance at the sessions was very good. It was unusual to have more than one or two teachers missing from any session. In fact, there was only one face-to-face session that had three teachers away in the second year (due to conflicting PD at a divisional PD day in which the Cohort met for one session), and one face-to-face session during the first year that had four teachers away (due in part to a snowstorm). While it is difficult to tell what teacher attendance would have been like if mileage had not been paid, it can be said that individual costs to teachers did not impact attendance. The potential for attendance to be impacted by teachers was, however, evident during the second year when using an alternate location (at a Hutterite colony school) was discussed for a session in which Numeracy Cohort teachers would share some of their strategies and projects with other teachers in the division. While none of the Cohort teachers openly stated they wouldn't attend because mileage would not be paid, they both asked if mileage would be paid and if other teachers might not want to attend because of the mileage costs as well as the time required for travel and fact that the location was unfamiliar to most teachers. While the venue was changed, the conversation surrounding this possibility indicates that mileage (as well as location) could have had an impact on teacher attendance at PD sessions.

In addition to the costs associated with travelling to PD outside the division, the time required for such travel was another challenge that was mitigated quite effectively through the Numeracy Cohort structure. By hosting meetings that were both inside the division, and centrally located, teachers did not require significant amounts of time for travel to and from sessions. As mentioned, the furthest teacher in the division from the division office had to travel 96 km, which amounted to about half an hour each way. Several teachers cited this as a significant positive aspect of the Cohort structure, thereby overcoming personal and general challenges to accessing meaningful PD. Being inside the division (and within half an hour of home in most cases) meant that face-to-face sessions did not impact the personal lives of teachers. They were able to pick their children up from daycare, and attend to family commitments such as sports as they would on most other days at work.

As far as teachers' comfort level with driving, this was mitigated to some extent through the Numeracy Cohort structure, at least in comparison to traveling to urban centres. As mentioned, challenges existed for teachers who were uncomfortable driving to certain (often urban) locations, as well as with road safety, particularly when it came to winter weather and driving conditions. Lack of familiarity with location was eliminated for face-to-face sessions by having PD sessions at the division office. In the cases where the Numeracy Cohort attended two sessions at Brandon University, familiarity was a slight issue for one teacher (new to the province), as well as for me as a facilitator (being that I was not familiar with the campus at the time). Having a large group of teachers attending certainly helped in these situations, as the challenges were overcome when other teachers who were familiar with the campus were able to give directions and support. Weather, on the other hand, was not something that the Numeracy Cohort initiative could mitigate as a challenge. While teachers had less distance to travel to face-

to-face sessions at the division office, weather still became an issue at one session during the first year. A snowstorm occurred the night before (and into the morning of) a face-to-face session in December. Four teachers did not attend the session at the last minute.

Another challenge that might have been mitigated somewhat was teacher awareness of PD opportunities. Over the course of the two years, there were several instances where workshops and presenters were talked about amongst the teachers. This was, perhaps, linked to the fact that teachers had numeracy/math as a common goal and so they shared knowledge about upcoming workshops with each other. As the facilitator of the group, I also shared upcoming opportunities and workshops with Cohort members. The ongoing, sustained contact with the group allowed for this to happen. As well as finding out about more opportunities, teachers attended several PD workshops on top of their Cohort participation. Pairs or small groups of teachers attended sessions on math games/centres, problem solving, workstations (two different ones), and Math Recovery. In addition to this, the entire Cohort attended a math-focused session on Universal Design for Learning, a plan for providing inclusive education in schools. While it is difficult to determine to what extent teacher awareness of outside workshop opportunities was improved by the Numeracy Cohort, a few Cohort teachers did indicate that they felt they both knew about more opportunities that were available, and that they had access to more PD opportunities through their involvement in the Numeracy Cohort.

As far as the geographic challenges related to bringing PD opportunities into the division, the Numeracy Cohort initiative was able to mitigate some of the challenges. As mentioned in the previous section on funding, some resources were brought in at little to no cost to the division. By bringing in faculty from Brandon University and a math consultant from another division, PD opportunities were created that didn't require anything more than mileage in one case. Because

the presenters did not charge for accommodations or charge a stipend/fee, the cost of these sessions was kept very low. In addition to cost, Cohort teachers also had to spend less time for travel as sessions were held in the division. It should be noted, however, that one side effect of saving travel time for teachers, was that significant travel time was expended by the two presenters who were brought in. Although the sessions were held at the school closest to each of the presenters in an attempt to minimize their travel time (and costs), both presenters had to travel nearly an hour each way to present to the Cohort. In the case of the two sessions for which presenters were brought in, weather was not an issue, but it could easily have been. The challenge of road safety or weather, again, is not something that could be mitigated by the PD model.

Another way that the school division was able to mitigate some of the geographic challenges related to bringing PD opportunities into the division, was to take advantage of other available resources for use in a different PD capacity. For example, in the second year of the Numeracy Cohort's operation, the division brought in a speaker, to present at a divisional PD day about the concept of deep learning. The school division shared some of the presenter's travel expenses with another division. Since he was traveling from Australia, the travel expenses were significant. Because the school division had made a significant investment in bringing in the speaker, it made sense to try to make the best use of the resource as possible. As a result, after the original day-long speaking engagement he did with all of the teachers and staff in the division, the presenter spent a half day with the administration council and a half day with the Numeracy Cohort, facilitating further thinking and learning about leading divisional change. Due to the fact that the costs associated with travel had already been covered by the divisional PD day, the extra half session came at low cost to the division.

Challenges related to collaboration with other teachers were also mitigated to some extent by the model. As the Cohort progressed, more and more time was built into the model for teacher collaboration, and more autonomy was given to teachers to cater their activities towards their goals. As previously mentioned in Chapter 4, teachers chose to reduce the number of face-to-face sessions from five down to four the second year in favor of engaging in more self-directed collaboration within primarily grade level collaborative groups. In this way, opportunities for collaboration were fostered through the Numeracy Cohort structure.

One of the things that emerged from the data in the study around teacher collaboration had to do with the extra planning required for teachers to collaborate, particularly when they were from different schools. In addition to teachers describing this as a challenge during interviews, it was evident from the data in the study that it took significant time and organization for the Numeracy Cohort to get to the place where collaboration outside of face-to-face sessions took place. Despite being encouraged to access release time to get together and collaborate on their MAR projects, only four of the twelve Cohort teachers did so during the first year of Cohort operation. In the interviews and discussions held with teachers towards the end of the first year, many of the teachers expressed that they should have accessed more time for collaboration. Some teachers said they forgot about taking the time, and others elected not to due to not wanting to be away from the classroom or worrying about how others might perceive them taking a day to engage in this type of work. In response to teachers' requests to have more control over their time and more time to collaborate with small groups of teachers, the structure of face-to-face meetings was changed during the second year of Cohort operation. The number of face-to-face meetings was decreased by one, and teachers were encouraged to plan two days in the fall for use in meeting their collaborative goals. Eleven out of thirteen teachers accessed

the two days, with only the high school teachers not doing so. As indicated in the Table 2 in Chapter 4, the teachers who accessed the days used one day to attend an external PD opportunity, and then planned for a follow-up day to put the new information into practice. Part of building the two days of collaboration time into the meeting structure the second year, was providing time for planning these days at the first meeting in September. Facilitator notes from the September meeting indicate that the plans were largely created at that meeting. This speaks to the challenge of the extra planning required to set up collaboration between teachers. In order to get together for collaboration, teachers needed to have time to plan for it. Where they would meet, when they would meet, and what tasks they would engage in all had to be decided. When time was built in for this planning to occur, teachers more readily accessed collaboration time.

Online technology also had the potential to mitigate geographic barriers for both the school division and its teachers. Skype was used to bridge the geographic distance between a presenter from Australia and leaders in the division on two occasions during the Numeracy Cohort initiative. The first time Skype was used was for the purposes of planning the divisional PD day and the follow-up sessions that would be held with the administration council and the Numeracy Cohort. As the facilitator of the Cohort, I attended this session with other PD committee members and principals. The Numeracy Cohort teachers were not in attendance. The second time Skype was used was for a follow-up session to talk about next steps a few months after the divisional day. The second Skype session with the presenter had teams from each school in attendance, some of which were Numeracy Cohort members. Online communication platforms like Skype have changed what is possible in the area of teacher PD. Although it was only used twice in relation to the study, its potential for teacher PD in the future was evident in a few comments made by teachers and principals in the division. Adding planning and follow-up

sessions, as well as the divisional speaking engagement and workshops the next day, increased the contact time with the presenter; and these extra sessions did not require any travel costs such as flights, mileage, and hotel, nor were they vulnerable to poor weather and safety concerns. They did, however, require technology expertise to set up on a division-wide basis, and were prone to connectivity issues. This was evident in the second session when some of the multiple locations were not able to receive video despite being able to hear the conversation.

In addition to the use of Skype to bridge geographic distances and bring presenters in virtually, the online component of the locally constructed model created on SharePoint also had the potential to allow teachers to communicate and collaborate more frequently, despite the geographic distances separating them. Teacher uptake of the online platform, however, was weak with many of the teachers electing not to participate when prompted to post responses online. The following table outlines what was posted under each section by the end of the two-year process.

Table 6

Online Postings over Two Years

Section	First Year	Second Year
What is Numeracy?	Cohort teachers generated numeracy definition together and posted	
Our Goals		4 small groups generated goals on chart paper in second year and pictures posted
Our Stories		
Our Context		
Checking in	Teachers asked to share behavioural and curricular goals for round 2 of MAR projects (8 responses)	
	2 more questions asked to check in with second round MAR projects. Only 1 or 2 responses to these.	
MAR Projects	Most teachers posted their first and/or second round MAR projects online during the first year	
Let's Celebrate	Teachers were asked to post a celebration after the first MAR cycle. 5 teachers posted a celebration.	
Lean on Me	Two teachers (partners) posted a question about a problem they were having in the first year. One teacher replied.	
Resources	Facilitator posted all meeting agendas, PowerPoint slides, handouts and other meeting materials	Facilitator posted all meeting agendas, PowerPoint slides, handouts and other meeting materials

As is evident in Table 6 above, although there were several attempts to use the SharePoint site as a communication tool, teacher uptake was poor. By the end of the first year of operation, the site was largely abandoned, except for its function as a space to share resources and access forms. In the interview conducted with the superintendent of the division, both the division's hopes for

SharePoint's use in the division and the struggles associated with its uptake were evident when he commented on the subject:

If you have a professional learning group that's-, of six people who work on a-, in one school, or in one community, the opportunities for those people to get together informally are improved. We don't have those informal opportunities to the same extent because of those distances involved, and it also has some costs that are there. The attempts to overcome that through blended learning have been a struggle. We have set up a divisional SharePoint site that we've now had running for almost four years now. However, it's basically a very static site. It tends to be a place where we post things. It's more like a private website as opposed to a collaborative centre. Teachers are busy. They haven't had the time to necessarily use all the professional networking components of SharePoint. When we think of where SharePoint is, it's supposed to be a professional networking site, the same way that Facebook is a social networking site. And we know that people, when they go onto Facebook, they go, they read things, they comment on them, they like things, they post their own items, their own photos, they make their own comments, they-, they're doing that . . . in their private life on Facebook. Within SharePoint, that component has never developed. Now that's partly our responsibility too, because we need to give people some support and some teaching in that, but there's so many other professional development things we're trying to do that it hasn't taken off the way we would like.

When further asked about whether he thought the challenges with the online component's uptake were unique to this context, he added further insight:

I think, you know what, I'm going to say, I think that generally SharePoint sites, First Class sites, within work environments tend to end up being a little more static than people intend. And people are a little bit more reluctant to do it because they're very aware of, if-, of making a mistake, of saying something that is public. And I think that's one of the reasons why people are a little bit about using it because once they've put it out there, they're exposed to perhaps people questioning their ideas or-, and I think that's just something they're not prepared to do in a professional environment. In a personal environment, they can limit that to their friends, their family, and they can generally keep that there. Within the professional environment, they don't necessarily know everybody. So I think it's something that other school divisions are seeing too as they've tried to do it. Even the department, they've set up the MAPLE site. It has not been as dynamic as they hoped in terms of professional collaboration. Basically, people like meeting in person, and I would say teachers like in-person contact, so we have to-, we can't expect the blended model is going to be the total answer. And those are things we're learning as we go along. Trying to understand the dynamic.

Both the facilitator notes and the comments made by teachers in the interviews and focus groups conducted with them support the viewpoint that teachers preferred to talk to each other face-to-face, and were reluctant to post online. Several comments by teachers indicated that they found it onerous, unhelpful, and that they while they liked sharing their work and ideas, they preferred to do so on paper or orally with other teachers. In addition, one teacher noted the vulnerability with posting online. She said she felt like it needed to be really awesome if she was going to put it out there for all of the others to see, and she had a sense that it was permanently out there once

it was posted, indicating her fear that she could regret posting something. Another teacher noted a further issue with online discussion. She said that once you post something, you have to wait (sometimes a long time) for someone to respond. The lack of critical mass engaging in the online discussion was something that appeared in the facilitator notes as well. In the end, the teacher feedback during the first year was largely negative, and this led to the decision not to ask teachers in the second year of the initiative to post their projects or engage in online discussion.

In addition to challenges with regards to the uptake of the online platform, one further challenge surfaced through the facilitator notes collected for the study. This was the issue of technology expertise. On several occasions over the two-year period, my own lack of technology expertise was an issue in my role as facilitator. This required me to seek the help of information technology (IT) specialists. Implementation of the SharePoint platform was one such area. Although there was an IT specialist who was able to help me set up the site, SharePoint had not been used as a communication tool in the division before. As a result, I had to look up what the capabilities were and work with the IT specialist to get things up and running. Moreover, the facilitator notes recount several glitches in the functioning of the site, including getting notifications sent to the Cohort teachers when someone posted in the Lean on Me section. This was not remedied until the second half of the first year. Part of the problem with uptake of the new platform was likely the learning curve that I had as a facilitator, and the slow nature of the site's development because of it. In small rural divisions, IT specialists cannot possibly know everything that is needed about both networks and computer hardware, as well as software and trends in education. As a result, when new initiatives like the Numeracy Cohort are implemented, there are growing pains associated with the uptake of new technologies.

Discussion and implications related to geography. The study supported much of the literature in the field that suggests that the geographic location of rural school divisions necessitate both more time and money to attend PD outside of the division, something that affects both divisional budgets and the budgets and personal lives of teachers (Lyons, 2008; MASS & MAST, 2006; Tytler et al., 2011). It was the impact of this travel on the personal lives of teachers that I found particularly interesting in the study. Several teachers cited issues such as having to make special daycare arrangements, arrangements for their children to get to sporting or other extracurricular events, or even arrangements to be away from their families overnight in some cases. One of the teachers even went so far as to say that the disruptions in her personal life caused her to pick and choose which PD opportunities she would engage in. While evidence of the personal cost to teachers does exist in some of the literature in the field (Tytler et al., 2011), data from this research study illuminates this issue through the personal stories of the participating teachers. Through their stories, a real sense of the personal costs associated with attending external PD opportunities while living and working in rural contexts can be understood.

The literature on rural education indicates that many rural school divisions focus “their energy and resources on providing relevant and instructional-based opportunities for local professional growth as opposed to external development due to time, distance, and cost factors” (Manitoba Education, 2009, p. 5). This was the case for the rural school division in this study. While bringing presenters into the division, providing support through the Numeracy Coach, and providing collaborative opportunities within the school division reduced the amount of time teachers had to travel, costs associated with traveling (for example mileage and hotel expenses), and issues related to inclement weather and poor driving conditions, these challenges were not

something that could be entirely eliminated. Because the most geographically isolated teachers in the division did not have colleagues with whom they could collaborate in their buildings in many cases, some travel was still necessary, even within the division. Moreover, in order for outside presenters to be utilized in the division, some travel was still required. The result of this reality was that time and costs for travel could be reduced but not eliminated. Similarly, the issue of inclement weather and poor driving conditions could be partially mitigated by reducing the distances required for travel, but never completely overcome. This is an important finding in the study that I believe is noteworthy, along with the fact that weather and road safety are legitimate challenges faced by rural divisions and their teachers, particularly in relation to teacher PD.

Another important point that surfaced in this study was the difficulty surrounding the use of an online platform within the PD model. Despite the fact that there is much literature that supports the use of online components in rural PD models to bridge geographic distances (Annetta & Shymansky, 2006; Cruise, 2012; Kenny et al., 2008); technology expertise, connectivity issues, and teacher uptake were barriers to the success of this portion of the Numeracy Cohort model. While some literature has already indicated that rural divisions may be at a disadvantage in terms of ICT capabilities (CCL, 2006), this study illustrates exactly why such a disadvantage is a cause for concern. More research into the ICT challenges faced by rural school divisions would be beneficial in mitigating both instructional challenges and PD challenges related to ICT use. This would enable rural divisions to fully realize the capabilities of online communication, sharing, and professional growth.

Staffing

Staffing, like funding and geography, was a significant challenge for the rural school division in this study. Recruitment and retention, substitute teacher availability, teacher workload, teacher isolation, and internal capacity were all challenges the division and its teachers faced as they attempted to provide and engage in meaningful PD. The Numeracy Cohort model was structured to mitigate several of these challenges. In this section of the chapter, challenges related to staffing will be identified, and the ways in which the PD model was structured in order to mitigate the challenges will be described. A description of the findings regarding the model's ability to mitigate challenges related to staffing will also be included.

Identifying and addressing challenges related to staffing. In order to determine the extent to which challenges related to staffing were mitigated through the Numeracy Cohort model, it is useful to first provide a brief overview of the challenges faced in the division and the steps taken to mitigate them through the Numeracy Cohort design. The overview was constructed by comparing data, visual organizers created from the data, and my own background knowledge about the division as a facilitator. Although the Cohort model has been previously described in Chapter 4, further details about the elements of the PD model's design are helpful in understanding how the model was able to mitigate challenges specifically around five areas of interest: recruitment and retention, substitute teacher availability, teacher workload, teacher isolation, and internal capacity. Each of these will be considered in a separate section.

Recruitment and retention. Although recruitment and retention of teachers in the school division did not appear to be significant issues in the larger schools in the division, it was evident from the interviews with teachers that very small schools and Hutterian schools saw more significant staffing changes in general. In addition to difficulties recruiting teachers to work in

very small, isolated communities, movement in the division often resulted in teachers migrating from the smaller, more isolated schools to larger, more accessible schools in the division. This was particularly apparent in the focus group discussion with principals in which a principal from a larger school in the division joked with the Hutterian principal, saying “Yeah, it's [name removed]'s job to develop teachers that I may go and snag.” The Numeracy Cohort model, as well as providing effective PD for the division’s teachers, had the potential to improve teacher job satisfaction, thereby positively influencing recruitment and retention in the division.

Providing teachers in the division with more opportunities to engage in collaborative PD had the potential to reduce feelings of isolation felt by teachers in the division. In addition, providing PD specific to the contexts of the rural teachers in the division had the potential to meet some of the diverse needs of teachers related to the varied contexts in which they worked. As a result, while not a specific focus of the Numeracy Cohort model, teacher recruitment and retention were potential areas of challenge in the division that could be positively impacted through additional support for professional growth in the division.

Substitute teacher availability. It was evident from the teacher interviews, focus group discussion with teachers, and principal focus group discussion that the availability of substitute teachers was one of the challenges faced by teachers (and the division) in accessing (and providing) meaningful PD. While the school division did have a small pool of substitute teachers (called guest teachers in the division) available, the number of available substitute teachers was limited to primarily retired teachers who still resided in the division due to its location. To remedy this problem, the superintendent described that the division had already made the unique move of hiring contract substitute teachers in the hopes of increasing the availability of substitute teachers for teacher release. This move, although separate from the Numeracy Cohort initiative,

had alleviated some of the issues around the availability of substitute teachers prior to the PD model's implementation. However, getting a group of twelve to fourteen teachers together in the division required significant additional resources as far as substitute teachers were concerned. One of the ways this challenge was addressed through the PD model design was through the geographically diverse recruitment of teachers. Because the schools in the division were geographically separate, they each used their own pool of substitute teachers. As a result, recruiting teachers from diverse areas allowed for the maximization of substitute teacher resources. In addition, face-to-face sessions with Cohort teachers were scheduled for midweek (Tuesday or Wednesday). Since many workshops (and therefore substitutes required for other PD release time) occurred on Fridays, scheduling Cohort sessions midweek minimized the challenge of substitute teacher availability through PD model design.

Teacher workload. Teacher workload was another staffing-related challenge experienced by the rural school division and its teachers in the study. Teachers in the division had many hats to wear, due in large part to the small number of positions that existed in the division. In addition to being classroom teachers, data from the teacher interviews, principal focus group, and facilitator notes indicated that the teachers recruited for the Numeracy Cohort were coaches, leaders, parents, and community members as well. Many of them had heavy workloads due to the contexts in which they worked (e.g. multi-grade, multiple subjects and courses) and the additional roles they voluntarily took on. As such, teacher workload was something that had to be considered in the creation of the Numeracy Cohort. In order to minimize the impact of the extra work that was required through Cohort participation, divisional planners decided to embed the PD initiative within the regular work hours of teachers. Teachers were released to attend sessions or engage in collaborative planning together, thereby minimizing the potential impact of

the initiative on their personal lives. They were also excused from the traditional professional growth plan process used by the division when they participated in the initiative. Eliminating the professional growth process for Cohort teachers took something off of their plates, something that rarely happens for teachers in any context.

Teacher isolation. Teacher isolation was perhaps the most significant challenge for the teachers in the rural school division in this study. In actuality, the entire PD model was created to provide opportunities for teachers to engage in collaborative inquiry, particularly those in the most geographically isolated contexts in the division. In addition to having very few teachers in their buildings, teachers in very small schools in the division described that they typically did not have other teachers that taught the same grade levels and subjects with whom they could collaborate. As such, they experienced significant professional isolation in addition to geographic isolation. In addition, the small number of teachers in the division (approximately ninety) in general meant that there were just fewer teachers to collaborate with. One teacher from a mid-sized school in the division noted the following:

I've definitely noticed coming to this division this year that it is more difficult to find people who have the same professional goals as you, who are teaching the same thing, who want to get better at the same things, just because numbers are limited.

As previously mentioned in Chapter 4, the model was designed in large part to mitigate the challenge of teacher isolation by recruiting teachers from geographically diverse areas of the division. Teachers were also recruited with a critical friend from their own school or a school nearby in order to promote collaboration and reduce isolation. In addition, a blended learning design including a face-to-face component (face-to-face meetings and sessions), online

component, and classroom component (MAR projects) was also used to decrease teacher isolation. By providing teachers with as many face-to-face sessions and meetings as possible, and by promoting communication and collaboration between face-to-face meetings online and through ongoing collaborative MAR projects, the potential existed for teachers' feelings of geographic and professional isolation to be reduced.

Internal capacity. The final challenge faced by the division with respect to staffing was internal capacity. Not only were there fewer teachers in the division from which to draw expertise, but there were also fewer formal leadership positions from which to draw leadership. This was evident in the structure of the division, which had only two senior administrative positions (the superintendent and the student services coordinator) and no curriculum consultants or other leadership positions at the divisional level. Such a large PD initiative required facilitation (Patton et al., 2012; Pitsoe & Mailia, 2012; Richardson, 1999), and this was not something the division had the capacity to accommodate. As a result, the superintendent and school board created a 0.25 FTE position in order to mitigate this challenge. Additional capacity was also sought in the form of bringing in external presenters to contribute to what was already available in the division.

Mitigating challenges related to staffing. Data collected during the study provides both insight into the complexities of the challenges faced by the division with regards to staffing, and evidence of some successes experienced as a result of the PD model design. Again, the five areas of challenges related to staffing (recruitment and retention, substitute teachers, teacher isolation, teacher workload, and internal capacity) will be used to describe these in separate sections.

Recruitment and retention. Retention of teachers did not seem to be an issue over the two-year period of the study. Out of the twelve teachers who began year one on the Numeracy

Cohort, none left the division, and none of the teachers mentioned wanting to leave the division in any of the interviews that were conducted. Nonetheless, the superintendent of the division was very aware of teacher PD as critical to teacher recruitment and retention when he discussed his own role in advocating for school board support of teacher PD. In his interview, the superintendent described it this way:

And the other thing that happens is you lose teachers. If they don't get the opportunities to develop in [name of division removed], they will go elsewhere. If they feel they're stagnating, they'll go elsewhere. We don't want to lose people; we want to develop people. One of the costs of developing people is we might lose them anyways to other leadership, divisions, other opportunities, but we'll also attract really good people because they see us as a place where they can grow as a professional.

It was this sort of argument that allowed the superintendent to both hold the line on the division's PD budget, as well as secure additional funding (and support for reallocation of staffing funds) for the creation of the 0.25 FTE Numeracy Coach position. He understood that teacher PD was linked to job satisfaction, teacher retention, and recruitment of teachers. The superintendent also suggested that in addition to job satisfaction, employee health could be impacted by adequately supporting teacher PD. In his interview, he stated:

I would also argue, I can't say I've studied this but I would argue that when you have opportunities for people to be involved in meaningful PD and they're growing, I think that in the end, you'll end up with a healthier workforce. You'll have less absenteeism from illness and stress if people feel they're supported and

have colleagues who they can collaborate with. I can't quantify that; it's basically a working hypothesis on my part.

While such a claim is beyond the scope of this study, it is interesting that this is the viewpoint of the leader of the division. While he didn't indicate that recruitment and retention of teachers was a problem, he certainly recognized the potential for them to be positively impacted by robust teacher PD offerings.

In speaking with principals during the focus group discussion, teacher recruitment and retention surfaced in two different ways. The first was in a comment made by one of the principals:

And if you don't embed opportunities like this within the workday. We have 20% of our teachers that do almost 100% of the work. So we have 20% of our teachers are involved in everything, because they're the "go-getters," they're the ones that are on the bus already and driving the bus. And if we tax them to a greater degree than we are right now, we're going to lose them. In the teaching profession-, just not in your building, they're going to go into something else. Yeah, teaching, you don't make a pile of money at it, but it's the self-gratification of the job, in many cases, that keeps a person going. And if you don't enable them to enjoy life outside of the profession, they're not going to be here for very much longer.

Concern about over-taxing teachers by expecting them to engage in PD outside of their workday was expressed in this comment, as well as the fear that teacher retention could be an issue not only within the division, but also within the profession if too much stress is put on the personal lives of teachers. This comment is evidence of the principal support that existed for embedding the PD opportunities provided for Numeracy Cohort teachers within the workday. When

combined with the teacher comments previously discussed about the impact of attending external PD on their personal lives, it appears that the embedded nature of the PD may have mitigated some potential challenges surrounding teacher workload and retention.

The second way that teacher recruitment and retention surfaced through the principal focus group discussion was in an exchange between two principals about hiring each other's teachers. Evidence of difficulties retaining teachers in very small schools (including Hutterian schools) existed within the exchange as two teachers made reference to one principal hiring another principal's teachers. While reasons for the teachers moving were not given, it is logical to think that teachers might desire to move to bigger schools for a variety of reasons. In the case of the division in the study, the smallest schools were often geographically isolated. Moreover, they had very few teachers with whom to communicate and collaborate. Finally, the smallest schools in the division had some of the heaviest workloads as teachers were expected to teach students across many grades. One of the teachers in the Numeracy Cohort was single-handedly responsible for teaching kindergarten through grade eight students. While the exchange between principals was short, and not a lot of detail was given, the potential for teacher retention issues to exist in small schools, in the division, and even in the profession came to light.

A third way that teacher retention emerged as an issue was through the facilitator notes that were collected. One of the entries read:

[Presenter's name removed] said something about if people are here, if they haven't left the division, there is something worth staying for. He said that the unique thing about the small division is change is more possible than in big division due to the scale. We can implement change initiatives and carry them out much quicker. Maybe, he suggested, this is why we stay here. I thought to myself

that I have had this same thought many times. I am torn between wanting to leave, and wanting to stay to make a difference in a rural division. I don't have other facilitators to draw from, other people. I am very much alone in my work with this. I always thought of teachers feeling isolated but I guess I do too as a facilitator.

It is evident in this passage that I had been thinking about what the presenter had said. If people haven't left, then there is something worth staying for. He had suggested that the possibility of change and of making a difference was a draw for people, and that had resonated with me. Obviously the possibility of change through the Numeracy Cohort initiative was a drawing point for me, despite feeling somewhat isolated and overwhelmed. Ironically, not even a year later I did end up accepting a new position outside of the school division. I would say that the greatest contributor to this decision was the heavy workload associated with teaching three quarters time on top of the quarter time Numeracy Coach role. Throughout the facilitator notes collected over the two-year period, there are several references to the challenges I faced in trying to provide adequate support and facilitation with only a quarter time position. I believed in the model and was committed to the process, but felt overwhelmed by the work and pressure on several occasions. It is obvious to me in hindsight that while the potential for change through an innovative PD model had the capacity to mitigate some of the challenges surrounding staff retention in the division, it wasn't enough to offset the heavy demands that were put on me.

Substitute teachers. As previously mentioned, the availability of substitute teachers was a challenge in the school division, so much so that the division had already taken steps to hire contract substitute teachers (called guest teachers in the school division). When asked to describe this move, the superintendent described it as follows:

We were one of the first rural school divisions to do that and the idea was, it was to give us a little more depth, it was to attract young teachers to come to our school division, give them a chance to develop, and give us the opportunity to have some consistent people who were ready to be there when we needed them. It's done so, it's done at a limited cost. It isn't like you're hiring an additional teacher, because a lot of times we think of the substitute rate of \$140-\$150 a day as the standard cost of having a guest teacher, but it isn't. Guest teaching that occurs during a school year is made up of one-day absences all the way up to term positions. Having people ready in these positions to take on that role means that often when we get to a position where it's six plus days, and the guest teacher would receive the regular pay anyways, so that's the pay that they would receive. We prioritize these guest teachers to the six plus situation so the cost difference isn't that significant. There are times when it's even a cost savings because we are hiring young teachers in these roles. They tend to be teachers who have uh, you know, 0-2 years of experience. There were times when schools for long term guest teachers were counting on retired teachers who were often 10 years of experience and so it actually saves money to have these people available. It keeps us from contracting a more expensive teacher. So there's certain payoffs on that. Economically, it hasn't hurt the school division to go with this model. It does cost us a little bit more, but it's also more effective in terms of carrying on the teaching and learning, whether it's a long term absence or it's somebody who's going to a PD meeting. We have somebody who is known to the school, known to the students, comes in and carries on routines and I think that's important. As well,

those teachers have moved into positions in our school division and are working out very effectively. It's an excellent entry-level position for a young teacher.

The decision to hire contract guest teachers had been a positive one for the school division. In addition to bringing new teachers into the division with a contract and guaranteed salary, it also gave significant depth to the pool of substitute teachers available when teachers did decide to attend PD. This was true whether it was a teacher or two attending an external PD workshop, or a group of teachers like the Numeracy Cohort meeting at a face-to-face session in the division. While three contract guest teachers was not enough to cover the needs of the entire Numeracy Cohort, they went a long way towards mitigating the challenge of substitute teacher availability.

The extent to which the availability of substitute teachers was a challenge over the two year PD initiative was difficult to ascertain from the data collected. The superintendent of the division described the challenge of accessing substitute teachers particularly in collaborative PD initiatives like the Numeracy Cohort as follows:

As we move to a model that just doesn't have a teacher leave for a day to go to the city, because we're pulling out a group of teachers, whether it's the French Cohort, the Numeracy Cohort, the Physical Education Cohort, the Literacy Group, you know. Because we're pulling out a group of teachers all at once, we don't necessarily have access to the depth in terms of guest teachers to do that. That's become a challenge and we are trying to do things to address that by hiring contract guest teachers that we move to two, and now we've moved to three. We can have at least three available on any given day so that we can get a little bit deeper as we go along.

From this comment, it appears that collaborative initiatives that involve a large number of teachers being away from their classrooms at the same time actually put an increased strain on the pool of substitute teachers. While the division had clearly addressed this problem (at least to some extent) through the hiring of contract substitute teachers, it was still a problem. Principals also indicated challenges with regards to accessing substitute teachers, generally, and more specifically with regards to the Numeracy Cohort. More problematic, perhaps for principals, was accessing substitutes for teachers in highly specialized areas such as high school sciences, music, or French. In some schools, substitute teachers refused to come in for some grades or subjects, and in other schools principals mentioned that substitute teachers were not capable of teaching the content, and therefore the day was really just “babysitting.” Teachers echoed this concern in their focus group discussion, suggesting that without a substitute teacher that is able to teach the content in a course or subject, the day is really a lost day, or a day in which no learning would occur. One teacher made this point succinctly in an interview, stating:

There is also nobody that actually substitutes at our school that is a math teacher, so I have to be very well prepared to leave the kids with something that they can do with a guest teacher that is not qualified. And so I’m losing classroom time, and we all know that we don’t have a lot of classroom time to get the jobs done.

This is, perhaps, why several teachers over the two-year period mentioned that they did not want to be away from their classroom too much. If students were not able to learn effectively in their absence, there was a significant educational cost to their being away.

Another issue related to the availability of substitute teachers capable of teaching the subject or grade of teachers attending PD sessions, is the amount of extra work that is incurred by teachers in order to plan for a substitute teacher for their absence. While this is not

exclusively a rural issue (urban teachers also have to plan for substitute teachers when they attend PD sessions), it is still worth mentioning for two main reasons. The first is the fact that planning for a substitute teacher unfamiliar with a particular subject or with particular content can take significantly more time to do. Secondly, when combined with travel time to urban centres, or overnight stays for PD sessions, extra planning time has the potential of compounding the impact of teacher PD on the personal lives of teachers. In several instances, teachers included “planning for a sub” in the list of challenges they faced in accessing effective PD, along with driving to Winnipeg, the cost of mileage, and time away from their families. It is, perhaps, the compound effect of all of the time required to attend external PD that makes planning for a substitute teacher a significant challenge.

One final challenge related to substitute teachers during the study that surfaced was the impact of having too many teachers away in very small schools to maintain functionality. One of the Cohort teachers reflected on not being able to attend PD with teachers in her school when she had worked in a very small school in the division, saying, “You couldn't go together most of the time because somebody had to mind the store.” This idea surfaced with both principals and teachers in the data. One teaching principal in a very small school noted: “there are times when I've been the only teacher there and the rest are either subs, one qualified, one not qualified or not even there, and it's an EA in the classroom.” The challenge of maintaining routines and functionality in very small schools while still allowing teachers to attend PD sessions is significant. From the teaching principal's comment above, it is evident that accessing qualified substitutes in very small schools was also a significant issue. While the point he was making was that there weren't enough people to maintain the function of the school, the fact that it is not necessarily uncommon to be missing substitutes, have unqualified substitutes, or even EAs as

substitutes is worth noting. I noticed this as well in a comment made by another principal who had to deal with very small Hutterian schools when he said, “we can't get guest teachers from the division, we're able to support within by putting non-certified colony people in, putting in EAs into the teaching position, and moving teachers from colony to colonies.” While he had indicated that getting substitute teachers was not a problem, really he meant that the colony schools had found ways to overcome the problem by using non-certified colony people and educational assistants (EAs). This is not surprising given that a certain level of familiarity must be had with students and schools in order for functionality to be maintained. In colony schools, there are often only one or two teachers. In a one-teacher school, if the teacher has to be away, non-certified colony people or the EA who already works within the school could be preferable to bringing in a substitute teacher with little knowledge about the context.

The challenge of accessing substitute teachers was both exacerbated and mitigated through the Numeracy Cohort initiative. At a base level, the Numeracy Cohort model put added strain on the pool of substitute teachers available in the division by holding sessions that required up to fourteen substitute teachers at a time. In order to keep the effect of this to a minimum, meetings were held midweek, as most external PD sessions occurred on Fridays. In addition, dates were scheduled as far ahead as possible to maximize use of the divisional contract substitute teachers, and to provide time for substitute teachers to be booked. Several of the substitute teachers in the division were retired teachers, so by giving ample notice, the likelihood of accessing substitutes was higher. Finally, one of the effects of having teachers participate from as geographically diverse locations as possible, was that the teachers accessed different pools of substitute teachers from within the division. Had fourteen teachers tried to book substitute teachers in just the south end of the division, there would have likely been a significant problem.

Evidence of the extent to which the challenge of accessing substitute teachers was mitigated through the Numeracy Cohort initiative was evident in both the teacher interviews and teacher attendance. The attendance charts collected from the division indicated reasons for teacher absences, and there were no instances of teachers being absent with the reason of not being able to access a substitute teacher during the first year (out of eight days requiring substitute teachers). During the second year, however, there were two instances of a single teacher not attending due to lack of substitutes, and one day in which a teacher said they were unable to attend because there were too many teachers away from the school and they had to take on the role of acting principal for the day. Considering the demands placed on the pool of substitute teachers by the Numeracy Cohort initiative, this is a very low number of issues surrounding the availability of substitute teachers. Likely the combination of accessing non-certified substitutes or EAs, holding meetings midweek when demand for substitutes was generally less, drawing teachers from different geographic areas with different substitute pools, and setting meeting dates in advance to give ample time for booking to occur, contributed to mitigating this challenge in the PD initiative.

Teacher interviews provided mixed information about the availability of substitutes. Teachers in larger schools generally felt that substitutes were not an issue, although in a few cases this viewpoint changed over the two-year period. Two of the instances in which teachers were unable to get substitutes happened in a school in which the teachers at the beginning did not feel that accessing substitutes was an issue. Cohort teachers in smaller schools were more likely to cite substitute availability as an issue overall, and particular mention was made of it being more difficult to access substitute teachers for multiple day workshops. While substitute availability tended to vary between locations and even over time within the same location, it was

certainly a challenge that was raised by teachers at a variety of times, in a variety of circumstances. The fact that it only became a logistical issue for the Numeracy Cohort on a few occasions provides much stronger evidence of the extent to which it was a challenge during the initiative.

Despite mitigating some of the issues surrounding substitute availability, the PD initiative was not able to mitigate all of the challenges evident with regards to substitute teachers. Substitute teacher quality, meaning everything from certification to being experienced and qualified to teach certain subjects or grade levels, was not something for which there was any evidence of improvement or mitigation. As a result, teachers continued to express concerns about being away from the classroom, or losing class time throughout the initiative. Similarly, the issue of having too many teachers out of very small schools was not something that could be mitigated through the PD model. At least two instances were mentioned of teachers needing to stay behind to keep things running due to principals being away. While there was no specific mention of any Cohort teachers not attending because too many teachers in their schools were away, the issue was raised more generally as a problem by principals and teachers. It is difficult to ascertain if the number of absences exacerbated the problem teachers in very small schools, in particular, had to incur as a result of their participation in the Cohort. One teacher from a very small school did note that he had been away from his classroom twenty to thirty days for a variety of reasons, including coaching, the Numeracy Cohort, and other commitments. Finally, the issue of the compound effect of the extra planning for substitute teachers and travel time or time away from families was only partially mitigated through decreasing travel associated with attending sessions. The number of meetings Cohort teachers attended created a significant burden on prepping time for substitute teachers. While none of the teachers openly cited the

prepping as a challenge or burden with regards to the Numeracy Cohort, more than half of the teachers cited being away from the classroom as an issue at some point over the two-year period. It is uncertain whether this concern stemmed from the extra planning required for being away or from the fear that without substitute teachers who were able to teach lessons in certain subjects, there would be “lost days” for student learning.

Teacher isolation. The data collected for this study both verified that teacher isolation was an issue in the division, and illuminated and extended the scope of this important barrier. Through the teacher focus group discussion and the teacher interviews conducted by the division, it was evident that all of the teachers desired opportunities for more collaboration with other teachers. What was interesting was that there seemed to be differences between larger schools, smaller schools, Hutterian schools, and high schools with regards to opportunities for collaboration with other teachers. In the largest elementary school (from which two teachers who taught at the same grade level were nominated), teacher isolation seemed to be less of an issue. During the focus group discussion, one of these teachers indicated that her situation was different than that of the other teachers in the Cohort in that she was able to work with her critical partner and one other teacher in their school who taught at the same grade level on an ongoing basis. She recognized that she had the opportunity to collaborate with at least two other teachers who taught the same grades, and that while teachers did not necessarily have this opportunity in other schools in the division, it worked well for them. In the smallest public elementary schools in the division, those that were most geographically isolated, opportunities for collaboration with colleagues were much sparser. For example, one of the Numeracy Cohort teachers taught in a school with a teaching staff of three teachers, all responsible for a different range of grades from Kindergarten through Grade 8. Not only didn't he have another teacher

who taught the same grade(s) as him in his building, there were only two other people in his building with whom he could collaborate at all (and they had a variety of grades and subjects as well for which they were responsible). The Cohort teachers who worked in the Hutterian schools in the division were completely isolated. They were the only certified teachers within their buildings; opportunities for collaboration within their schools were non-existent. Finally, the high school teachers in the Numeracy Cohort had somewhat limited opportunities for collaboration within their buildings. While there were other teachers who taught the same subject as they did (mathematics), they were responsible for different courses than the other mathematics teachers in their buildings. As a result, opportunities to collaborate on improving instruction in particular courses were limited. All of the Numeracy Cohort teachers expressed a desire to collaborate with other teachers who worked at the same grade level, or taught the same courses as they did. Despite having colleagues with whom to work at their grade level, even the teachers in the largest elementary school sought to visit other schools to observe and collaborate with colleagues who taught in a similar context. While teacher isolation seemed to be a bigger issue in very small schools and Hutterian schools, it was also an issue for Cohort teachers in the two high schools in the division.

One idea that emerged from the teacher focus group discussion was the teachers' noting of attending external PD sessions as an isolating experience. One of the teachers described it as follows:

One of the things that has always bothered me is, as a rural teacher, you go to PD and they tell you to get in your school teams. [Laughter from table] And I'm like I'm it; I'm here. Can I join somebody please? And that, for people that aren't very outgoing, if they're shy - I'm fairly outgoing, it doesn't bother me as much as it

used to - but if you're a shy person, that's going to stop you from going to the next one because here you sat by yourself, you had to initiate conversation with people you don't know, in a different teaching setting . . . , and I know our division is getting a little better at sending groups of people, but I don't - we still don't go with the teams that other divisions would go with.

It was evident from the focus group discussion that this point struck a chord with the Cohort teachers. The laughter and agreement surrounding the point indicated that the teachers had experienced isolation even in a room full of other educators, due to the contexts in which they worked. While the extent to which this challenge impacts access to meaningful PD for teachers is not evident in the data, the point emerged as a potential challenge for rural educators.

Another area where isolation surfaced as part of the research study was through the facilitator notes. In the quote cited earlier in this section, I wrote: "I am very much alone in my work with this. I always thought of teachers feeling isolated but I guess I do too as a facilitator." This is an important point to note. While the model was aimed at reducing teacher isolation, as the facilitator of the cohort, I also felt isolated in terms of having colleagues with whom to talk and collaborate on the project. There were no consultants in the division with whom I could have spoken about working with groups of teachers. There were no other workshop facilitators to bounce ideas off of near enough to me to access. Although I did speak with other people who had leadership experience (another teacher leader, a divisional coordinator, my own principal, and the superintendent of the division), I was not really able to engage in collaborative experiences that related to my own facilitation role. In April of 2014 (the first year of the Numeracy Cohort operation, I did attend a session put on by a mathematics consultant from

Winnipeg. The session was sponsored by the Manitoba Rural Learning Consortium (mRLC), whose mission is described as follows:

The Manitoba Rural Learning Consortium (mRLC) was established in 2011 to support rural school divisions in addressing the unique challenges facing rural education. mRLC works across and within school divisions with a focus on consultation, coaching and collaboration. School divisions commit to the network by purchasing a membership and engaging in network activities. (mRLC, 2017)

At the time, I described my experience through the notes I kept as facilitator of the Numeracy Cohort in the following way: “I was thinking at the session that there really isn’t much offered to people like me - facilitators in small divisions. It was a real jackpot to have this session pop up just when I needed it.” The session was designed for consultants and coaches, and focused on how to work with teachers to improve mathematics instruction. Through the facilitator notes, it is evident that the session was invaluable to me as a facilitator. It also brings to light both the typical lack of such opportunities in rural divisions, and the importance of developing not only instruction, but also leadership and facilitation skills in rural places.

In addition to the verification of isolation as a challenge through the data collected as part of this study, another important distinction was evident as two main types of teacher isolation emerged. Teachers felt isolated both from other colleagues with whom they could collaborate, and more generally from the field. Karen, one of the high school teachers in the Cohort, indicated on several occasions that she felt that she was isolated from new ideas in the field. In a comment during the focus group discussion with teachers, she said:

I find it's easier to get stagnant here because it's harder to go out. It's - and for myself I, even on the Numeracy Cohort, . . . my partner, we don't teach any of the

same subjects. And even the leader in my school, we're not teaching the same subjects. So there's really nobody that I've been able to communicate with that were actually teaching the same thing at the same time that would want to work on anything. So it kind of leaves you like . . . hmm, I guess I'll just have to take care of this myself - do whatever I feel is best and there's no department bringing stuff in. So when I was at Crocus Plains, for just a little bit there, they had a department, and there was a Math Head, and they directed your PD and they directed kind of like the school goals and how the department was run. So there was a lot more sort of influence. And here, it's just whatever you see fit, which is good in one way, but I think you need a little bit of balance.

Both forms of teacher isolation are evident in this comment. As well as not having another teacher who taught the same courses at the same time to collaborate with, Karen described both a lack of new ideas coming in, and a feeling of distance and stagnancy with regards to the broader field. She partially attributed this, in her comment, to the size of her school and the fact that there were no departments or department leaders who had the responsibility to set goals and guide professional learning. Her feelings of isolation seem palpable in comments like, "I guess I'll just have to take care of this myself." Other teachers also noted the issue of teacher stagnancy in the focus group discussion. The point was raised that if teachers are not willing to engage in collaborative PD, the pool of teachers with whom one might work is further reduced. While the extent of the problem of teacher stagnancy was not evident in the data in this study, the emergent concept of isolation from new ideas is important in terms of challenges faced by teachers in accessing meaningful PD.

Data collected in the research study provided evidence of the extent to which the model was able to mitigate the challenge of teacher isolation. Both the teacher focus group discussion and the interviews conducted with teachers indicated that the model was successful in decreasing isolation, both in regards to providing opportunities for collaboration, and in regards to increasing access to new ideas. One teacher during the focus group discussion said: “It’s given an opportunity to collaborate with people who are like-minded and have the same goals.” This view was echoed by all of the Cohort teachers at some point over the two years of Cohort operation. Similarly, several teachers indicated that they had had access to new ideas they otherwise would not have had access to due to their participation in the Numeracy Cohort. Due to the nature of the goals of the model, it is important to look at the ways the model was able to reduce both forms of teacher isolation. As such, they will each be considered in separate sections.

Teacher collaboration. The Numeracy Cohort model provided opportunities for teachers to collaborate through its structure. As previously mentioned, teachers entered the process with a critical friend or partner with whom they could collaborate. They were also encouraged to collaborate with other teachers on MAR projects when their goals aligned. Data collected as part of the study indicated that one third of the pairings remained in tact throughout the process. The other two thirds of the pairings, however, separated to work with other Cohort members. This was particularly true when the critical friend pairings did not contain teachers who taught at similar grade levels. Figure 8 (below) shows the movement of teachers from critical friend pairings to more collaborative, grade level specific groups over the two-year process.

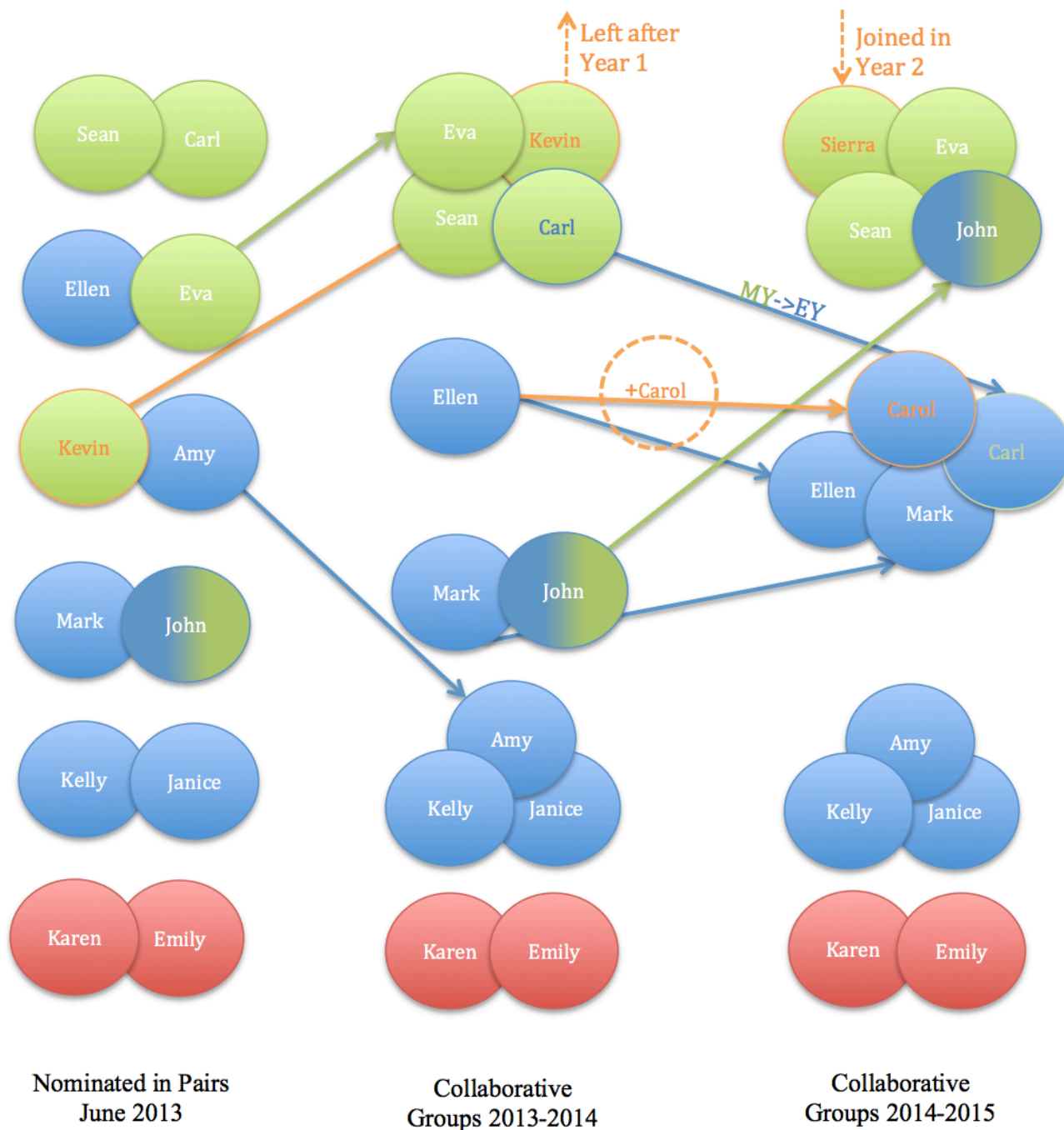


Figure 8. Movement across collaborative groupings over two years.

In Figure 8 (above), each grade level is represented by a different color: senior years (red), middle years (green), and early years (blue). Changes in participants over the two-year process are also indicated in orange. It is easy to see from the diagram that only the high school teachers

(Karen and Emily) and two of the early years teachers (Kelly and Janice) remained together throughout the process as critical partners. It is also easy to see how clusters of grade level groups formed, particularly in the second year of Cohort operation. Although much more detail will be provided in Chapter 6 about the individual and collaborative work engaged in by the Numeracy Cohort teachers, the movements in collaborative groupings provide evidence of mitigation of teacher isolation. They also provide information about challenges to collaboration within such a model. As such each pairing's trajectory will be described briefly.

Karen and Emily, represented by the red circles in the diagram, were the two senior years teachers who participated in the Numeracy Cohort (one from each high school in the division). As previously mentioned, due to the fact that other teachers in their respective buildings did not teach the same grade levels or courses as they did, they had limited opportunities for collaboration within their own schools. Through the Numeracy Cohort design, the two teachers became critical friends or partners, thereby providing them with opportunities for collaboration that did not exist within their own schools. In reviewing the teacher interviews conducted with the two high school teachers, it was evident that while they were able to collaborate on one project, several barriers existed that prevented them from collaborating more significantly over the two years. Emily was on medical leave for the first half of the first year of Cohort operation, which meant that the pairing was not able to begin the process together. While Emily's principal (who had also taught grade nine math) attended on Emily's behalf during her absence, continuity suffered. Another issue that prevented more significant collaboration between Karen and Emily was timetabling. They indicated in their interviews that they did not teach the same courses during the first year, with the exception of part of the course 40S Applied Mathematics. It was for this course that they collaborated on designing an assignment for the logic unit on truth

tables. During the second year, while they did end up teaching a few of the same courses, the courses were timetabled in opposite semesters, making it difficult to collaborate on them. Karen and Emily were not in the same place (at the same time) to collaborate on any of their courses. The result was that while they were able to collaborate on one project during the two-year process, most of their MAR projects were done independently.

Kelly and Janice were the two elementary teachers in the largest elementary school in the division. Both of them taught in a grade three/four split classroom, literally across the hall from each other. Prior to participating in the Numeracy Cohort, they collaborated extensively without external motivation. They shared materials and ideas, and visited one another's classrooms on a daily basis. Kelly and Janice were very aware that their situation was beneficial, and not like that of the other Cohort members. Over the two-year period, they collaborated on several things. They completed MAR projects together on implementing math workstations in their classroom and on improving student skills by identifying problem areas. They met with grade one/two teachers in their school, and engaged in year planning. They attended a Math Recovery workshop together, and looked at ways of implementing such a model in their own school. They partnered with a Cohort teacher from another school in the division (making a group of 3 over much of the process), and visited classrooms of teachers outside the division on two separate occasions to see math workstations and Math Recovery being used in other contexts. Despite the fact that these two (and in many cases three) teachers collaborated already prior to the Numeracy Cohort model being implemented, they indicated in their interviews that they valued the extra time and resources to further their collaboration efforts. While they didn't necessarily need motivation or opportunities for collaboration to occur, the Numeracy Cohort provided them with resources with which they were able to make their collaborative efforts more robust.

Sean and Carl were two middle years teachers who worked at two different, very small schools in the division. They did not know each other prior to their involvement in the Numeracy Cohort, partially because one of them was a new teacher (to the province, to the division, and to the profession). Sean and Carl were two of the more isolated teachers in the division, second only to the Hutterian teachers. Both of them taught in the grade six to eight grade range, and both were responsible for teaching the subject of mathematics. In their interviews, both teachers expressed regret the first year about not getting together in between Cohort sessions. They had meant to, but it never happened. The more experienced of the two suggested three different reasons why it may have been that they didn't get together: the expectation wasn't strong to do this, they didn't know each other very well yet, and his own reluctance to have a new person see his own classroom when things were not perfected yet. In the second half of the first year of Cohort operations, Sean and Carl joined with two other middle years teachers (Kevin and Eva) who were paired up with early years teachers as their critical friends. This more organic grouping formed as they all expressed interested in improving student engagement through project-based learning at the middle years level. The middle years group focused on project-based learning continued in the second year of the cohort, despite a few changes (as indicated in *Figure 8*). One of the changes during the second year was that Carl had his teaching assignment change to early years. As a result, during the second year of Cohort operation, he left the middle years project-based learning collaborative group and joined another early years group focused on workstations. This is indicated on the diagram by an arrow and a green circle changing to a blue circle. Despite the change from middle years to early years, Sean and Carl continued to both attend meetings, and to "touch base" with each other when they saw each other. At the end of the second year of the Cohort running, when they were interviewed

separately, they both discussed collaboration in terms of their new collaborative groups. Sean spoke about the project-based learning middle years collaboration, and Carl spoke about creating workstations with early years teachers after they had attended a workshop as a small group. Both teachers indicated that collaboration had been better the second year.

Kevin and Amy were two teachers from one of the medium-sized elementary schools in the division who taught at different grade levels: Amy teaching grade two/three, and Kevin teaching grades four to eight mathematics. In the interviews conducted at the end of the first year, they expressed that they really had not been able to collaborate much because their grades were not even close together. As a result, Amy paired up with the two teachers in the largest elementary school (Kelly and Janice) to work on workstations and Math Recovery. Kevin ended up joining the middle years project-based learning collaborative group. At the end of the first year of Cohort operation, Kevin discontinued with the Cohort due to a change in teaching assignment. Sierra, a new teacher to the school who was responsible for grade seven and eight mathematics, joined the Cohort in his place. This change is indicated by the orange dashed lines and circles in *Figure 8*. At the end of the second year, both Sierra and Amy reflected on the fact that they, together, hadn't collaborated at all, but rather each of them engaged in collaboration with their respective groups.

Ellen and Eva were two teachers from the other medium-sized elementary school in the division, and like Kevin and Amy, had teaching assignments at different grade levels: Ellen in grade two, and Eva mostly at grade eight. At the end of the first year of Cohort operations, Ellen and Eva also indicated that collaboration between them hadn't worked out due mostly to the fact that they worked at such different grade levels. Eva also joined the project-based learning collaborative group, which left Ellen somewhat isolated. In her interview at the end of the first

year, Ellen indicated that she worked pretty much alone on her idea of implementing workstations in her classroom, and that she had a colleague in grade one in her school who was a much better fit for collaboration. As a result, her grade one colleague (Carol) was invited and joined the Numeracy Cohort in the second year of operation to be her partner (see orange dashed circle in *Figure 8*). Even though this meant that there were three teachers from the one medium-sized school, it was much more effective for collaboration and the reduction of isolation, particularly for Ellen. In the interviews held at the end of the second year of Cohort operation, Ellen and Carol described the collaboration as “the best part of the Cohort.” They were able to attend a BER workshop on workstations during the second year and then take a day immediately after the workshop to get together to create workstations for their students. They were joined by both Carl, who had changed job descriptions to become an early years teacher in the second year, and Mark, who had only Kindergarten and grade one students. Also during the second year, this organically-formed early years group planned and ran a Hundred Day at one of the elementary schools, bussing in students from the two other schools. Eva, who had joined the middle years project-based learning group, indicated that while she didn’t collaborate with her original partner, she was able to collaborate with the other middle years teachers in a more “authentic” way. Moreover, she indicated that the other middle years teachers were interested in tackling the same issues as she was.

Finally, Mark and John were the two Hutterian teachers who came from two different Hutterite colony schools in the division. They taught at very different levels as well. Mark had only four Kindergarten students when the Cohort started, although he also volunteered to teach some high school students working in his school on video-based distance learning. John had eleven students from Kindergarten through grade eight in his school. During the first year of

Cohort operation, the two teachers agreed that they could collaborate on creating culturally relevant mathematics lessons for their students. In reflecting on the first year, they indicated they probably should have tried to get together more, as they really only got together to hurriedly finish their MAR project forms. They also indicated at the end of the first year that they were interested in collaborating on some of the other projects that were going on in the other groups. This is precisely what happened in the second year as John joined the middle years project-based learning group, and Mark (now K-1 teacher) joined the early years teachers who attended the BER workshop, constructed workstations together, and planned the Hundred Day. At the end of the second year, both teachers indicated that the second year better met their needs as teachers, and both appreciated the opportunity to collaborate with others. John indicated that it was difficult to make connections with other teachers in the division in his context, and even went so far as to say the Cohort was able to “lift the gates of isolation” for him.

Despite the fact that the collaborative experiences of the Cohort teachers were diverse, it can generally be said that what began as nomination of teachers with critical friends or partners from their schools or from a nearby school ended with organic collaborative groups forming. In many of the interviews and discussions, teachers discussed emailing each other directly, and some even indicated that they spoke with each other about other subjects/matters not related to their collaborative Cohort work. These comments support the view that the Numeracy Cohort did, in fact, effectively mitigate some of the challenges surrounding teacher isolation that existed in the division. In a comment during his interview, the superintendent stated the following:

Well, again, for me one of the big days was last May when everybody came in and presented to the admin council on the different initiatives they were doing, the projects they were doing, and to see that each project had teachers collaborating in

different schools working together on this, and it just gave you a real sense of the teachers working together, trying methodologies that would give kids different opportunities to explore concepts, rather than just one way. It was very exciting and to hear the teachers present and being excited about continuing on in the next year. . . . Again, my individual discussions with teachers as I travel around to schools in the school division are that this has been outstanding. They don't want it to end. They want to keep working together.

Evidence of collaboration and reduced isolation existed not only in the statements made by teachers, but also in the statements of those who saw the teachers engage in Cohort activities. Much of the collaboration that occurred was evident in the facilitator notes that were kept as well. The notes provided both evidence of collaboration and, along with the MAR reports and other reflections done by Cohort teachers as part of their participation, information about the trajectories of collaboration over the two-year process.

In looking at the specific aspect of critical friends in the PD model, it is difficult to ascertain whether they contributed to or hindered collaboration for teachers. For the two pairs that continued together throughout the process (Kelly and Janice; Karen and Emily), the pairings had some benefit. Kelly and Janice were able to continue their collaboration with the backing of more resources and time. While Karen and Janice engaged in a collaborative project only once, it is difficult to ascertain whether or not more collaboration would have occurred if the timetabling of courses had been more amenable to their collaboration. Critical friend pairings in the PD model clearly did not work well for teachers when grade levels were not the same. The formation of organic grade-level groups speaks to the importance of common contexts in terms of effective teacher collaboration.

Teacher isolation from new ideas. The second form of teacher isolation, or isolation from new ideas, was also reduced through the Numeracy Cohort model. Teachers were exposed to a variety of new ideas in the area of mathematics instruction and student numeracy over the two-year period. During face-to-face sessions, new ideas were brought to Cohort teachers on a regular basis (See Appendix F for a chart outlining the content of sessions). As previously mentioned, the entire Cohort also attended the Universal Design for Learning workshop hosted by Brandon University in the first year. Smaller groups attended various workshops put on by presenters on topics such as problem solving, using math workstations, and Math Recovery. Presenters were brought in; one a consultant from another division (Guided Math), and another, a mathematics education professor from Brandon University (workstations). Three of the early years teachers visited classrooms of teachers outside the division to gain ideas about workstations and Math Recovery, and a few teachers visited fellow Cohort teachers' classrooms to see how workstations were working in their classrooms. The group had a divisional presenter from Australia work with them for a half day about system change and deep learning, and, of course, many ideas were exchanged as teachers met on an ongoing basis. Many of the teachers indicated that they appreciated having new ideas brought in through these avenues. At the end of the first year of Cohort operation, when the group engaged in an activity involving writing a "report card" for the Numeracy Cohort, several strengths emerged. In addition to "a chance to collaborate" and "bringing teaching practice out of isolation," two of the strengths identified were "access to new ideas/speakers/presenters" and "new knowledge gain." Of ten things identified, four were clear indications of reduced teacher isolation. One of the Cohort teachers expressed this thought in the teacher focus group discussion:

It was good to have somebody bring in some ideas and some of the PD topics that are out there and some of the new things that are happening because I'm not likely to see it any other way because it's just something that I don't go looking for and I don't just run into. So, it takes kind of a burden, a burden off, because you're not trying to figure out well what's happening out there in the world. You're getting exposed to some of that here, and you're able to look at it and say, "Okay, what do I want to do with this?"

From her comment, it can be concluded that isolation from new ideas was, in fact, a challenge for the teacher. She clearly felt the burden of having to go out and find out what was happening in the field of mathematics education on her own. Her appreciation for having ideas brought into the division for her to engage with was evident in the comment, as was the effectiveness of the PD model in reducing teacher isolation from new ideas.

Teacher workload. A fourth challenge the school division and its teachers faced in providing and accessing meaningful PD that was related to staffing was the issue of teacher workload. Despite the fact that several of the teachers had small class sizes and that eight out of thirteen of the teachers in the second year of the cohort had a decade or more of teaching experience, workload was a challenge for Cohort teachers in terms of finding the time and energy to collaborate. Teacher workload challenges emerged in three main areas during the Numeracy Cohort initiative: new or changing job descriptions, multi-grade classroom assignments, and the fact that teachers had many hats to wear.

In terms of new or changing job descriptions, it is evident from the data collected from teacher interviews that in addition to two Cohort teachers being new to the division, several of the teachers had experienced significant changes in their teaching load. Just within the

Numeracy Cohort teachers, there were five teachers who were new to the grade or subjects they were teaching at some point during the two-year initiative. There were another four teachers who had experienced significant change in the previous few years, although they had taught the grade they were currently teaching at least once before. This leaves only four teachers who had relative stability in their teaching load over the previous five to ten years, and the one teacher who left the cohort after year one due to a change in teaching assignment. With only four of fourteen teachers enjoying the stability of a consistent teaching assignment, it is not hard to understand how heavy the teaching load was for teachers. Preparing for new courses takes an extraordinary amount of time, and is very difficult to do in conjunction with action research about one's practice. While a variety of experience is beneficial for breadth of understanding, depth of understanding about student learning at a particular level, grade, or in a particular subject may suffer.

The second way teacher workload emerged as a challenge during the Cohort initiative was through multi-grade classroom assignments. In analyzing the data collected through teacher interviews in the division, it was evident that eight out of thirteen of the participants taught in a multi-grade situation. Moreover, three of the eight teachers taught in a room with three or more grades in it. One Hutterian teacher even had eleven students across seven grades from Kindergarten through Grade 8. While the small numbers of students in the division necessitated such groupings, the impact on teacher workload was evident as a challenge. Preparing materials for students at multiple grade levels is a tremendous amount of work. There are more materials to find, more curricula with which to become familiar, and more learning trajectories to plan. While many of these teachers enjoyed small class sizes, the workload related to preparing was significantly larger than a typical single-grade context.

The third way teacher workload emerged as a challenge for Cohort teacher was through the fact that they had so many hats to wear. Cohort teachers described committee involvement, such as the technology committee and PD committee; union involvement; coaching involvement; and leadership duties, such as having to be acting principal when their own principal was away. The demands on teachers to do their fair share in wearing the hats that needed to be worn, was significant. One teacher in the teacher focus group discussion indicated:

the same people that are on the school, the local school PAC committee, which are on the local rink board, which are on the town whatever, it seems to be the same people. That happens in small schools too. The same teachers end up being on several committees, which can be - [it can] make PD difficult in that those teachers are extremely busy, [they have a busy] workload, and then [an] extremely busy PD load

Along with involvement in committees and other voluntary activities, this teacher's comment brings to light the fact that rural teachers also have heavy workloads and heavy PD loads, such as was the case with the Numeracy Cohort. Moreover, these teachers are often also the community members who are involved with the local rink board. One of the principals in the focus group discussion indicated, "a rural teacher is essentially a teacher, a parent, a coach, a you name it." The result of having so many hats to wear in a school, division, or even a community is that teachers are "spread thin," and have to make choices about how to use their time and energy. Besides teacher PD, there are many other hats that need to be worn in the lives of rural teachers.

While new or changing classroom assignments, multi-grade assignments, and the fact that teachers were already wearing many hats were all beyond the reach of the Numeracy Cohort PD model, the model attempted to mitigate the challenge of teacher workload in two important

ways. The first was through embedding the PD within the workday of teachers. The reality of the Numeracy Cohort initiative was that it required teachers to engage in action research about their own practice. Divisional planners felt, at the conceptualization phase, that teachers were busy people and that holding meetings outside the workday would be detrimental to participation. As a result, meetings were embedded in the workday, and teachers were released through the use of substitute teachers. The result of this structure, as was already mentioned, was that teachers not only had the added work of engaging in the MAR projects, but also the extra work of preparing for substitute teachers for their absences. In this way, the Numeracy Cohort added to the workload of teachers. Evidence of teachers feeling the increased workload could be seen in several places. The first was in comments teachers made about having to prepare for substitute teachers, and being away from their classrooms too much in their interviews and focus group discussion. Teachers also expressed that they didn't have time to get together with their critical friend, or even time to finish filling out the MAR forms when they spoke about their experiences. Finally, the attendance charts which indicated reasons given for absences, included one instance of a teacher electing not to attend to be in class for her students, who would be writing provincial exams within the next week or two. While it is difficult to ascertain the extent to which the added workload of the Numeracy Cohort impacted teachers from the data, attendance (and the reasons given for absences) might indicate that the Cohort teachers managed the increased expectations. There were relatively few absences from Cohort sessions, and none directly linked to workload issues.

The second way that an attempt to mitigate the challenge of teacher workload was made through the Numeracy Cohort initiative was through the elimination of professional growth plans for Cohort teachers. The Cohort teachers were not required to complete a professional growth

plan, keep track of the PD they engaged in, or report on their year as other teachers in the division were required to do. School division planners felt that through their ongoing engagement in the Cohort, and year-end presentations to the principals in the division, this was something that was redundant and some work that could be removed from the plates of Cohort teachers. Although a few teachers commented on their appreciation of not having to do the plans, the move to remove professional growth plans seemed to have been of minimal consequence with regards to teacher workload.

Another important thing that emerged from the data with regards to teacher workload was the plight of the part time principal and facilitator. For those people in small rural school divisions with part time leadership roles, such as a part time principal or facilitator, workload issues are even more prevalent. One of the middle years teachers on the Numeracy Cohort was a part time administrator. In addition to being from one of the more isolated, very small schools, he had to juggle all of the responsibilities he had as both an administrator, and as a Cohort teacher. On several occasions, his administrative role posed challenges for his participation in the Cohort. For example, he had to choose between administration council meetings and Numeracy Cohort meetings on two separate occasions, choosing to split his time between the two. On in-school PD days, he also had to juggle the responsibility of organizing the PD for the teachers in his school and participating in what the Numeracy Cohort had planned for the day. One way he managed these competing responsibilities was to offer to bring the teachers in his school to the activities organized for the Numeracy Cohort. Although this was a creative and flexible solution to the problem, the challenge was significant for him when in-school PD time was used for Cohort meetings. The part time principal on the Numeracy Cohort indicated in his interviews that getting away from his school was difficult as an administrator, but that the one

thing that was sometimes easier was not having to bring in a substitute if meetings fell during his administration time. This is, perhaps a shortsighted benefit, however, given that his administrative work would likely have had to be done outside of school hours in that event.

As a part time facilitator, the issue of workload was a glaring challenge. Throughout the facilitator notes, there were instances in which I expressed that I was exhausted and at a breaking point. In one such entry, I indicated that over the previous few days, I had been juggling being a volleyball coach (including practices, games and a weekend tournament), working on a provincial exam test development committee (that included a two-day meeting for which I was away from my classroom), writing my research proposal, preparing for a Numeracy Cohort face-to-face session, preparing a presentation for SAGE (the provincial PD day), and teaching three quarters time. In frustration about the workload I was experiencing, I wrote:

I kill myself, trying to do both jobs with not enough time to do either really well.

And my family suffers. If you look at each of the things I had on over the 10 days above, THEY ALL MATTER!!! Presenting at SAGE was my own PD with colleagues I had agreed to present with. The VB is important because my son wouldn't be able to play (or the other kids his age) because they had no coach. I stepped in to avoid this. The PD committee organization and the cohort meetings are important to me as well. . . I know I am at a melting point and things are bad right now. I think it is important to put this down. This is certainly a problem with this model of things. While having a teacher as a facilitator adds credibility, it ties my hands in a lot of ways and makes me feel overworked and stressed out. Also, it is highly dependent upon one person, which is a vulnerability. If I got sick, it

may just be over instantly. Rural divisions need to build capacity in the area of facilitation as well.

Throughout the facilitator notes, there are instances of extreme stress and exhaustion exhibited, usually in times of critical workload stress. A pattern can be seen at as well around report card times and semester changeovers as my teaching load and facilitation load competed for valuable time. An example of one such comment is included below:

Prior to the Jan. 30th day, I felt immense pressure, yet again to put everything together. My university work got busy with my proposal defense, it was exam period, and report cards were due. A perfect storm of stress. I ended up losing essentially 2 days because of my proposal defense (Wednesday) and the PD day Friday (I spent Thursday preparing for the day). In the end, this made me pretty stressed out. I ended up spending most of the day Sunday doing my report cards and then prepping for the new semester, which started Monday (yesterday).

In reviewing the pattern and quantity of comments in the facilitator notes surrounding workload, it is obvious that the role of part time facilitator, at least at 0.25 FTE time was not sustainable. In addition to comments about the stress level I was experiencing, there are also a significant number of comments about the impact of the stress on my health. One such comment is included below:

Personally, in February and March I had some health-related issues that largely prevented me from being as active as I would have liked. It is worth noting because I have come to realize (after seeking medical advice) that my health issues seem to be stress-related. I find myself wondering about the sustainability of a model like this for the facilitator. Is it reasonable for one person to facilitate

this with only 1 hour a day (0.25 time). Maintaining a 0.75 teaching load on top of this is certainly difficult and has taken a toll on me physically, mentally, and emotionally.

This comment, along with several others in the facilitator notes, indicate the immense toll of the quarter time facilitation role on my health and well-being. Not only was the Numeracy Cohort model not able to mitigate the challenge of teacher workload, it intensified and exacerbated the issue for me as a part time facilitator.

Internal capacity. In small rural divisions, internal capacity is a challenge, particularly when it comes to teacher PD. There are fewer people with whom to collaborate, bring new ideas in, facilitate PD opportunities, or even provide instructional leadership. The superintendent of the division in this study succinctly described this problem in his interview, noting:

We have ninety professional staff. We are not going to have all the strengths that a staff of two or three thousand would have, or two or three hundred teachers would have. We have to scale it and find where are our strengths, and we have to play our strengths.

With only ninety teachers in the division, the strengths from which the division could draw were naturally limited. Initiatives for divisional change could not be embarked upon unless sufficient expertise and strength existed in any given area, and while there was a clear desire to draw on the strengths inherent in the division, some things were just not possible in areas for which there wasn't sufficient internal capacity. In another comment during the superintendent's interview, he described the reasons numeracy was chosen for implementation of the new PD model:

I think one of the reasons we started on numeracy, as I said, there was some drive within our school division itself to what was happening with kids getting to grade

nine and what do we need to do to improve teaching and learning throughout the school division? But also, you know I'll make no bones about it, if we didn't have a person within our school division who could-, who had the capacity to provide that leadership, it may not have been a very good investment to put the dollars there.

In this candid comment, the superintendent of the division described the complex decision-making continually at play in such small rural divisions as they negotiate how to engage in systemic improvement while considering the strengths and constraints of the internal capacity that exists within the division.

One of the areas of internal capacity that posed significant challenges for the rural school division in this study was leadership. There were simply very few formal leadership positions in the division, which meant that there were fewer people to lead things like professional development and change initiatives. The superintendent of the school division described the division's leadership in the following way:

Our admin council is made up of fourteen people. And that includes eight school principals, superintendent, student services coordinator, and then we get into secretary-treasurer, maintenance coordinator, transportation coordinator, technology manager. And so we end up with an admin council of fourteen, but we surprisingly have a lot of joint meetings, we have joint meetings with the resource, the student services team. We have, we invite groups to participate in admin council meetings so that we are also bringing those leaders in, so that they have a chance to work with that group to make sure that the ideas that they're

working on in the classroom are front and centre with the administration of the school division.

While there were fourteen members attending administrative council meetings, there were only eight principals (not all full time) and two upper administrative positions in the division. Even though other divisional employees were brought to the administration table, including the secretary-treasurer, maintenance coordinator, transportation coordinator, and technology manager, these people were not educators. The weight of divisional leadership, at least in terms of instructional leadership and professional development, rested on the shoulders of at most ten people. There were no curriculum consultants or instructional leaders; this work had to be taken up by the administrators and senior administrators, who already had many hats to wear themselves.

Given the few formal leadership positions that existed in the division, it is not surprising that the division had a strong focus on leadership development, particularly in the area of teacher leadership development. The superintendent noted in his interview:

We're working to try and develop our leadership. We have lots of really good people who have great potential. So some of the things we've done in the last five years, we have run a small leadership cohort internally. We've also had a couple of people who now have accessed the Manitoba Rural Learning Consortium leadership development program as well. And we'll be looking to do that as well as looking at other ways of doing leadership development. But when we talk about leadership development, we have to remember, a lot of times people think that leadership development is strictly about developing your next administrators. It's not. It's about developing classroom leaders. It's about developing curriculum

leaders. It's about developing leaders in terms of, whether it's physical literacy, or whether it's numeracy, we try and develop leadership across the whole division.

You know, teachers are in a unique profession. They work as a group, almost like a flock, and at times the leadership is coming from the shepherd, but sometimes it's coming from within, somebody right in the middle of the flock is changing the direction and making things happen and we have to encourage that. We have to realize that there's good ideas in the-, amongst everybody within the group.

By looking for ways to develop leadership from within, the school division was looking for ways to develop internal capacity, both through the development of individual people with individual interests, strengths, and capacities, and more broadly in terms of the capacity to change. By actively engaging in leadership development within the division, the division also increased the pool from which leadership could be drawn.

In addition to recognizing the need to engage in active leadership development, the superintendent added a cautionary thought about maintaining a focus on the priorities of the division. He indicated:

We can't be everything to everybody. We can't try and address every idea, every thought, we have to keep focused. That's the role of administration, is defining some of that, working with it, and making sure we work through it. But, at the same time, you don't want to just, you want to do that in a way that is never discouraging to people who are taking a lead and doing something that's positive for outcomes for kids.

Again, the idea of over-extending the capacity of the division, or spreading people thin, emerged as an important caution in the study. Again the delicate balance of considering the capacity of

the division and its people, while allowing for change to occur, came up in comments of the superintendent. This is, perhaps, indicative of the complex nature of leading small rural divisions. Desire to grow and change must always be tempered by consideration of internal capacity.

In terms of teacher professional development, the issue of internal capacity was critical. As previously mentioned, teacher PD was planned in a variety of ways in the division. The first was through divisional days, planned by the Joint PD Committee. As was previously mentioned, a committee of teachers from every school in the division, the superintendent, and the student services coordinator participated in the joint committee, planning two divisional PD days each year for teachers in the division. This committee met outside of school time, on a voluntary basis, adding to the workload of already busy teachers in the division. In-school PD days were the responsibility of individual schools, and by default, the principals of individual schools. School principals had to organize PD opportunities for the teachers in their schools, or organize a committee to do this work. In the principal focus group discussion, the weight of this was evident in several comments made by the administrators. One administrator described the task of planning PD for high school teachers, all who taught different grades and subjects, as “an insurmountable task.” In order to provide in-school PD, the administrators leveraged resources in a variety of ways. In the high schools, the principals allowed teachers to plan their own in-school PD experiences. One of the high school principals noted:

What we found helped was allowing more of the individuality to happen during PD, like in-school PD, or- They are far better to go and sit with a colleague, even within the school, or online with someone, or go to another-, they're finding that to be the most effective PD at the high school level. And that's what-, I haven't

done a lot of planning of in-school PD for that reason, except, you know, the big, all inclusive, like the Circle of Courage or those kind of things. But, it makes much more sense for them to go do what they need to do, and it's a lot less stressful on me too than to plan a . . . a show. That's what it felt like some days.

This strategy both provided individual teachers with a say in their PD experiences, and took the stress load off of the administrators in the high school to come up with PD that was relevant and meaningful for such a variety of professionals. Another way that principals leveraged resources to provide in-school PD for teachers was to access free resources that were available through outside organizations. One of the elementary principals who had done this in his school suggested:

I think we can do a better job of leveraging the resources that we presently have that we could get for free. For instance, our union dues pay for the Teacher Action Cohort. They will come out and it's free of cost, free of charge and present whatever you want, essentially. You need to give them your topics that you're interested in seeing at the start of the year. They'll come out and do a fabulous job.

By accessing resources that were free of charge, some of the administrators were able to mitigate both financial challenges and workload challenges related to being in charge of providing in-school teacher PD. The final way administrators leveraged resources to provide in-school PD for teachers was to partner up with other schools on in-school PD days. This strategy was used largely by one of the very small school administrators with only four teachers. He noted:

Even in our small school, there's enough variety that you can't find something for everyone, unless it's an initiative that we developed at the school and it's

something we work on there, but that's not always effective PD, like for professional development, I'm thinking that's kind of, I'm thinking other things. Like our school plan. But to be specific, professional development for teachers, it's hard, even at-, even with just four teachers to find something that suits everyone.

One of the ways he managed to deal with this challenge was to allow teachers to attend in-school PD being hosted by other schools in the division. For example, one teacher might attend a workshop on technology use in a different elementary school, another might meet with music teachers in the division, a third might meet with the Numeracy Cohort, and so on. In terms of this strategy, the Numeracy Cohort was able to mitigate this challenge by providing one source of PD from which to gain access.

The data collected in this study suggests that in-school PD days presented a significant demand on the internal capacity of the rural school division. This is evident in the employment of several strategies to leverage external resources. In-school PD days were likely a significant challenge due to the intersection of two critical aspects of internal capacity: leadership and expertise. Due to the few formal leadership positions and small number of professionals that existed within the division, both of these areas of capacity were stretched when it came to in-school PD days.

Aside from divisional and in-school PD days, teachers in the school division in this study also participated in professional growth plans and individually-guided PD such as attending workshops alone, or with someone else. The superintendent noted in his interview:

We are counting a lot on the professional . . . spirit of our teachers, that if they're not fitting perfectly within one of the priority area groups, that they may not be

getting the collaborative PD we would like to see them getting, and we've got to find ways to connect them with teachers, whether it's regionally, through the Manitoba Learning Consortium, Rural Learning Consortium, or even through MERN or other groups that are doing some interesting things in their areas.

Recognizing that the school division could not be everything to everyone, the superintendent noted that individual teachers had to engage their own professional initiative to find PD opportunities that met their needs, should the division not be able to provide them. Again, for these, the division relied on PD opportunities available through outside organizations to make up for areas in which the division had limited internal capacity, itself. In addition, the division relied on the professionalism of teachers to engage in the important task of finding PD opportunities that fit their needs, themselves.

In terms of mitigating the challenges faced with respect to internal capacity, the Numeracy Cohort initiative was successful in a couple of ways. The first was by building internal capacity in the area of numeracy instruction. Although the success of the initiative in terms of its ability to meet the needs with regards to numeracy instruction and student learning are the topic of the second research question and will be discussed in detail there, the Numeracy Cohort model clearly built capacity in this area through the hiring of a 0.25 Numeracy Coach, the bringing in of external presenters on the topic of numeracy, and the ongoing work in which teachers engaged through their MAR projects. Perhaps the most obvious evidence of this capacity was contained in the hosting of a PD event by the Numeracy Cohort teachers in April of the second year of the initiative. On an in-school PD day, Numeracy Cohort teachers shared their work, experiences, and expertise with other teachers in the division. This would not have been possible without the initiative.

The second way the Numeracy Cohort initiative was able to mitigate the challenge of internal capacity was by having leadership structured within it. By hiring the Numeracy Coach, the burden of leadership was transferred away from already busy classroom teachers and administrators. Although it was only a 0.25 FTE increase, the initiative did increase the formal leadership positions in the division.

While the creation of the extra 0.25 FTE position and building of internal expertise in the area of numeracy were positive outcomes that mitigated some of the challenges the division faced with regards to internal capacity, the initiative was not able to mitigate all of the division's challenges. The sheer number of teachers and administrators in the division as sources for expertise and strength is not something that could be overcome by the Cohort model. While the addition of a Numeracy Coach added to the expertise and strengths in the division in the area of numeracy, the model was still limited by the fact that there was only one person's expertise from which to draw in the division. Despite bringing in presenters from other organizations, there certainly still was a limit to the capacity one person could bring to such a situation. In my facilitator notes, I described this limitation after attending a PD session by a consultant in an urban division on the topic of facilitating workshops on numeracy instruction for teachers:

I had 2 days away from my hectic work load which I noticed for me also brought with it some time to think – to think about the cohort, to think about my successes and failures as a facilitator. I realized as I thought how important developing the facilitator and creating a mechanism in rural divisions for rural teacher leaders or coaches to develop themselves is. I noticed how she had significant reading and skills under her belt. She mentioned how she was blessed with the time to plan, read, and collaborate now that she was out of the classroom. This caused me to

think about the limitations of how we do it. I am only $\frac{1}{4}$ time and I just don't have the time to devote to this like she does. This is especially important at startup. There is so much work on the front end of things. Also, I don't have the time to think really and plan. It is certainly hard and this way of doing things has the potential of burning out a facilitator (eg. My recent health issues). I wish I had the time she has to devote to this. The reality is that I don't and perhaps one of my best leads here is to find people who do and ask for access to their wisdom. I could really use a mentor like her. The mentor also needs a mentor. I really lucked out by this session. There is potential that if this session was not offered, I would have had to struggle through all of this myself. As part of this model, there should be a plan for development of facilitation skills before and during implementation. I think I will be a better facilitator in the second year than I was in the first because of both this session and my own experiences in the first year.

In this passage, the limitations of both a quarter time position and having one person facilitate the initiative are evident. Until this workshop, I hadn't considered what it would have been like to engage in this work in a larger urban division. The passage shows both that growth was occurring as I learned from another's expertise, and that my own capacity was limited. In terms of mitigating the challenge, the design of the Numeracy Cohort both grew capacity in terms of numeracy and facilitation skills, and illuminated a further challenge of the capacity of one person to facilitate, particularly at a quarter time.

Discussion and implications related to staffing. While recruitment and retention of teachers have been identified as issues faced by rural school divisions (CCL, 2006; Chance & Segura, 2009; Hardré, 2009; Lowe, 2006; MASS & MAST, 2006; NADC, 2010; Seltzer &

Himley, 1995; Tytler et al., 2011), the school division in this study did not report significant issues with either recruitment or retention. While the superintendent spoke of the importance of developing an organization in which people could grow as significant for teacher recruitment and retention, and while the principals spoke of the issue of keeping teachers in the smallest communities, retention did not surface as an issue with any of the fourteen teachers who participated in the Numeracy Cohort over the two-year period. This may have been partially due to the fact that the division was rural but not particularly remote. The most geographically isolated communities, including the very small schools and Hutterian schools in the division, appeared to lose teachers to the larger schools primarily, but not necessarily out of the division. What did surface as an issue in the division was the significant changes in job descriptions that teachers experienced, even over the two-year period of this study. Ten out of fourteen teachers that participated in the initiative experienced significant changes to their teaching assignments during, or within a year or two prior to the study. As a result, only four teachers enjoyed relative stability in regards to the subjects and grade levels that they were assigned to teach. This had a profound impact on the PD initiative. The needs of teachers that were new to a teaching assignment centered increasingly on developing strategies for mathematics instruction for their new contexts. The fact that eight of the teachers taught in multi-grade (and often multi-subject) contexts compounded the need for a variety of instructional strategies that were adaptable to multiple levels. The issue of assignment stability is an important finding in this study that runs parallel to the issue of recruitment and retention. Changing job descriptions in rural places impact both the kind of PD needed by teachers and the workloads that they bear.

Another area of interest that emerged in this study along the theme of staffing was the issue of availability and quality of substitute teachers. While the study supported literature in the

field that suggests that substitute teacher availability is a challenge in rural divisions (Harmon et al., 2007; Lyons, 2008; Manitoba Education, 2009; Seltzer & Himley, 1995; Tytler et al., 2011), substitute teacher availability was a fairly minor issue in the study. The *quality* of substitute teachers, however, was an issue that was both prevalent and insightful in terms of rural challenges. Even though teachers were able to access substitute teachers for most sessions in the study, the constant worry about “losing time” in the classroom with students was an issue for teachers. When substitute teachers did not have the background to teach a mathematics lesson, teachers viewed the class as lost time. Principals even used the term “babysitting” to describe situations in which substitute teachers were in the classroom to supervise students, but did not have the background experiences, qualifications, or capacity to engage in a lesson with students at that level or in that subject area. It is possible that this idea of lost time also played into parental and trustee concerns about teachers being away from the classroom too much. As a result, the study raises quality of substitute teachers as a significant challenge for rural school divisions as well as substitute availability.

Professional isolation is another area in which the study offers some insight. The study supports the literature that suggests that professional isolation is a significant challenge for rural divisions and teachers in terms of providing and accessing meaningful PD (Howley & Howley, 2005; MASS & MAST, 2006; Seltzer & Himley, 1995; Tytler et al., 2011). The teachers in the study experienced significant isolation, particularly those in the smallest and most geographically isolated schools. What became evident through the study, however, were the two categories of professional isolation that emerged through the conversations with teachers in particular. The first type of isolation teachers identified was isolation from other teachers who taught the same subjects and/or grade levels with whom they could collaborate (Hardré, 2009; MASS & MAST,

2006). This was particularly challenging for very small school and Hutterian schoolteachers who worked in environments in which they were the only teacher (or one of two to four teachers all teaching different grade levels). The second type of isolation, however, was not linked to school size. This category of isolation had to do with isolation from the broader field of education, including current research, trends in education, and innovative teaching strategies. This finding suggests that rural PD models should both find ways for teachers to collaborate with colleagues who teach the same grade levels and subjects, and find ways to make new research, teaching strategies, and ideas in education accessible to their teachers.

The internal capacity of the rural school division in this study was a significant challenge for the division. With only two upper administrative positions and eight principals (some who were part time or teaching principals) in formal leadership positions in the division, the school division in the study had limited capacity for leadership of improvement or PD initiatives. There were no curriculum consultants, assistant superintendents, or even vice-principals to delegate leadership responsibilities to; leadership was the responsibility of the ten people in the division who had formal leadership roles. This supports the literature in the field that suggests that administrators in rural places experience multiple roles, heavy expectations, and demanding workloads (Forner et al., 2012; Newton & Wallin, 2013; Starr & White, 2008; Wallin, 2009). For the division in the study, the lack of formal leadership positions meant there were simply fewer people to engage in planning improvement initiatives, maintaining focus on divisional priorities, supporting curriculum development and implementation, and planning and leading PD within the division. As a result, if these things were to occur, teachers had to be encouraged to step up into leadership roles wherever possible and wherever there was an interest expressed. One of the things that was evident in the study, however, was that with less than ninety teachers in the

school division, the leadership capacity of teachers was also limited. The amount of expertise and leadership capacity within very small divisions is not only limited by formal leadership positions, but also by sheer number of people. The division in this study elected to hire a 0.25 FTE Numeracy Coach to help alleviate the challenge of leadership capacity; however, there were several challenges noted with this way of adding capacity in the division including concerns about: the feasibility of engaging in this work with only a 0.25 FTE position, the ability of one person to have the breadth and depth of knowledge required to work with a broad range of teachers, and the technology expertise of the facilitator engaging in a blended learning model. Together these point to issues with the vulnerability of both relying on a single person to facilitate large PD initiatives, and creating workloads that are not reasonable for teachers stepping up into leadership capacities. While articles have been published about the plight of the teaching principal (Newton & Wallin, 2013), not much has been written about the plight of rural teacher leaders in similar dual roles. More research into this area could shed light on how teaching-leadership roles could be used to build the internal capacity of rural divisions in a way that is sustainable for the teacher-leaders who step up into these positions.

Contextual Differences

There were three primary contextual differences in the division that required specific consideration when the Numeracy Cohort was conceptualized: the Hutterian schools in the division, the very small schools in the division, and the more general issue of accessing PD that was relevant to the contexts of teachers, regardless of which schools they were in. Each of these will be considered in separate sections. A discussion about the unique challenges associated with each contextual difference, how the PD model was designed to include and accommodate

differences, and the extent to which the model was able to mitigate any challenges faced will also be included in each section.

Hutterian schools. According to Waldner and Waldner (2016), there are 107 Hutterite colonies in Manitoba. These colonies are rooted in their faith, which stems from Anabaptist origins beginning in the early 1500's during the Protestant Reformation (Kleinsasser, 2006; Waldner & Waldner, 2016). The Hutterite Bretheren, according to the website which is edited by Mark Waldner and James Waldner (2016), believe in what is termed "Community of Goods," that is that all things are shared by all members of the community. Community members work for the benefit of the entire community, and each member earns the necessities of life, rather than individual wages. Modesty is an important virtue for Hutterians, which is evident in their distinctive dress featuring long dresses and head coverings for women, and simple attire for men. Along with agriculture, many colonies have diversified to include manufacturing (Kleinsasser, 2006).

Hutterian communities (referred to as colonies) pose a distinct contextual difference in many Manitoba school divisions. While some Hutterian communities choose to be entirely responsible for their own education programs, many elect to participate with local school divisions to provide education for children in their communities. One of the primary differences between divisional Hutterian schools and public schools is where they are situated. Hutterian schools typically exist on private land, owned by the Hutterite colony. While teachers are provided (in some cases) by local school divisions, the buildings, themselves, often belong to the community. This was the case for the Hutterian schools that were part of the rural division in this study.

Identifying contextual differences and challenges related to Hutterian schools. In the division that was part of this study, seven out of fourteen schools in the division were Hutterian schools. Each Hutterian school had only one or two teachers, in addition in some cases to a community member who taught German to the students. This made for isolated work conditions for Hutterian teachers in the division. Not only were their communities geographically isolated, but the teachers, themselves, were isolated from other teachers in their workplace. In 2014-2015, the Hutterian student enrolment ranged from nine to forty-one and a half students in the Hutterian schools in the division. Teachers who worked in these contexts necessarily taught multiple grades and subjects as part of their job assignments. Such workloads required teachers to prepare a broad range of content for students, some even having to teach all subjects across Kindergarten to Grade 8. Aside from isolation and workload challenges, teachers in Hutterian schools had cultural differences to take into account as well. While some teachers were themselves members of their respective Hutterian communities, many were not, creating a situation for which cultural knowledge and sensitivity was required.

Addressing challenges and contextual differences through the model. When the PD model was conceptualized and implemented in the school division in this study, several decisions had to be made in order to address the unique contextual differences associated with the Hutterian schools in the division. The first thing that had to be decided was how to include seven different schools. Having a teacher participate from each school was logistically impossible, far too costly, and not representative of the overall numbers in the division. In recent years, the division had changed the administrative model to have one principal oversee all of the colony schools together. Although this had required significant travel on the part of the colony administrator, it allowed for more cohesiveness between the colony schools as a whole, as well

as allowing for one person to collectively deal with some of the contextual similarities and differences between colony schools. Due to the success of this model, divisional planners felt that a similar way of dealing with the PD model could be beneficial. Two teachers were nominated from the larger body of all Hutterian schools to participate in the Numeracy Cohort. By having the Hutterian teachers come from different colonies, issues related to having too many teachers out of the building or not having adequate substitute teacher coverage in the community were avoided. In addition, by recruiting two teachers from different colonies, it was possible to generate a pair of teachers responsible for the same grade level since typically Hutterian teachers worked in buildings in which they were the only ones responsible for their grade levels. The final way that the division attempted to address the issue of contextual difference, particularly around cultural difference, was to include not only two colony teachers, but also two Hutterian teachers who were themselves members of their respective Hutterite communities. Including teachers who had an in-depth understanding of the culture and communities in which they taught (and lived), the Hutterian teachers were able bring a voice to the table about their culture and the unique needs of Hutterian students, teachers, and communities.

Challenges surfacing from the data. Data from the study both extended the contextual differences already mentioned and illuminated unique challenges faced by Hutterian teachers, students, and communities. In addition to teacher isolation, heavy workloads (multi-grade, many subjects), and differences in culture and communities; several other challenges surfaced in the data from the study, including accommodating religious holidays, student achievement, and a complex relationship between education and Hutterian communities. Each of these will be discussed in this section.

Although they were not identified in planning the PD model, religious holidays surfaced as a challenge in the data collected as part of this study. As a facilitator, I was unaware in the beginning that in-school PD days were often scheduled on religious holidays to allow Hutterian teachers to attend religious services on those days, and to allow teachers who were not Hutterian to work collaboratively when their students were attending religious services. This meant that the in-school PD days that fell on religious holidays were poor choices for running Numeracy Cohort sessions as teachers who were Hutterian community members would be unable to attend (they would be attending religious services). Once during the two-year period, a date was selected that fell on an in-school PD day that coincided with a religious holiday. Although I changed the date as soon as the conflict came to my attention, the issue bears mention due to the fact that it speaks to need for knowledge and sensitivity when cultural differences exist.

The two Hutterian teachers who participated in this study (John and Mark) were members of their Hutterian communities as well as being teachers within them. This allowed for insightful interview conversations to occur about the context in which they lived and worked, including the unique challenges they faced as educators. One such challenge that was identified was student achievement. On several occasions, the teachers expressed concern about the academic achievement of Hutterian students, particularly in the area of mathematics. There was concern that the students were falling behind. John and Mark mentioned a lack of effort in high school, in particular, and the need for students to re-take courses after not passing the first time. While lack of student achievement could be attributed to personalities and aptitudes in some cases, the teachers noted that the problem was much more complex than that. Mark explained some of the history behind what he perceived to be deterioration in the valuing of education as a community. In the interview conducted in the Fall of 2013, he said:

Education has been pretty deep in our DNA, in our history, back when we were in Europe. A lot of nobles sent their kids to the Hutterite schools because they were so much-, so far advanced, and even as educating females was practiced by the Hutterites [a] hundred years before it even became mandatory. So education is pretty strong in that sense in our past, but I think it fell apart when-, in Russia, and even here during the thirties. . . it was down to survival, and they took the guys out at a very early age just to help get enough together for the-, for the table. . . That's kind of where it started falling apart . . . it has stayed like that for a long time, until, I would say twenty years ago. Some, a few people started going to university to educate themselves and to become teachers, and then we had the BUHEP program start out. So it's kind of started to gain momentum now, but the value of education, I think, is starting to increase. Kids, often because of those few generations of . . . lack of education, that kind of diminished the value of it. So, how do we get kids now interested in that if their parents and their parents before them didn't see the value in it, because it wasn't necessary. Well, it's beginning to be, so we have to be proactive and get those kids involved and somehow relate it to the farm, to the community to make it something that they understand.

The unique and complex history behind the Hutterian communities that settled in Canada includes a tumultuous relationship between education and community. In difficult times, education was seen as less necessary than putting food on the table for the community, and as such, its value deteriorated. Deep-rooted beliefs in the community about the value of education were difficult to overcome, and the teachers in the study both indicated that they hoped to find

ways to get both students and community members to see the value of education. As Mark indicated in this comment above, it was really only in the last few decades that his community had begun to value education again, and to educate their own teachers.

The Brandon University Hutterian Education Program (BUHEP) was a unique program designed by Brandon University for the purpose of educating Hutterian teachers. On their website titled *Hutterian Bretheren*, Waldner and Waldner (2016) described the program as follows:

Many of the Schmiedeleut Hutterian Colonies have found it more suitable and appropriate to have teachers from their own colonies. As a result of interest by several colonies, a program called BUHEP (Brandon University Hutterian Education Project) was initiated in 1995.

The BUHEP program began with Brandon University, in Brandon, Manitoba, Canada. Brandon University professors provide the training for Hutterian students. Typically students take their courses during the summer months and for the rest of the school year, they work as interim teachers in different classroom setting. Initially courses were also taken off-campus, often on Hutterite colonies, during the year, but due to low enrollment that practice has been discontinued.

The BUHEP program marks the first time that such a large group of Hutterites has been involved with post-secondary education. Twenty-one Hutterites were part of the first group of BUHEPpers, seventeen joined the second group, and over twenty enrolled in the third group. The numbers attending today are a lot lower, counting perhaps half a dozen, but the program continues and has graduated over 70 Hutterian educators over the past decade.

It should be noted that the majority of Hutterite colonies in North America do not have Hutterian teachers; teachers, Hutterian or non-Hutterian are hired by their respective school districts to serve the colonies' needs. (Secondary education section, para. 2-5)

Both of the teachers involved in the Numeracy Cohort initiative were products of the BUHEP program. This program, as Waldner and Walder (2016) indicated, was sparked by an interest in having those who are part of the Hutterian culture educating Hutterian children. This cultural piece had, and continues to have, the potential to create more relevant and appropriate educational experiences for Hutterian children. Mark also spoke briefly about the importance of the cultural aspect in terms of Hutterian education in his interview in June of 2014 when he noted the following:

There are a few individuals that really pushed it in the last thirty years to educate our own teachers. Now, the idea was . . . the kids will still see the importance of- and the cultural aspect of education, and we will make it important . . . I guess as a cultural thing, the attitude was always, you know, this is the community, this is the school. You go there and have your school and then-, there was never this connection. It was always a separation, and the kids I think did not see the value in it. Neither did I until it started dawning on me, and the leadership here asked me if I would like to go . . . So my academic record is really not that good either because of [the] cultural background of it . . . And they think I'm the brightest guy around, right, and say well, "If you didn't have to do it, and look at you, why should it matter to us, right?" And so that's kind of the irony of it.

This comment contains many important ideas about the Hutterian community and the peoples' beliefs about education. First of all, the move to educate Hutterite people to become their own teachers and to link the cultural aspect with education was a critical move in the community. By having Hutterian teachers, it was, perhaps, possible to bridge the divide that existed between the school and the community. Second, the need to help kids see the value of education was of critical importance to both Mark and the community. Mark, himself, had left school to work in the community before graduating. He ended up going back to get his GED and eventually became a teacher, but he had experienced, first hand, what it felt to be a young person who did not see the value of education. This was something that seemed to be changing in the community as time went on. Students had begun to graduate from high school, and the community had begun to value graduation and education more broadly. Mark also said the following of graduation:

Graduating wasn't a mandatory thing up till now, and it's-, we leave it kind of up to them to decide whether they want to graduate or not, and as more kids are graduating, the peer pressure is starting to build up, and they want to.

Moreover, he indicated that the graduation of students had become a real community celebration. Over time, community values had changed. On top of having teachers that were themselves Hutterites, another reason for a change in the community's valuing of education had to do with industry. In order for carpenters, welders, plumbers, and other tradesmen to gain qualifications needed in the industry engaged in by Hutterian communities, they necessarily had to attend community college. John and Mark shared that some people took trades qualifications courses to help bring them up to the level needed for college. The desire to achieve college certification in trades helped contribute to an increased value being placed on education within the community.

One of the things that was unique about the Hutterian contexts about which John and Mark spoke was the desire to do something to improve things for high school students. While neither of the teachers was responsible for teaching high school students, they were both very aware of the issues the community faced with regards to high school. For the Hutterian colonies in the school division in the study, and many others across Manitoba, high school classes were delivered by interactive television (ITV). Mark described the ITV system in this way:

There's Hutterites teaching it, they're all Hutterites from different communities. . . . It doesn't matter where you are teaching it from. You can use that studio in there as your teaching platform . . . We used to have, it was basically just one way studios, where it actually had to be a physical studio there too. The kids could see the teacher but the teacher couldn't see the students . . . You talked back with a two way radio and the picture was snowy all the time . . . It was the old analog system. Then the new technology came in, where we digitized and then it didn't matter where we started from.

According to Mark, things had improved over the last several years, particularly after the ITV system had moved to a private colony and redundancy had been built into the network. In describing the ITV network, Mark said the following:

There's about thirty communities, thirty-two or something, and we use the fiber of Manitoba Hydro, fiber as a backbone, and then short hops using towers and radios to communicate, digital, or broadband network. So, it's quite reliable already. I know in the old days, it was horrible. You never knew from day to day whether you were going to have a class or not, but now the equipment is getting better. The redundancy is built in . . . The more people that can be added to the system,

the more loops we can make, so it doesn't matter where I get my signal from. I have three feeds here coming in . . . so if a link goes down, it doesn't really affect anybody except the technicians have to fix it. It doesn't affect the day to day class.

Mark shared that he had taught electrical courses on the ITV system, himself, for two years. As such, he was very aware of the earlier connectivity issues with the system, as well as the significant improvements that had taken place.

While significant improvements to the accessibility of high school education had been made in the Hutterian schools in the division in the previous decade, Mark was also very open about the fact that accessibility was not the only problem high school students faced. In the interview, Mark also said, "That's one of the problems with the ITV system. It has some pros but the cons are those kids have to be self-motivated." While things had changed from one-way studios to interactive studios in which teachers travelled from school to school and taught lessons from multiple locations, students still had to be motivated enough to engage in the school work independently much of the time. When combined with the issues of community support and views about the necessity of education, it is not hard to see how some students could be unsuccessful.

Both of the Hutterian teachers in the study expressed a desire to improve the issues surrounding Hutterian education through their instruction. In the area of mathematics instruction, they recognized the need to help students see the relevance of the material to their lives, and sought to develop culturally relevant activities and connections. A common theme throughout the interviews with the Hutterian teachers was discussion about how to make connections between the agriculture and industry that supported the communities economically,

and the mathematics curriculum. John and Mark engaged in MAR projects that involved the creation of such activities. For example, John created a mathematics activity that involved taking students to the community chicken barn to learn mathematics. Mark also engaged his Kindergarten students in mathematics activities while collecting maple syrup, something the community had been involved in doing (see John and Mark in Chapter 6).

Mitigating challenges faced by Hutterian teachers. In terms of mitigating the challenges faced by the Hutterian teachers in accessing meaningful teacher PD, the model was successful in several ways. The most obvious way the model was able to mitigate challenges was by reducing teacher isolation for the Hutterian teachers, the most isolated teachers in the division. As mentioned previously in the section on staffing, John and Mark both indicated that they appreciated having the chance to discuss and collaborate with other teachers. John even said that being part of the Cohort had “lifted the gates of isolation” for him. In the final interview conducted at the end of two years of participation in the Numeracy Cohort, John also indicated that he found working on multi-grade projects with the other middle years teachers was very beneficial, and that he felt more connected with other teachers in the division, choosing to email them on a regular basis.

In addition to the comments made in interviews, several other pieces of data pointed to the reduction of isolation and increasing of collaboration for the Hutterian teachers. In the first year of the Numeracy Cohort operation, John and Mark worked on culturally relevant mathematics projects. During the second year of the Cohort operation, the Hutterian teachers separated and worked with other, non-Hutterian teachers who were teaching similar grade levels. Mark worked with other early years teachers on mathematics workstations, attending a workshop together, and having a follow-up day to create workstations with other teachers. John joined the

middle years group that was making mathematics projects for their students that would both meet outcomes across multiple grades, and that linked mathematics with the real world.

While the Numeracy Cohort initiative was not designed to look at the unique educational challenges that existed in the Hutterian communities in the division, the teachers expressed several of the challenges that existed. While it was beyond the scope of a collaborative PD model to address these challenges, it is important to note that the MAR projects did allow the teachers to address some of the unique educational challenges they faced by designing projects that addressed both the desire to link community agriculture and industry, and by focusing on multi-grade projects for students. This, in combination with the ongoing focus on multi-grade instruction, provided content that was responsive to the needs of the teachers in the Numeracy Cohort, including the Hutterian teachers.

Another way that the challenges and potential ways of mitigating challenges emerged in relation to the Hutterian schools during the study was when consideration was given to hosting a PD day at a Hutterian school when the Numeracy Cohort teachers would share some of their work with other teachers in the division. In the end, the day was not held at a Hutterian school, but rather at one of the public schools that was more centrally located in the division. When the idea was discussed between the Colony principal and myself as facilitator, two prominent things emerged. The first was that these isolated schools never hosted divisional days, and that many teachers in the division were unaware of where the Colony schools were. After my discussion with the Colony principal, I noted the following:

He was so excited. We talked about how groundbreaking that was – never been done to my knowledge. And isn't that the whole point of this Cohort – to reduce teacher isolation? What a better way to do that than run a PD session at one of the

schools most of the teachers in the division have never had a reason to go to. I had to ask even where it was. Apparently the school is beautiful with a gym and 4-5 classrooms for breakout sessions. Now there are some politics involved - the school belongs to the colony, but [Colony Principal name removed] thought that the head of the colony school would appreciate the visibility generated by such a visit. Business is important to the colony and raising awareness about their industry is politically favorable.

It is clear in the facilitator notes above that there was considerable excitement about the potential of holding a PD session at a Colony school, something that had never been done. As time and discussion about this went on, however, two potential problems emerged. The first problem was the time of year. The session was to be held at the end of April and due to the fact that the community was heavily involved in agriculture, and seeding crops at that time of year, there was significant concern about whether or not the community would be open to hosting such an event at a busy time. The second problem that emerged was the logistics behind travel, mileage, and parking. The Colony principal was concerned about not having parking for up to fifty people on site. In addition, the fact that divisional mileage was not paid for travel to divisional PD days, there was concern expressed by the Cohort teachers about whether some teachers might choose not to attend. Lack of familiarity with the location and cost to individual teachers could have been a deterrent. Finally, there was the issue of mileage for Cohort teachers expressed as well, primarily by me as a facilitator. For other meetings, Cohort teachers were paid mileage. The question was whether or not they would be paid mileage to attend this meeting, even though other teachers would not be receiving mileage. This was a particularly difficult point as the teachers were already doing a lot of extra work to prepare an in-service day for other teachers in

the division. It felt to me, as the facilitator, to be insulting to suggest that the teachers should also pay for their own mileage to the event. In the end, I decided not to host the in-service day at the colony school. The Colony administrator and I felt that the benefits did not outweigh the challenges. The discussion and decision surrounding the possibility of holding a PD day for teachers at an isolated Hutterian school illuminates several of the challenges surrounding teacher PD in diverse divisions with contextual differences that must be considered. Common challenges such as mileage, lack of familiarity with locations, geography, and teacher isolation all emerged as this situation was considered. In addition, unique community considerations such as the school belonging to the community as opposed to the division, or agricultural considerations such as seeding time, illustrate the importance of contextual difference in rural school divisions. While these contextual differences are unique to the division in the study, the importance of their being considered in the development of PD models is noteworthy.

Very small public schools. In addition to the seven Hutterian schools, there were also two very small public elementary schools in the division. These two schools each had less than fifty students, and only three to four teachers each. Both had part time teaching principals, and teachers in both of the schools typically taught a range of grades. For example, teachers in a school might be assigned to three classrooms at the K-2, 3-5, and 6-8 levels. The schools were somewhat geographically isolated, each necessitating approximately 30 km travel to the nearest school in the division.

Identifying challenges related to very small schools. In many ways, teachers in the division's very small schools experienced similar challenges to teachers in the division's Hutterian schools, including: geographic and professional isolation; small staffs that all had different teaching assignments; and heavy multi-grade, multi-subject workloads. Teachers in the

very small schools in the division, despite having much larger staffs of three to four teachers (Hutterian schools only had one or two teachers) still did not have people in their buildings who taught the same grades or subjects as they did, creating significant teacher isolation. They also had very unique teaching workloads that, as well as being heavy due to the multiple grades and subjects teachers were required to teach, were unique teaching contexts that required flexible consideration when planning teacher PD opportunities.

Addressing challenges related to very small schools through the model. The very small schools in the division necessitated unique consideration when it came to the implementation of the Numeracy Cohort PD model. The superintendent and I (in consultation with principals from the very small schools) decided that since the two schools were geographically close to each other (approximately 30 km apart), one teacher from each school would be nominated, creating a pair of critical friends or collaborative partners for the Cohort. Nominating one teacher from each of the small schools ensured that the some of the most isolated teachers in the division participated in the Cohort. It also eliminated the issue of having too many teachers out of the building for the school to function, requiring too many substitute teachers in one school, and the issue of teachers not being responsible for the same grade levels. The teachers who were eventually nominated (Sean and Carl) both taught Grades 6 to 8 and were able to collaborate on the development of real world projects for their middle years classrooms (see Sean and Carl in Chapter 6).

Challenges surfacing from the data. As previously mentioned in the section on challenges related to staffing, the teachers in the very small public elementary schools in the division were some of the hardest hit by challenges surrounding teacher isolation and workload in particular. Due to the very small staffs in these schools, opportunities for collaboration were

minimal. With only three or four teachers in the school, all who taught different grade levels, these teachers did not have many opportunities for meaningful collaboration. In addition, the very small school staffs also resulted in significant workloads as teachers had to prepare materials for typically three or more grades of students. Despite the fact that class sizes were often smaller in these very small schools, the “number of hats to be worn” were often not. School teams still needed coaches, representatives were still needed on school and divisional committees, and community involvement was still expected for teachers in their personal and family lives. As a result, the three or four teachers in these small public elementary schools had many hats to wear, thereby increasing their workloads.

In addition to the amplification of challenges surrounding isolation and workloads, teachers in the very small public schools in the division also cited challenges with regards to accessing substitute teachers and funding through school budgets. Throughout the data in the study, both of these issues surfaced several times. As previously mentioned, teachers in small schools were more likely to cite the availability of substitutes as an issue than those in larger schools, and although the availability of substitutes was only cited as an issue for attending Cohort sessions on two occasions, one of these was in a very small school. Like the issue of accessing substitute teachers, the scale of very small school budgets was also mentioned as an issue, although there were no instances over the two year period of teachers in very small schools being denied access to school PD budgets in relation to the Numeracy Cohort. It is difficult to ascertain from the data the extent to which these two issues were prevalent for teachers in the study. Since there were only two very small school teachers participating in the Numeracy Cohort, and since the Hutterian schools operated differently both in terms of budgets (through the Colony principal structure) and substitutes (through the use of community substitutes and

EAs), it is hard to determine to what extent the experiences of the two very small school teachers are indicative of the challenges of others working in very small schools. This is also partially complicated by the fact that one of the very small school principals was the participating Cohort teacher from his school, allowing him to fund his PD experiences himself, as opposed to asking his principal for school-based funding. What did emerge through the teaching-principal's interviews and participation in both the teacher and principal focus group discussions was that his unique situation allowed him flexibility despite the fact that the scale of his budget was very limiting. His position also allowed him flexibility with regards to timetabling during the second year, and he was able to block off administrative time that minimized his use of substitute teachers when it fell on days on which there were Numeracy Cohort meetings. This might have been the reason that while he mentioned both the availability of substitutes and the scale of his small school budget as limitations, these did not manifest themselves as particular challenges during the Numeracy Cohort initiative.

Mitigating challenges related to very small schools. Although much of the model's ability to mitigate challenges has already been discussed in previous sections, a brief discussion in relation to very small schools is needed. As previously mentioned, teacher workload was not something that could be reduced through the model. In fact, participation in the Numeracy Cohort added one more role for small school participants to take on, rather than mitigating workload as a challenge. As was also previously mentioned, time away from the classroom (or school in the case of the administrator) was a challenge, something that was obviously exacerbated by the Numeracy Cohort. In the interviews conducted with the teachers, however, these challenges, along with challenges surrounding the accessing of substitute teachers and funding through school budgets, seemed to be downplayed. While teachers openly cited these as

challenges to accessing PD generally, they were less likely to cite them as issues with the Numeracy Cohort model. Both of the very small school participants indicated that they valued the access to colleagues with whom they could collaborate, as well as the opportunity to create multi-grade resources that fit their contexts. During the first year of Cohort operations, the two teachers (Sean and Carl), along with two other middle years teachers in the Cohort (Eva and Kevin), were able to collaborate on significant middle years multi-grade projects. Although they were not able to collaborate much the second year due to Carl being reassigned to an early years job description, both teachers continued to collaborate with other teachers in their grade ranges. In this way, the design of the PD model was able to mitigate the challenge of teacher isolation for these, some of the most isolated teachers in the division.

Challenges surrounding accessibility of effective PD. One final contextual difference that surfaced from the data in terms of challenges faced by the division and its teachers in providing and accessing effective PD, was the accessibility of effective PD more generally in the province. The interviews and focus group discussion with teachers contained several references to difficulty both in finding PD that was applicable to the contexts in which the teachers were teaching, and with regards to the quality of PD that was available in the province. In terms of finding PD that was applicable to their teaching contexts, teachers indicated that there was not much available that focused on the multi-grade contexts two thirds of the teachers in the Cohort taught in. Hutterian teachers noted that along with a lack of available PD that focused on multi-grade contexts, they also found a lack of PD on culturally relevant instruction and strategies for their Hutterian students. High school teachers indicated that there was a general lack of PD available for mathematics teachers who taught at the high school level as well.

In addition to a lack of availability of PD relevant to the teaching contexts of Cohort teachers, several teachers discussed the issue of the quality of PD opportunities that were available to teachers. Several teachers noted the decrease in PD offered by the provincial education authority. This was mentioned in particular by one of the veteran high school teachers (Karen) on several occasions. In an interview conducted at the beginning of the process, she noted:

In terms of actual math content, I haven't been impressed since I first entered the teaching profession and they had YAGs. I used to like the YAGs. They talked about the curriculum and what you could expect. Somehow they seemed to know a little more what was going to happen on these exams. They talked about them. They gave us these cool activities sometimes, and they showed us some cool resources we could use. . . I have quite a few other resources on my shelf that came out of those YAGs back in, I guess probably 1999 and 2000.

The YAG (Year at a Glance) sessions Karen was referring to in this quote were sessions that had been offered provincially when the Manitoba mathematics curriculum underwent significant changes. The sessions were led by teachers and personnel from the department of education, and were directly related to instructional strategies and curricular implementation. Although the Manitoba high school curricula underwent another change from 2009-2012, these sessions were not offered in relation to the new curricula, at least not in their previous format. Moreover, support documents were not published in relation to the curricular changes for teachers. The fact that new curricula had been introduced at the high school level in Manitoba in recent years without any curricular support documents and very little PD support seemed to be a particular concern for Karen. Other teachers also indicated that they had noticed a decrease in provincial

PD support as well. This unique contextual situation meant that the job of supporting teachers with regards to mathematics instruction had been significantly offloaded onto school divisions. For small rural divisions that did not have leadership positions such as curriculum consultants to do this work, the onus was left up to divisions to find solutions, or to teachers to find other avenues of PD to pursue.

In addition to the perceived decrease in provincial government PD support, several teachers also noted that there were an increasing number of publisher-sponsored workshops available to teachers in the province. Some Cohort teachers indicated that these workshops were designed to sell books, rather than support teacher learning, and as such they were not as helpful. In one interview, an elementary teacher noted:

I want to go and see either somebody who is in the trenches like us . . . and has found something that works for them and thinks it's a great idea. And you know what? You may think it's great. I may hate it. . . but it's something that works for them and it's very, yeah, I don't need to listen to a publisher . . . who's never been in the classroom for twenty years . . . I don't need that.

Several of the teachers relayed experiences of attending workshops that they thought were centered around instructional strategies or that they thought would be led by teachers, only to find out that the workshops were publisher-sponsored workshops designed to sell books or other instructional materials. Teachers shared that these workshops were not helpful to them, and not what they had expected. The magnitude of this problem becomes obvious when one considers budgetary limitations, particularly in small, rural divisions. If, as the principals indicated in their focus group discussion, there was really only money in school budgets to send each teacher out to one workshop a year, if the workshop was not valuable to the teachers attending, because it

didn't relate to their teaching context, or the publisher sponsoring the workshop was more interested in selling books than the PD itself, the PD opportunity could be a waste of resources. With smaller pools of resources to begin with, rural teachers, schools, and divisions have the potential to be more acutely impacted by such a waste.

Two final issues cited by teachers with regards to the quality of PD available in the province related to the knowledge of the presenters facilitating sessions and the stage of teachers' careers. While new teachers were likely to indicate that any new ideas were helpful to them, veteran teachers felt that it was more and more difficult to find PD that met their needs. Two teachers with several years of experience indicated that they felt that in some cases, they had more experience than people presenting on certain instructional strategies, which made those sessions of little benefit to them. Several of the teachers with more teaching experience indicated while they had been interested in getting materials that they could use the next day in their classrooms earlier in their career, their needs had changed and they were more interested in getting a new idea or path to follow than resources or ready-to-use materials. The variety of experience levels on the Numeracy Cohort illustrated just how different the needs were for teachers at different career stages. In terms of finding PD for the groups, this meant that a variety of strategies were needed to meet the significantly varied needs of Cohort members.

Mitigating the challenges around accessibility of effective PD. In terms of mitigating the challenges surrounding the accessing of effective PD, while the Numeracy Cohort was not able to change what was available elsewhere in the province, it was able to change what was available in the division. Through the initiative, teachers engaged in classroom visits, ideas were brought to the Numeracy Cohort meetings, and MAR projects gave teachers the opportunity to work on areas that interested them or pertained to their own teaching contexts. While multi-

grade and culturally relevant PD opportunities were lacking elsewhere in the province, teachers in the division developed their own multi-grade and culturally relevant resources for their own classrooms. While the extent to which the professional needs of teachers were met through the Numeracy Cohort model is the topic of the second research question, it can be said here that through its design, the Numeracy Cohort model was able to mitigate the challenge of accessing effective PD, both in creating PD that was relevant to the contexts in which teachers worked, and in providing learning opportunities that were responsive to the needs of teachers.

Discussion and implications related to contextual differences. As previously mentioned in Chapter 2, Hardré (2009) suggests that “rural teachers need tools and strategies from professional development that are flexibly adaptive to the rural context, feasible with available resources, and locally meaningful” (p. 4). This notion is at the heart of the final category of challenges faced in rural divisions around the accessing and provision of meaningful teacher PD. The Hutterian and very small schools in the school division were unique contexts that had to be considered in the model design. Teachers in these schools experienced significant geographic and professional isolation, heavy workloads (multi-grade and multi-subject assignments as well as many hats to wear), and in the case of the Hutterian schools, cultural and religious differences that had to be considered. The size of the schools also created significant challenges especially in relation to removing one or more teachers from the school and still having the critical mass necessary for the school (or even in-school PD) to run effectively. One thing that was highlighted in this study was the way in which the school division dealt with the unique contextual differences that were inherent in the division. By recruiting teachers for the Numeracy Cohort from across the geographically diverse division, the most isolated teachers in the very small and Hutterian schools were included in collaborative opportunities they otherwise

would not have had. In addition, they were able to address their own context-specific needs by accessing support through the Cohort and engaging in MAR projects that they could cater to the multi-grade, multi-subject contexts in which they worked. They also had the time and space to investigate community linkages and culturally relevant instructional possibilities that might meet their needs as educators and the unique contextual needs of their students. This way of dealing with contextual differences offers possibilities for other rural divisions facing similar contextual differences. The successes and challenges of the Numeracy Cohort model provide insight into ways rural divisions can provide collaborative opportunities to the most isolated teachers in rural places, and how the unique contextual needs of teachers and students might be situated at the center of PD opportunities.

One of the things that emerged to me as a researcher looking at the data in this study was the extent to which the smallest schools in the division appeared to be microcosms that amplified the challenges in the division with regards to accessing and providing meaningful teacher PD. Challenges such as limited budgets, internal capacity, costs associated with travel to PD, teacher retention, professional isolation, heavy teaching loads, substitute availability and quality, and finding PD applicable to one's context were all challenges that were amplified in the smallest schools in the division. For this reason, it was evident to me as a researcher that the size and scale of both schools and divisions are as fundamentally important to the challenges faced in rural places as considerations such as geographic isolation. As a result, I would suggest that "smallness" and "remoteness" are critically important considerations when generating locally constructed PD models that mitigate the challenges faced within rural contexts.

The fact that the accessibility of effective PD emerged as a contextual difference in this study is a noteworthy point. Aside from the situation in the individual schools and even the rural

school division in this study, the state of education and teacher PD in Manitoba impacted teachers' ability to access meaningful PD in several ways. Teachers noted a lack of available PD in three areas: multi-grade/subject contexts, culturally relevant instruction (especially for Hutterian students), and high school mathematics. They also indicated that PD quality was also an issue in the province, perceiving both a reduction in the quantity and quality of PD being offered by the ministry of education in particular. Teachers noted a lack of PD around new mathematics curricula implementation in the province, as well as discontent around the recent move towards the use of publisher-sponsored workshops by the province. These observations and comments by teachers in the division should contribute to the conversation around the PD needs of rural teachers in the province. They provide information for the ministry of education and for organizations that provide teacher PD at all levels of the education system.

Conclusion

Chapter 5 has presented the study's findings and discussion about the implications of the findings regarding the PD model's ability to mitigate the challenges faced by the rural division and its teachers in providing and accessing meaningful PD. While findings from the study suggest that the locally constructed model was able to mitigate several challenges faced by the rural division and its teachers, the findings also suggested that there were several challenges that could be reduced but not entirely eliminated. In addition, the study's findings suggest that more research is needed in the areas of: provincial educational funding, the use of both general revenues and locally levied property tax in funding education in Manitoba, resource allocation in small rural divisions, challenges related to the use of ICT in teacher PD models, internal capacity within small rural divisions, the plight of rural teacher leaders, the PD needs of rural teachers, and the availability of PD within the province. The next chapter, Chapter 6, focuses on the

effectiveness of the model in terms of supporting teachers' professional growth in the area of mathematics instruction and student numeracy. Through an examination of the experiences of teachers and the perceptions of participants about the model's effectiveness, insight about the extent to which the model was able to support teacher professional growth can be gained.

Chapter 6 - The Model's Effectiveness in Supporting Teacher Professional Growth

The second research question for this study focused on the extent to which the model was effective in terms of supporting teachers' professional growth in the area of mathematics instruction and student numeracy. In order to answer this question, I first examined the data available for each teacher. As well as looking at characteristics of the individual teachers who participated in the Numeracy Cohort initiative, including their background experiences, teaching loads, areas of interest, needs, goals, and views about PD, I also examined evidence available from their MAR forms, reports, and interviews to develop an understanding of the experiences of each teacher over the two-year process. From the data, a description was constructed of each teacher's background, areas of interest (including needs and goals), action research activities, and reflections about the PD model. This chapter begins with shortened versions of the descriptions constructed about each teacher's experience (pseudonyms have been used). In general the descriptions begin with senior years teachers and move down grade levels towards early years teachers, which can be seen by comparing the descriptions of the teachers with *Figure 8* in Chapter 5. In some cases, descriptions of critical friends were combined where I felt that they worked so closely together that their experiences could not be described distinctly in isolation without losing important connections.

Following the individual descriptions of the experiences of the Numeracy Cohort teachers, a discussion draws together common themes and findings about the Cohort teachers' experiences overall, utilizing four out of five of Guskey's (2000) levels of evaluation for professional development. The second half of the chapter considers the perspectives of the superintendent, the principals, and the facilitator (Numeracy Coach) in terms of the model's effectiveness in supporting teachers' professional growth in the area of mathematics instruction

and student numeracy. The chapter ends with a discussion about these perspectives, an examination of Guskey's fifth level of evaluation, and a conclusion.

The Teachers' Experiences with the Model and their Perspectives about its Effectiveness

Karen. Karen had been a high school mathematics teacher for more than a dozen years prior to participating in the Numeracy Cohort initiative. In her first interview, Karen shared that she felt isolated in her position. Even though there were two or three other teachers who taught mathematics in her building, she really had no other teachers who taught the same courses as she did with whom to collaborate. In terms of professional development, Karen indicated that she appreciated hearing knowledgeable speakers present on topics, attending workshops in a divisional team, networking with other teachers at PD events, and hearing about strategies and ideas teachers were using (especially those she could take back to her own classroom and try).

Over the two-year initiative, Karen engaged in four rounds of MAR projects, including: designing a quiz creation assignment for her Precalculus math students, designing and implementing a Grade 9 exam, learning and using a computer graphing program that allowed her to create complicated graphs required for use in her curricula, and development of an Grade 8 assessment tool to help with transition meetings for students moving from elementary school to high school. Through her MAR forms, her oral and written reports about her experiences, and her interviews, Karen described positive results in particular around her implementation of the Grade 8 assessment tool, noting: "the feedback was positive from the teachers. The assessment gave us a discussion point and everyone could tell quite quickly, which students are struggling with the math outcomes." With regards to the computer graphing program, Karen also indicated that she was successful in learning the program and that her resulting knowledge allowed her to create higher quality questions for student notes, assignments, and assessments. In relation to

her quiz creation activity, Karen felt the activity was worthwhile, but noted that: “Students were definitely engaged in the project. However, they didn’t achieve better results than normal, nor did they recognize their own questions.” Similarly, she described varied results in relation to the Grade 9 exam she created and implemented twice, noting that while the exam helped her to see areas students struggled with including test anxiety, study skills and independent learning, and although she felt it helped students make better course choices for Grade 10, the exam did not necessarily have the desired effect of improving student confidence and test writing skills.

Over the two-year initiative, Karen reflected on the PD model and the extent to which it was meeting her needs on many occasions. Interviews, written reflections, oral reports, presentations to the administration council, and focus group discussions all provided opportunities for Karen to think about and express her perceptions of the effectiveness of the model. From all of these sources, several key points can be drawn. The first is that Karen really appreciated both the community afforded to her by the initiative, and her exposure to new ideas and information about teaching strategies, assessment, and conducting action research. Karen felt that it was easy to become stagnant in the division and really felt that the Numeracy Cohort had successfully reduced the isolation she felt both in terms of collaborating with other teachers, and more broadly from new ideas in the field. She noted that even though there were only two high school teachers on the Cohort, she appreciated hearing about what was happening in early and middle years classrooms and did not find the focus on earlier grades a waste of time. On the contrary, Karen felt it was helpful to have so many teachers in the division “plugged in” to some common understandings and strategies about numeracy education. A second overarching point that emerged in Karen’s comments about the PD model is that the Numeracy Cohort had provided her with the time and focus to develop new materials and strategies for her classroom.

She acknowledged that she would not have done these things without the impetus provided by the initiative, and identified the Cohort as the reason she was able to put several things into practice. A final overarching point that emerged through Karen's comments was that her view about what counts as PD had changed as a result of her participation in the Numeracy Cohort. Karen noted on more than one occasion that she previously would not have thought of collaborating on the design of instructional strategies and materials on a topic or creating an assessment tool, implementing it, and reflecting on the results as PD. She noted that she previously felt that PD often entailed a presentation, and that the work of implementing ideas into practice was left up to the regular work of teachers if it happened at all. Her participation in the Cohort had changed her view of PD, allowing her to see designing and implementing new strategies and practices as part of legitimate and effective professional growth. She also noted that she liked the independence and self-direction that such a view of PD afforded her.

Emily. Emily, the other high school teacher on the Numeracy Cohort, returned from a medical leave in time to attend the December 4th meeting in 2013. Prior to her return, her principal had attended Numeracy Cohort sessions on her behalf. Although Emily did not participate in the initial interviews that took place in the fall of 2013, it was evident in later conversations that she was fairly new to the profession, and that she had been assigned several new courses to teach, particularly in her second year of participation in the Numeracy Cohort.

Emily engaged in three distinct cycles of MAR over the two-year initiative, including: the incorporation of "foldables" in her mathematics classes, the inclusion of project-based assessments (e.g. models, video lessons, quiz creation) in some of her mathematics classes the first year, and the inclusion of hands-on project-based learning activities in several of her classes the second year. Emily also collaborated with Karen and me (as Numeracy Coach) to design and

implement a truth tables lesson and assignment for Grade 12 Applied Mathematics during the first year of Cohort operation, although this was not written up as a MAR project. In reflecting on her MAR projects, Emily was cautious in her assessment of the effectiveness of several of the strategies she implemented, noting both positive and negative observations. Of the foldables, she indicated that while some students found organizing features helpful, some students were concerned that their foldable did not look exactly like the teacher's. She also wrote in a reflection about the foldables that "the students found this method of note taking more confusing and it took up a lot of classroom time." Similarly in her observations about the project-based assessments and activities in her other rounds of MAR, she indicated both positive (e.g. engagement, independence, high quality products from some students, and increased awareness on her part of student understanding) and negative aspects (e.g. some poor quality products, and student frustration with less structured tasks) of the strategies. Of the collaboration with Karen and me on a truth tables assignment, Emily cited it as the best part of the year, noting, "It was helpful to talk about what has worked and what hasn't with teachers who have already taught the material." She also indicated that her students were easily able to answer questions about truth tables on their final provincial exam.

At the end of the two-year initiative, Emily indicated that the Numeracy Cohort had given her the opportunity to focus on what she wanted to do and had given her a push to actually make some changes. Moreover, she noted that the most beneficial thing was the MAR projects. One of the downsides to the initiative expressed by Emily was the lack of collaboration at the high school level. The high school teachers didn't teach the same courses at the same time, and other than the truth tables assignment, weren't able to collaborate on their action research

projects. Emily noted that this made the Cohort less helpful for high school teachers, and she wondered if the Cohort was really the best use of her PD time.

Sean. Sean was a teaching principal in his very small school. In addition to being a 0.35 FTE administrator, he was also responsible for teaching middle years half time, and overseeing student services in his building. Sean joined the Numeracy Cohort with approximately twenty years of teaching experience, all of which occurred in small schools (16 to 120 students) in Manitoba and Saskatchewan. At the beginning of the process, Sean's teaching assignment included science, mathematics, and French at the Grade 6 to 8 levels. His class had a total of 18 students: two at the Grade 7 level, and the remainder being split between Grade 6 and 8. Later in the process, he shared that his teaching assignment was subject to frequent change, due to the fact that as a teaching principal, Sean often ended up giving himself classes and courses that were left over once he had organized workload assignments for his teachers.

Sean's critical friend or partner was Carl, a teacher who was also in a very small school somewhat close, geographically, to Sean's school. The two had never met, given that Carl was brand new to the division and profession. Both teachers, however, taught middle years mathematics in their respective schools at the Grade 6 to 8 levels. Sean engaged in four distinct cycles of MAR over the two-year initiative, including: using workstations in his mathematics classes, trying a "flipped classroom" structure in his mathematics classes, and collaborating with Carl, Eva, and Kevin (and later Sierra and John) in two rounds of designing and implementing real world projects (called The Shopping Spree and Vacation Time) at the middle years level. While Sean suggested that he was still finding ways to incorporate workstations effectively in his classroom after his first cycle of MAR, he described his use of a "flipped classroom" and iPad recording software (Educreations) in the following way: "This was highly successful and gave

me great feedback on each student.” Of the experience of designing and implementing real world projects with his colleagues, Sean noted that the collaboration was the most beneficial part of the entire experience.

In reflecting on his experiences with the Numeracy Cohort, Sean noted several things. The first was that the Numeracy Cohort had reaffirmed his beliefs about quality mathematics instruction, and fostered a change in his teaching practice. Sean indicated he had always believed in the use of hands-on learning in the mathematics classroom, but his practice had actually changed to include more hands-on learning as a result of his participation in the Cohort. In addition, he had developed an interest in project-based learning and student engagement. Other ideas like fostering connections between students in different schools in the division had also surfaced for Sean through his involvement, and he was able to develop multi-grade resources in his work with other middle years teachers who worked in similar contexts (see John). Sean noted that he, like many teachers, had a tendency of reverting back to textbook or worksheets when things were busy or time was short. The Numeracy Cohort reminded him that he wanted to include more hands-on learning on a regular basis. In reflecting on the process, Sean wrote the following:

I valued time to collaborate with colleagues. This enabled me to stretch my thinking on several topics. The cohort helped me organize and focus on mini-action plans moving towards reaching my goal. I am not sure if my original goal is still the same or not, but I do know that I am pleased with the progress I have made towards improving classroom student learning. The activities I have tried have definitely been engaging to my students and beneficial to their learning.

In addition to comments made about his teaching practice, Sean also made several insightful comments about the PD initiative. One such comment that Sean made in one of his interviews, was that he didn't like writing up the MAR reports. While he said the forms were not that cumbersome, and likely a necessary part of this type of work, he typically did such things in his head as opposed to writing them down. Finally, Sean made an important point from an administrator's point of view. Since Sean was responsible for planning PD sessions for his teachers as part of his administrative role, he faced a challenge when the Numeracy Cohort sessions took place on in-school PD days. In a few cases, to overcome this challenge, his teachers attended the Numeracy Cohort sessions as participants. He noted that this was helpful to both him as an administrator and to the teachers who attended the sessions.

Carl. Carl was new to the province, division and profession when he joined the Numeracy Cohort in the fall of 2013. His teaching assignment at the beginning of the process was in one of the very small schools in the division, and included a multi-grade (6 and 8) class as well as Grades 3-8 French. Although Carl had had a few months of supply teaching experience in a variety of subjects, he was most comfortable in early years. He admitted on several occasions that he lacked confidence in his instruction, due to being a new teacher and being out of his comfort area of early years. In his second year of participation in the Numeracy Cohort, Carl had a change in his teaching assignment, moving from middle years to early years (K-3). This was an area in which he felt much more comfortable by his own admission.

Over the two-year period, Carl engaged in four distinct cycles of MAR, including: experimenting with new strategies such as math games, rotations, and a carpentry project in his middle years classroom, collaborating with other middle years teachers (Sean, Eva, and Kevin) on the creation and implementation of The Shopping Spree project in the first year of Cohort

operation, collaborating with other early years teachers (Mark, Ellen, and Carol) on implementing workstations in his classroom the second year, and participating with his class and the other early years teachers in a divisional Hundred Day. While Carl indicated several positive results from his MAR projects in terms of student engagement in particular, the collaboration with other experienced teachers who had taught in multi-grade contexts was one of the most beneficial elements of his participation in the Cohort.

In reflecting on his experiences and the extent to which the Cohort had met his professional needs, Carl noted that he had gotten many new ideas for his classroom through the presenters that were brought in, through informal conversations with other Cohort teachers, through the MAR projects, and through workshops and resources that were brought to his attention. To this end, he felt quite strongly that the Numeracy Cohort had met his needs, at one point writing the following:

I find this is very helpful. I enjoy being able to discuss activities and new teaching strategies with the group. I have found great resources and new ways of approaching mathematics. This cohort is very helpful, especially as a new teacher.

A second thing that emerged when looking at the data about Carl's experiences centered on changes in his teaching practice. While it follows that his interest in developing a variety of strategies for mathematics instruction would lead to many changes in his practice over a two-year period, Carl's thinking about changes in his practice appeared to change significantly during his participation. At the end of the first year of Cohort operation, Carl said the following when asked about changes in his teaching practices and structures:

My structure . . . it isn't completely developed, but I have some math games that I've introduced, some activities. I was more of the . . . I wanted authentic learning

in the math, so I've kind of been trying to find activities to tap into some of their interests and that so . . . But I like the rotations, like I started that, like I'll have some on Mathletics, we'll be doing some textbook work, like an authentic assignment, and just keep rotating throughout that.

From this comment, it is evident that Carl had difficulty both focusing on a strategy for use in his classroom, and on describing his choices with regards to the development of learning experiences for students. Elsewhere in the interview, he expressed disappointment that he still used a lot of textbook work, and noted that he still felt "all over the place." At the end of the second year of Numeracy Cohort operation, Carl's description of his own teaching practice and the changes that had been made to it were much more developed and insightful. At one point in his interview at the end of the second year, he said the following:

One thing that I've changed, is kind of focusing on one program to use, rather than twenty, because when I came last year, I wanted to try hands-on learning, I wanted to try centers, I wanted to try this, that. I didn't give it enough time to develop. I find that now, I've kind of settled. I used Mathletics this year. Next year, I want to do the Power of Ten and really focus in on that. . . That's one thing I've noticed this year, and why I've changed stuff, is using Mathletics and using, you know, some of the other work that I found online, I just, the kids are confused because it's not consistent. So I want to have that consistency next year.

It is evident in this comment at the end of the second year that Carl had begun to recognize that incorporating too many strategies made things difficult to understand for students. As a result, he had begun to focus more on depth than breadth in teaching strategies in his practice. In addition,

Carl had also begun to think more deeply about the overall approaches he took as a mathematics teacher. In another comment at the end of the second year, Carl noted the following:

When I first came in, I was focusing more on the strands and just teaching them strand by strand and getting through the curriculum. And now I've kind of, like discussing with other Cohort members, I kind of have a more open approach.

Like, I want to keep all the strands going at the same time, because you shouldn't be teaching number sense and then moving on.

This change in viewing math strands as something that should be taught simultaneously (in a spiral, ongoing way as opposed to in a linear, consecutive way) demonstrates the growth Carl was undergoing as a teacher. This was a marked change from the desire to “accumulate” strategies he had expressed in his first year of participation.

The third thing that emerged from the data surrounding Carl's experiences was the level of support he received from the Numeracy Cohort as a new teacher. On several occasions, a group formed around Carl at face-to-face meetings as he eagerly asked for advice about various things related to his teaching. As he began to work on the collaborative MAR projects with other teachers, he also asked them for support, advice, and resources. In the second year of Numeracy Cohort operation, Carl said the following of his experience:

I felt part of their school kind of . . . I felt like a professional learning community.

I did from the Cohort and I wouldn't probably have experienced that otherwise. . .

I wouldn't have known [Carol] and [Ellen] at all really. Like you would have seen them, “Hey, how's it going,” but I felt comfortable to say, “I need help with this. Can you help me?” Whereas in my school, it's not that no one's willing to help, it's just we're all working at different areas, and different grades. It's hard to

have that professional learning community which I felt the Numeracy Cohort brought to me.

This theme of appreciation for the support and the networking opportunities afforded to him through his participation in the Numeracy Cohort was prevalent in many of Carl's comments. It likely contributed to Carl's assertion that he had become more confident as a teacher in his final interview. Support from Cohort teachers, changes in thinking about his practice, and having some experience at multiple levels likely all contributed to his increased confidence as an educator.

Eva. Eva was in her eleventh year of teaching when she joined the Numeracy Cohort. She had spent her entire career in the school division, teaching primarily the same grade levels and subjects throughout that time. Eva described her teaching load the first year as including both Grade 8 (mathematics, English/language arts, social studies, science, and art) and Grade 7 (mathematics and art). In an interview from the second year, however, she also mentioned teaching Grade 6 mathematics, so it is possible that her teaching load changed slightly over the two-year period. Eva also indicated in her initial interview that her goal was to eventually teach primarily middle years mathematics, as it was her favorite thing to teach.

Over the course of the two-year initiative, Eva participated in three distinct rounds of MAR, including: implementing workstations in her classroom, including a problem solving model (BRAID); and two cycles of designing and implementing real world projects (The Shopping Spree and Vacation Time) with the other middle years teachers (Sean, Carl, and Kevin the first year; Sean, John, and Sierra the second year). Sean and Eva were the two consistent members in this endeavor, and their continuation of the project-based learning projects over two cycles allowed for expanded learning (including the integration of multi-grade outcomes and

improved collection of student data) and the interchanging of members in the collaborative group. While the workstation and problem solving cycle of MAR did not result in any lasting change in practice for Eva, she was heavily invested in both cycles of project-based learning. Individually, in reflecting on the project-based learning, Eva noted that students were able to demonstrate artistic ability, that the project was nice for students who might not do as well on paper-and-pencil tests, that she was able to identify trouble spots for students (for example a student who didn't know what taxes were), that she felt students had a stronger understanding of percentage concepts and would retain it longer, and that she noticed students had more ownership over their work when they thought they would have to share it with students in another school.

In reflecting on the model, her goals, and the extent to which her professional needs had been met, Eva indicated several important things. The first was that her practice had changed significantly as she included projects in her mathematics instruction. Given that Eva's initial goals included allowing for student choice, engaging students in hands-on activities, and finding alternative forms of assessment, this change allowed her to meet several of her goals. One of the things Eva seemed most proud of was what she called an oral defense. This was an interview she held with students at the end of their projects in which they had to demonstrate their learning one-on-one with her through conversation and an on-the-spot task. According to Eva, these oral defenses provided students with strong oral skills (but maybe weaker test-taking skills) a credible and authentic way to demonstrate their knowledge.

Another important point that Eva raised about the PD model had to do with her own engagement in trying out and reflecting on new strategies. Eva noted that she had "developed relationships with the people that are teaching the same thing" in the division, and valued both

the sharing of ideas and the positive, safe environment (free of judgment) that the Cohort provided. She noted that the structure of the Numeracy Cohort “lit a fire under her butt,” causing her to actually *do* something, rather than just talking about it, and that the interviews helped her to reflect on the process. Interestingly, Eva said that the MAR forms were limiting, although she thought the accountability of the MAR process and collaboration were important. The part she found most difficult about the forms was the last box, which was the box that required her to reflect on the action and what she had observed. From her comments, it appeared to be the style of the form that Eva found limiting, as she noted that she didn’t particularly like blackline masters. It may have also been that she preferred to reflect orally on her experiences, as opposed to in writing.

The final important point that emerged in looking at Eva’s interviews and reflections culminated at the end of the process. In her final interview (June, 2015), Eva indicated that she planned to move on from the Numeracy Cohort and focus on another area of interest. Her reason for doing so had to do with making room for new people to join the Cohort. Eva said the following when asked about whether she wanted to see the Numeracy Cohort continue:

Yes, I definitely want to see it carry on. I like the idea of recycling some people here and there. Like I mean, I think I’ve got the gist of it and I have other goals to proceed with. . . I think the most beneficial thing of it is it’s motivational, and my brain has only got so much in it, but when you put five of them together, it’s amazing. And so when they work together, then good things happen, right? . . . I would just like to see it filter down – not down – spread out more.

Eva brought up in the same conversation how important she thought the PD day the Numeracy Cohort teachers hosted in April for other teachers in the division was. On this day, the

Numeracy Cohort teachers ran sessions about the action research they had been engaged in over the two-year period. They demonstrated strategies and shared resources with teachers, reflecting on their experiences and sharing their thoughts about student learning. Eva's decision to make room for another person to join the Cohort raises some questions. Even though she noted that the initiative was one of the better things that had happened in terms of PD in the twelve years she had been in the division, she still indicated that she would step away. While it may be that this was an act of selflessness, it raises a question about whether or not the Cohort was really meeting her needs as a professional. It also raises a question about whether Eva felt the model had exhausted its usefulness for her. Finally, it raises a question about whether the amount of time and work required to engage in such work was ultimately too much for some teachers at some points in time.

Kevin and Sierra. Kevin joined the Numeracy Cohort as a specialized mathematics teacher, teaching primarily middle years mathematics; however, Kevin only attended three of the nine meetings during the first year of the Cohort's operation before leaving the Numeracy Cohort due to a change in his job description. There were a variety of reasons given for absences from Cohort meetings on Kevin's part. These included a death in his family, illness, having to take students on a field trip, having to be an acting administrator, and attending in-school PD sessions in his own school. While the number of absences might suggest a lack of commitment to the initiative, it was impossible to identify any motive behind the absences other than the reasons given by Kevin for each absence. While participating in the three sessions that he did attend, Kevin was instrumental in the design and implementation of The Shopping Spree project that the middle years teachers engaged in.

When Kevin changed job descriptions in his school, a new teacher, Sierra, was hired to teach Grade 7 and 8 mathematics. While she indicated that she was “voluntold” to be on the Numeracy Cohort (almost as though it was a condition of her taking the position), she said that she was glad she had been pushed to be a part of the initiative. She admitted that being a teacher who had never taught mathematics at Grade 7 and 8 before, she probably wouldn’t have chosen to participate in the Numeracy Cohort on her own. She found the interaction with other teachers very helpful, and was glad she had taken part.

Sierra picked up where Kevin left off, working with the other middle years teachers on project-based learning at the middle years level. She participated in both revamping The Shopping Spree project (to include multi-grade outcomes and the collection of more student data), and in the designing and implementation of a second project called Vacation Time. In reflecting on improvements in student learning in her concluding interview, Sierra noted several things. She indicated that she had changed from having students complete The Shopping Spree in groups, to having individuals complete Vacation Time. By doing so, this addressed the issue of only some students doing the work or demonstrating understanding of concepts. Sierra was candid in reflecting on the project-based learning she had engaged in with her students as is evident in her comments below.

I think from our projects, the students definitely say that they were more engaged in doing that, rather than just a regular lesson in class, but, I think this is still just a trial run for me, I’m not sure if it was 100% more beneficial doing this project-based learning as opposed to regular classroom learning. I don’t know. I’m not convinced yet. . . . [There were] things I would have done differently, so maybe that would change whether or not . . . it would be more beneficial . . . Truthfully I

probably wouldn't have done this last one unless it was part of the Cohort, because I wasn't really convinced . . . The one thing I did like about it though is that we decided as a group that we were going to have a three part assessment where you'd have the oral defense, and then you'd have the written part, and then you'd have the project-based. And so we kind of decided as a mini-cohort that that's what the plan was. And that I found was very beneficial. My oral defense, yeah, I'm glad-, I will continue to do that for sure.

Sierra was more critical of the project-based learning the middle years teachers had engaged in, and somewhat more skeptical about the amount of time such strategies take in the classroom. She indicated at a face-to-face meeting that the projects should cover more than outcomes related to percentages, and pushed the group to really consider the question "How do you know that you are actually increasing student engagement?" In addition to contributing to decision-making about her own practice, this more critical point of view led to a healthy consideration of the benefits of the strategy and more focus on student learning for the entire middle years group.

Because Sierra joined the Numeracy Cohort in the second year, she didn't really have a chance to develop her own goals from the beginning. She easily assimilated into the middle years project-based learning group, and contributed to their collective thinking around the strategy throughout the second year, but it is difficult to tell what her goals might have been, had she not walked into something that was already in progress. At her first face-to-face meeting in September of the second year, Sierra did indicate that being new to Grade 7 and 8 mathematics and having both grades in the same room created a need for her in terms of teaching in a new, multi-grade setting. She said she was interested in seeing how other people taught multiple grades in the same room. As a result of this comment, provisions were made for Sierra to visit

Kelly and Janice in their school to witness instruction in a split classroom. In her final interview (June, 2015), although Sierra didn't speak specifically about this experience, she said the following about her reason for thinking the initiative should continue:

I think it's a very beneficial program and we have a really good setup of what it is right now. As a newer teacher (not really that new anymore, but still new in those subjects), I don't think I would have thought through it on my own time.

Despite the fact that she had been "voluntold" to be part of the initiative initially, Sierra admitted that if it had been left up to her to choose, she might not have chosen to do it. She said, "I wouldn't have known the importance of it if I was just able to choose on my own," indicating that she valued the process and the experience she engaged in over the year she had been involved in the Numeracy Cohort.

John. John was one of the two Hutterian teachers who participated in the Numeracy Cohort initiative. John taught all subjects in a K-8 school. He had eleven students (three in Kindergarten, two in Grade 6, and one in most other grades other than Grades 2 and 7). When he joined the Numeracy Cohort, it was John's second year in the division, although he had taught for six years prior to that at another colony school under much the same circumstances. At the beginning of the process, John noted that he felt isolated, and that there weren't many opportunities for collaboration with other teachers in the division.

Over the two-year initiative, John participated in three distinct rounds of MAR, including: collaborating with Mark (another Hutterian teacher) to design activities related to patterns and relations at the Kindergarten level (including songs, crafts, and weaving); working along side Mark to create culturally relevant, multi-grade, project-based learning activities for his Hutterian students (John created a Chicken Barn project focused on mathematics outcomes); and

collaborating with the other middle years teachers that designed and implemented The Shopping Spree and Vacation Time in his second year on the Cohort. John noted some positive student learning outcomes related to his first two MAR projects (such as Kindergarten students being able to identify patterns on butterflies), but it was the collaborative projects with other middle years teachers that provoked the most excitement about student learning for John. On his MAR form related to the middle years projects, John noted that in addition to being more engaged in math class, students “were very eager to get working on their projects and were especially eager to complete the model part of the project.” Moreover, when reflecting on the project, overall, he made the following comment:

Once student[s] got the whole idea of learning math in this new format, their attitudes were very positive. My weakest student was actually shining in Math Class for the first time. He caught on exceptionally well and had good result[s] at the end of the project. He was very proud of his work and it was the go to project to share with his parents during Student-Led Conferences. Parents were amazed about his change of attitude towards Math.

John mentioned the same student in his interview at the end of the second year as well, noting that his mother had said how excited her son was about his math projects. According to John, the projects had made a huge difference for the student, something that had been the biggest highlight in John’s Cohort experience.

When asked to reflect on the Numeracy Cohort Model and the extent to which it met his needs, John made several insightful comments. The first was related to how it had changed his attitudes and beliefs about teaching mathematics:

I would say mine have because up till now, I was doing the old school. Okay, pencil-paper tasks and tests at the end. Taking that step into the math projects, I was actually a little scared about it, because I wasn't sure what to expect. Like what would the parents' feedback be and that? What would the students' feedback be? And then I was amazed with the outcomes, actually, just because of the engagement and parents being okay with that way of teaching math. Because some still want the structured math lessons that they had, especially in a Hutterite community.

John described this change in his practice as “stepping outside his comfort zone,” and as is evident in his comment above, he felt the results of this change were positive.

Another important comment that John made in his final interview concerned the reduction of isolation and increased collaboration that occurred as a result of the Numeracy Cohort. John said the following:

I think being part of the Cohort has lifted the gates of that isolation that we had. Like we've now had a chance to discuss with other teachers, and being able to collaborate with them. And another thing is that the group that I was working with was really good at doing the multi-grade. We set up those projects for Grade 7, for Grade 6, for Grade 5, and even below if we need it.

As one of the most isolated teachers in the division, interaction with other teachers was important and beneficial for John. He noted that in addition to being able to collaborate with other multi-grade middle years teachers, reflecting on the process and hearing how things worked for other teachers were really valuable for him. The collaboration, according to John, met his needs much better the second year, as he engaged in actually getting together and working with other teachers

to create projects and to modify them into something that could be used in their multi-grade contexts. John indicated that the collaboration generated through the Numeracy Cohort was “a door that was opened that wasn’t there before,” something he clearly valued.

Mark. Mark, the other Hutterian teacher involved with the Numeracy Cohort, was primarily a Kindergarten teacher. In his school, there were only four Kindergarten students, despite the fact that there were seventeen children aged four and under in the community. In his initial interview (Fall, 2013), Mark shared that his job description was changing. Although he had twelve years of teaching experience (all within his community), Kindergarten was new to Mark. With seventeen young children that would be moving up into the school system, he knew that his job would require him to become a multi-grade primary teacher over the next few years, beginning with the four Kindergarten students he had at the beginning of the Numeracy Cohort initiative. Despite the fact that Kindergarten in the school division was only provided for half-days, Mark kept and taught his students most of the day. He also volunteered his time in the high school to help students working on the ITV system (see Chapter 5). His unique context and connection with his community was evident as he described his full time contribution to the education of the colony’s children.

Over the two-year initiative, Mark engaged in four distinct rounds of MAR, including: collaborating with John to design activities related to patterns and relations at the Kindergarten level (including songs, crafts, and weaving); working along side John to create culturally relevant, project-based learning activities for his Hutterian students (Mark used the maple syrup production he was involved with on the colony to approach math outcomes with his Kindergarten students); collaborating with other early years teachers (Mark, Ellen, and Carol) on implementing workstations in his classroom; and participating with his class and the other early

years teachers in a divisional Hundred Day. As a result of his MAR projects, Mark indicated that his Kindergarten students both were able to identify patterns in butterflies and buildings (as a result of the patterns activities), and that that they enjoyed learning about mathematics and science in an outdoor environment (during the maple syrup activities).

In reflecting on his experiences with the Numeracy Cohort, Mark made several observations. In the first year, in a written reflection, Mark wrote: “The collaboration of ideas with Cohort team members is very valuable. Especially from a small school setting with not a whole lot of interaction with other teachers.” The isolation that he felt due to his context was something that seemed to be addressed to some extent by the Cohort. In particular, Mark noted on several occasions that he appreciated the new ideas and strategies that were shared at Cohort meetings by presenters and his peers. As a new Kindergarten teacher, Mark had a high need for new and varied instructional strategies that were appropriate for early years students. While he was able to develop a few new strategies (patterns and relations) in his first cycle of action research with his critical friend John, it was in his second year (and third round of action research) with Ellen, Carol, and Carl, that Mark was able to develop multiple strategies and resources for use in his classroom.

Another important insight made by Mark on a couple of occasions had to do with his ability to work collaboratively with his critical partner. Despite having similar contexts (Hutterian schools), John and Mark had very different grade levels for which they were responsible (K vs. K-8). Mark noted the following in a written reflection:

Given the situation of teaching kindergarten math and collaborating with [a] critical partner who has [a] multigrade situation didn't work very well. Either

[my] critical friend had to lower his focus to meet kindergarten needs or I worked with [a] lesson not applicable to kindergarten.

Despite a couple of comments like this, Mark also noted that one of the best parts of the Numeracy Cohort was collaborating with his critical friend, particularly in relation to the culturally relevant activities. These conflicting statements provide evidence of the complexity of collaborative partnerships in PD models, particularly in those that work across many unique contexts. It was evident in Mark's comments that both things were true; sometimes the collaboration was forced and not quite authentic, and other times it was effective and inspiring.

Another interesting point raised by Mark's comments and reflections was that he was able to compare his own experiences with students with those of other teachers. In the beginning, Mark identified one of his interest areas to including looking into how his students' literacy and numeracy skills compared with other students in the division. By collaborating with other teachers in the division, he was able to hear anecdotal comments about struggles other students had that were similar to the struggles he noticed in his own students. Mark noted that this helped him understand common issues for students at that age, and set his mind at ease somewhat about his students' progress.

Overall, Mark noted that the Numeracy Cohort initiative allowed him to go "above and beyond" his goals. In his final interview, Mark said the following:

My math program is much more structured, especially with the centres and mental math skills from the students. Number sense is improving, and this is what my focus was – to get students to have a good number sense. And it's not every student, too. Like, there's still students that are struggling with that and just,

naturally don't have it, but I think they're a lot better off now because of some of the strategies and activities that we learned through the Cohort.

As well as learning about and implementing many new strategies in his classroom, Mark developed the beginning of a mental math program, implemented one culturally-relevant, cross-curricular activity, and got a sense of how his students were measuring up to other students in the division. He noticed significant enthusiasm on the part of his students, and noted that parents in the community had also said that the strategies he was using with students were helping them make sense of addition. It is interesting to note that despite all of the positive comments about the Numeracy Cohort made by Mark, at the end of the second year in his interview, Mark indicated that he would likely not continue with the Numeracy Cohort. He felt that he was fairly stable with his math instruction and wanted to focus more on other areas such as ELA. While continuing to say that he wouldn't change anything about the way the Cohort operated, and that it was a "powerful group," Mark planned on exiting nonetheless.

Ellen and Carol. Ellen had been a teacher since 1976 when she joined the Numeracy Cohort, except for some time that she was off to raise her family. She had started her career in Grade 2, but had taught every grade except Kindergarten in her career. While she had been responsible for all subjects at times (in some grades), there were several years that Ellen had been primarily a mathematics and ELA teacher. Although Ellen had been at the Grade 5 level for a few years, she made the move to Grade 2 in 2012-2013 in order to finish off her career where she had started it. As such, she was starting her second year back in Grade 2 when she was interviewed in the fall of 2013. At the beginning of the process, Ellen's critical friend was Eva, a middle years teacher in her school. While the two teachers had worked together for a decade,

their teaching assignments were vastly different (Grade 2 versus Grade 7/8). The result of this was that there were limited opportunities for collaboration between the two.

In her first year of participation in the Numeracy Cohort, Ellen engaged in two distinct cycles of action research. The first was focused on integrating instruction of problem solving methods in her classroom to improve students' use of specific strategies. Her second cycle of MAR was focused on implementing a workstation approach to math by using a five-station model that focused on the acronym LEARN. In reflecting on the effectiveness of these strategies on student learning outcomes, Ellen indicated that she felt 85-90% of her students were able to solve simple problems involving numbers to 20, and that even though it took some time to get students to understand how to engage with workstations, she did get them up and running well in her classroom context.

At the end of the first year of Numeracy Cohort operation, Ellen was interviewed about her participation in the initiative. During this interview, Ellen shared that having a critical partner (Eva) that was a middle years teacher was not ideal. She noted that while there were other teachers who were working on something similar (Kelly, Janice, and Amy), they already had prior connections and were already collaborating on what they were doing, making it difficult for her to participate. She felt that if she had an early years colleague from her own school, she would be able to engage in much more collaboration and sharing, and even went so far as to name a colleague, Carol, who taught Grade 1 in her school (Carol had taught for many years and had also previously been a school administrator in one of the very small schools in the division). As a result of this interview, Carol was invited to join the Numeracy Cohort in the second year of operation as Ellen's critical friend (Eva also remained with the Cohort).

During the second year of Numeracy Cohort operation, Ellen and Carol engaged in a MAR cycle focused on implementing workstations in their classroom. Together (and with Mark and Carl), they attended a BER workshop on workstations with Dr. Nikki Newton, as well as getting together to collaboratively create workstations for use in their classrooms. They also planned a divisional Hundred Day in which students engaged in large-scale workstation activities with students from other schools in the division. Ellen and Carol noted several improvements in student learning outcomes that resulted from their work, including the following summary that was recorded on the collaborative MAR form (filled in by all four teachers involved):

- 1) more student engagement – asking for groups
- 2) more confidence with math
- 3) more participating (safe learning environment)
- 4) less “down” time – excited to move on to next station
- 5) improvements in mental math (confidence & competence)
- 6) better at following sequential learning recommendations (tiered math?)

They also noted that the workstations they implemented in their classrooms helped them to better assess student understanding, differentiate instruction based on student needs, and use consistent vocabulary in their classrooms.

In reflecting on their Numeracy Cohort experience, both Ellen and Carol indicated that the PD model had met their needs in several ways. Both teachers felt that without the time provided by the Cohort to attend external PD and get together to collaborate on making strategy tubs for their students to use, none of it would have happened. Carol described this quite clearly in the teacher focus group discussion:

Time. Um, getting the time to sit . . . and work, not necessarily have things thrown at you. . . We've had people come in and speak to us, but it's time to take what you've learned and implement it. Find ways to actually implement it with another person in the same area rather than no time after your PD . . . So it's, I think time

is a huge one that you've got time not just to sit and listen to someone and learn that way, but to do things. It's huge for me.

In addition to the time provided through the Numeracy Cohort, Ellen and Carol also indicated that collaborating with other people in the division with similar teaching assignments and goals was critical to their success. It was this collaboration that had provided so many resources and the opportunity to plan things like the Hundred Day and the divisional PD day where Cohort teachers shared their strategies with other teachers in the division. They noted that collaborating with Carl and Mark, for example, had also allowed them to think through how their centers could be used in multi-grade settings, and how they could differentiate their instruction and resources to meet the needs of students at a variety of levels. On several occasions, Ellen and Carol both mentioned the importance of collaboration in meeting their needs and helping them grow as professionals.

Kelly and Janice. Kelly and Janice were two critical friends that both taught Grade 3-4 (all subjects except physical education and music) in the same school across the hall from each other. Prior to joining the Numeracy Cohort, they already shared resources, and were often in each other's classrooms throughout the day. Kelly and Janice both began teaching in 2001, twelve years prior to Numeracy Cohort start-up. Both teachers had had other teaching assignments in other communities prior to coming to the school they were in. Despite teaching the same grade level and being at the same school for eight years, the two teachers had only recently begun collaborating (the past year and a bit), due in large part to several maternity leaves on both of their parts that saw them alternating between teaching and being on leave at different times. That being said, it was evident at the beginning of the process that Kelly and Janice worked extremely well together, and shared similar beliefs about teaching and learning.

Kelly and Janice completed four distinct cycles of MAR projects (all together), including: implementing math rotations in their classrooms, designing and implementing strategies for helping struggling students in their classes, mapping out and designing a learning progression from Grades 1/2 to Grades 3/4 in their school, and implementing Math Recovery strategies in their classrooms and school. Despite sharing many positive outcomes (such as increased student engagement when using rotations, being better able to tailor instruction to student needs through the use of rotations, improvement with struggling students, and more effective strategies related to the timing of the introduction of multiplication), Kelly and Janice experienced difficulties both in accessing funding to attend a Math Recovery workshop, and in trying to get release time to properly implement Math Recovery in their school. While I was able to negotiate funding for the workshop with other divisional players (as Numeracy Coach), budgetary and financial constraints made it impossible for them to access release time to work with struggling students in small group settings.

When asked about the Numeracy Cohort model and the extent to which it met their professional needs, Kelly and Janice indicated that it was beneficial to work with someone, observe them in the classroom to see what was going well or not going well for them, and to have the release time to collaborate. Janice indicated that while she didn't particularly like the MAR forms, she understood that they had a purpose in keeping people on task and moving forward with their plans. She noted that a person could spend a lot of time "getting to" their goals, but having deadlines and timelines helped move things forward. Similarly, Kelly noted that accountability was important in the PD structure. When asked about the strengths of the PD model, Kelly also noted the following in the focus group discussion at the end of the second year: "I think for our Math Recovery program it was time. It was support from you. You were

our ‘ra-ra’ person and that really helped us. Otherwise I don't think it would have happened at all.” It is evident in this comment that Kelly and Janice appreciated having an advocate to deal with some of the roadblocks they faced with regards to funding in particular. Despite their disappointment with still not having time to work one-on-one with struggling students in their schedule, they appreciated the visitations, workshops, release time, and presentations that had been afforded them.

Amy. Amy was in her sixth year of teaching, all in the same division, when she joined the Numeracy Cohort. She taught one year on a Hutterian colony (Grade 2-8) when she began teaching, and had taught Grades 4, 5, 7/8, and 1, prior to her 2013-2014 split grade assignment in Grade 2/3. Amy noted that she had never had the same job description two years in a row, making for a demanding workload. She knew Kelly and Janice personally and professionally, and shared resources with them as well as having conversations on a regular basis. The fact that she already knew Kelly and Janice, and that her critical friend (Kevin) was a middle years teacher, made her decision to collaborate with Kelly and Janice on her MAR projects easy.

Amy’s MAR projects mirrored those of Kelly and Janice, due to their willingness to collaborate with each other, and included: implementing math rotations (she used the acronym BUILD) and implementing Math Recovery strategies with students. Amy engaged in two classroom visitations with Kelly and Janice in which the trio observed both rotations and Math Recovery being used in small group rotations in two different classrooms (in other school divisions). Whereas Kelly and Janice did not manage to secure release time to work with small groups of students in their schedules, Amy had three 55-minute periods per cycle devoted to running Math Recovery with individuals or pairs of students. In reflecting on her MAR experiences, Amy noted the following:

My students are really enjoying the approach to math and I am finding that the small group instruction is especially beneficial for my struggling students as well as those who need to be challenged. My students love "BUILD" and miss it on the days we don't get to it!!!

Similarly, she noted that the students with whom she had worked using Math Recovery strategies “made huge gains.”

When asked about the parts of the PD model that were most beneficial in her final interview, Amy indicated that the MAR was the most beneficial because it kept her focused and there was a timeline for which things needed to be finished. She also felt that the classroom visits were “huge” for her. Another thing that Amy had noted was that she didn’t feel as if money was as big of an issue for her as it was when she started. At the beginning of the process, Amy had noted that she felt like money was an issue. It had been made clear to her that the Math Recovery workshop, in particular, had resulted in a significant amount of the school’s PD budget being spent right at the beginning of the year. Amy joked in her initial interview that she had spent her own PD budget and the budgets of her critical partner and another teacher already. At the end of the first year of Cohort operation, Amy remarked that she felt her administrator had become much more supportive of the work the Numeracy Cohort was doing, especially after the presentations made to the administration council in May, 2014. By the end of the second year, she openly stated that she didn’t feel money was as big of an issue. While the reasons for the change in her perception weren’t articulated, one could surmise that the availability of release time for classroom visits and collaboration at least partly played a role.

Discussion about the teachers' experiences and perspectives

According to Guskey (2000), effective evaluation of PD initiatives involves five levels: participants' reactions, participants' learning, organization support and change, participants' use of new knowledge and skills, and student learning outcomes (pp. 79-81). In the experiences and perceptions of teachers that have been related at the beginning of this chapter, four of the five levels of evaluation can be seen. Participant reactions in terms of their perceptions about the model's ability to meet them are evident through the individual stories of teachers. Evidence of participants' learning is also evident through the explanations of learning and changes in beliefs and attitudes identified by Cohort teachers. Participants' use of new knowledge and skills, and improvements in student learning outcomes, are also evident through the descriptions of the MAR projects in which Numeracy Cohort teachers engaged. In order to draw together the experiences and perceptions expressed by teachers, and in order to draw conclusions about the effectiveness of the locally constructed PD model in terms of supporting teachers' professional growth in the area of mathematics instruction and student numeracy, four of Guskey's levels of evaluation will be considered under the following headings: teacher perceptions of effectiveness; teacher learning; changes in teaching practice; and improvements in student learning outcomes. Guskey's third level of evaluation, organization support and change, will be considered at the end of this chapter (following the descriptions of the superintendent's, the principals', and the facilitator's perspectives about the model's effectiveness).

Teacher perceptions of effectiveness. Despite extreme diversity in the teaching assignments and the contexts Numeracy Cohort teachers worked within, and despite the fact that the teachers in the study identified largely unique needs and goals when they were recruited to participate in the Numeracy Cohort initiative, there was surprising coherence in what teachers

said they valued about the model. Five broad categories of effectiveness can be constructed from the feedback provided by Numeracy Cohort teachers: community/collaboration, content, time and resources, autonomy, and focus/accountability. Through the descriptions of the teachers' experiences offered in this chapter, and teacher feedback provided during interviews, discussions, and on written reflections, these broad categories recurrently emerged as valuable elements in terms of supporting professional growth in the area of mathematics instruction and student numeracy.

One of the most valued out of all of the elements of the Numeracy Cohort model was the opportunity for collaboration, particularly with teachers who taught the same subjects/grades and had similar goals. Nearly all of the Cohort teachers indicated an appreciation for the Cohort community and collaborative opportunities it provided at some point in time over the two-year process. Linked with opportunities for collaboration was appreciation of: networking and sharing opportunities (see Carl and Eva); a safe, trusting, environment in which to learn (see Eva); reduced teacher isolation (see Karen and John); and the development of common understandings amongst Numeracy Cohort teachers (see Karen). The evidence provided in the preceding section about the experiences and perceptions of teachers supports the literature on effective PD that suggests that "professional development experiences are particularly effective when situated in a collegial learning environment, where teachers work collaboratively to inquire and reflect on their teaching" (Whitcomb et al., 2009, p. 210). It also strengthens literature in the field that supports networking (Darling-Hammond & McLaughlin, 2011); the establishment of a respectful, safe, trusting environment for teacher PD (Darling-Hammond & McLaughlin, 2011; Learning Forward, 2011; Timperley, 2008; Whitcomb et al., 2009); the importance of reducing

teacher isolation (Eaker et al., 2002; Darling-Hammond & McLaughlin, 2011); and the co-construction of knowledge (Learning Forward, 2011).

Content was another area of effectiveness identified by teachers. Teachers appreciated exposure to new ideas through facilitation of sessions, access to external workshops, presenters brought into the division, classroom visits, and sharing amongst their peers. “Worthwhile knowledge” (Timperley, 2008) has been described by many as an important consideration in the development of effective teacher PD. This view is supported by the various comments of teachers in the study. While the specific content mentioned by teachers varied (e.g. rotations, workstations, mental math strategies, problem solving strategies, Guided Math, Math Recovery, analyzing Programme for International Student Assessment [PISA] and Pan-Canadian Assessment Program [PCAP] results), it was evident that access to new ideas in the field of mathematics instruction and student numeracy were an important part of the learning that occurred.

Time and resources were identified on numerous occasions by many of the Numeracy Cohort teachers as particularly effective aspects of the model. Teachers appreciated having time to think and plan alone, to collaborate with critical friends or in small groups, and to create resources or develop strategies for their classrooms. They also appreciated the resources to which they had access through the initiative for purchasing classroom resources, or being released from their teaching duties. This finding supports literature in the field that suggests that time and resources are critical aspects of effective PD models (Bredeson, 2002; Goos et al., 2011; Guskey, 2003; Learning Forward, 2011; Timperley, 2008).

Several teachers indicated that autonomy to focus on areas of their own choosing was an appreciated element of the PD model. By allowing teachers to focus on areas of their own

interest, teachers felt the PD was applicable to their contexts and their work. In this way, the PD in which teachers engaged was aligned with their professional goals, something of critical importance for effective teacher PD to occur (Darling-Hammond & McLaughlin, 2011; Higgins & Parsons, 2009; Quick et al., 2009).

Focus and accountability were also identified by several teachers as strengths of the PD model (see Karen, Sean, Eva, Sierra, Janice and Kelly). Teachers felt that they were accountable to the group to follow through on their MAR projects, having to report on their work periodically at Numeracy Cohort meetings. Some teachers indicated that they wouldn't likely have maintained focus on their goals if it weren't for the ongoing nature of the initiative and the cycles of MAR that occurred. Keeping focused is an important part of professional learning communities and improvement initiatives (Eaker et al., 2002). Through the ongoing nature of the Numeracy Cohort model, teachers maintained focus on the improvements they wanted to achieve, and accountable to their peers to remain engaged in continuous professional growth.

In addition to the five areas of effectiveness identified by teachers, there were also two less effective areas commonly expressed by teachers. These were the MAR projects (more specifically the process or forms) and issue of problems with the viability of collaborative partners. Both of these areas were reported with conflicting comments from teachers. As was evident in the experiences of teachers related at the beginning of the chapter, some teachers indicated that they found the MAR projects to be one of the less effective elements of the model. None of the comments appeared to be related to the actual work done by teachers as part of the MAR projects such as the instructional strategies or assessments developed. Rather, the comments appeared to be more related to the forms and process of the action research itself. A few teachers indicated that they didn't appreciate engaging in the reflection part of the forms,

and preferred to do this mentally or orally, as opposed to writing on a form (see Eva and Sean). While several teachers also indicated that they understood that there had to be some process or way to document the cycles of MAR projects, they found filling in the forms somewhat tedious, and preferred not to post the form.

The second less effective area identified by a few teachers had to do with the viability of critical friends or collaborative partners. While some teachers indicated that collaboration with colleagues was one of the most effective parts of the model, several problems with the appropriateness of critical friends pairings were recorded. These problems largely centered around critical friends who had vastly different grade levels for which they were responsible, and the high school teachers' issues with timetabling (not teaching the same subjects at the same time). Although this concern has already been described in Chapter 5, the identification of it as a problem for individual teachers bears mention, and is something from which the school division can learn in the future.

Teacher learning. During the interviews conducted at the end of each year, teachers were asked what they felt they had learned through their participation in the Numeracy Cohort. While the responses to this question generally focused on the content of sessions/workshops and putting such ideas into practice (e.g. rotations, workstations, mental math strategies, problem solving strategies, Guided Math, Math Recovery, PISA/PCAP results), teachers also mentioned a few other areas of growth such as learning who other people in the division were, how to create culturally relevant or multi-grade projects for their classrooms, how to make math more fun for students, what good collaboration could be for themselves and for their students, the value of MAR projects as a professional learning tool, and even things that weren't working well in their classrooms. The learning described by Numeracy Cohort teachers highlights the importance of

including both content knowledge and pedagogical knowledge in teacher PD (Hunzicker, 2010a; Mundry, 2005; Porter et al., 2003; Quick et al., 2009; Timperley, 2008). Teachers identified learning not only about particular areas of math curricula, but also about strategies for engaging students with mathematical ideas. As a result, it was evident through their responses that both the content of the math curricula with which they worked and strategies for engaging students with mathematical concepts were of critical importance. Some of the other areas of learning identified (e.g. learning who other teachers were in the division, what good collaboration could be, and the value of MAR projects as a learning tool) indicate that besides content and pedagogical knowledge, teachers also learned about professional learning, PD models and structures, and their own preferences as learners.

According to Guskey (2000), an important aspect of evaluating the effectiveness of PD is through the measurement of affective goals, or changes in the beliefs and attitudes of participants. As well as being asked at the end of each year what they felt they had learned through their participation in the Numeracy Cohort, the teachers involved in the initiative were also asked if they felt their attitudes and beliefs about teaching mathematics had changed as a result of their participation. In response to this question, some teachers indicated that they couldn't really identify any changes in their beliefs and attitudes. A few also indicated that participation in the Numeracy Cohort had reaffirmed what they already believed about effective mathematics instruction. For example, Emily felt that she already had believed that hands-on, project-based learning was an effective strategy. While her practices had changed to include more of these opportunities through Cohort participation, her beliefs about it pre-existed the Numeracy Cohort initiative.

As was apparent in the teacher experiences shared at the beginning of this chapter, strong evidence of the effectiveness of the PD model existed in the stories of six teachers who identified specific changes in their beliefs and attitudes about mathematics teaching. Karen identified that her view of what counts as PD as a mathematics teacher had changed over the two-year process. Whereas she previously felt that the creation of quality assessment techniques was something that had to be done on her own time as an educator, she had learned that tasks such as the development, implementation, and analysis of such tools were, in fact, valid and helpful PD for her as a professional. Carl also indicated two very specific changes to his beliefs and attitudes in the interviews that were conducted with him through his participation in the Cohort. The first was that while he was interested in trying out any new strategies in his classroom at the beginning of the process, he had changed his attitudes and approaches to mathematics teaching, preferring to focus on one strategy in more depth as opposed to many at once. The second way that Carl noted significant changes in his beliefs about mathematics instruction was through his acknowledgement that he had developed an understanding that math strands are better approached simultaneously as opposed to consecutively in his programs. John noted that his beliefs and attitudes about effective mathematics instruction had changed as he moved from what he called “old school” paper-and-pencil tasks to project-based learning in his K-8 Hutterian context. He was surprised not only by the success of students with this form of learning, but also by the support from parents who saw the results. Kelly and Janice indicated that they no longer took for granted that students knew certain things when they came into their Grade 3/4 classrooms; they understood that many students had misconceptions, weak areas, or holes in their understanding that could be identified and addressed with a little extra support. This change in their beliefs led to changes in their approach to teaching multiplication as they elected

to teach the concept later in the year, thereby allowing them to identify and address some of the challenges students faced prior to the move from addition and subtraction strategies to multiplication strategies. Finally, Sean noted that even though many of his beliefs about quality mathematics instruction were reaffirmed by his participation, he had developed an interest in looking at student engagement and in project-based learning over the two-year process. Looking at improved student engagement as an objective had allowed him to develop assessment tools such as surveys for his students, and his participation in the generation of multi-grade project-based learning opportunities for students, while in line with his existing beliefs about hands-on learning, extended his areas of interest and understandings about effective mathematics instruction and learning.

Changes in teaching practice. The MAR projects in which teachers engaged provided the most significant evidence of the effectiveness of the Numeracy Cohort PD model. Through teachers' documentation on MAR forms, and their oral and written reflections about the results of changes made to their teaching practices, evidence of effective instructional strategies and improved student learning outcomes were recorded. According to Guskey (2000), the fourth level of evaluation of PD is "participants' use of new knowledge and skills" (p. 80). In the case of education, changes in teaching practice mark the application of new concepts and strategies to the teaching context. In the case of the teachers in the study, each one of them made significant changes to their teaching practice. Both the quantity and variety of changes that were identified speak to the effectiveness of the Numeracy Cohort model.

While the senior years teachers in the study were only able to collaborate on the creation of one (truth tables) assignment over the two-year period, individually they managed to create and implement several other changes to their teaching practices. Karen designed, implemented,

and analyzed several different forms of assessment including a Grade 9 exam, a Pre-Calculus math quiz design assignment, and a new Grade 8 transition assessment. Emily integrated foldables and many different project-based learning activities and assessments through her MAR projects. The sheer number of instructional and assessment strategies and tools implemented by the senior years teachers was remarkable. Despite the fact that both teachers were skeptical about the benefit of some of their strategies and tools, they indicated that several of them were things they would continue to use in the future.

The middle years teachers on the Numeracy Cohort were able to engage in more collaboration than the senior years teachers were, and as a result, made collective changes to their practices. Despite the fact that several of the middle years teachers experimented with rotations and workstations at the beginning of the process with minimal success, as a collective, the middle years teachers developed cohesiveness around the implementation of project-based learning. The creation and implementation of real world mathematics projects that allowed students to demonstrate their learning in a variety of ways captured the interest and focus of the middle years teachers. Even as two teachers (Kevin and Carl) left the middle years group and two (Sierra and John) came into the group, the focus and momentum of the collaborative project-based learning continued. In the second year of using the projects in their classrooms, the middle years group developed strategies for customizing project-based learning activities to multi-grade settings, assessment strategies that allowed students to show their learning in many ways, and methods of collecting data from students in order to assess their understanding and engagement. As such, the projects, as an instructional and assessment strategy became more contextually relevant and sophisticated. The majority of the middle years teachers indicated that the project-

based learning activities they had developed were things that they would continue to use in their classrooms in the future.

For the early years teachers involved in the Numeracy Cohort, the focus the first year was primarily on the use of rotations as a tool for mathematics instruction. Although the teachers involved had different terminology for the rotations (LEARN, BUILD, Daily 5 math, math rotations), in general they involved the use of multiple workstations at which students would engage in a variety of math-related activities such as math games, worksheets, direct teacher instruction catered to their level, problem solving activities, or technology-related math activities. Evidence from teachers suggested that these rotations were valuable in terms of increasing student engagement and enabling teachers to work with small groups of students at an appropriate level for their learning. As such, all of the early years teachers indicated that they intended to continue the use of rotations as an instructional strategy in their classrooms. In the second year of Numeracy Cohort operation, two distinct groups of early years teachers emerged. The first engaged in significant work around helping struggling students reach grade level (through Math Recovery). The second group of early years teachers investigated the use of more specific skill-related workstations focused on primarily Grade 1 and 2 addition strategies, creating workstations for their classrooms, and planning a Hundred Day celebration (that used several of these strategies) for students from all of their classrooms. Both of these groups implemented significant changes in practice, and both indicated that they intended to continue the use of these strategies long term.

While the brief summaries of senior, middle, and early years MAR projects don't include all of the projects (e.g. the Hutterian culturally relevant activities), they provide an overview of the quantity and variety of changes in teaching practice that were realized through the Numeracy

Cohort initiative. As was already mentioned, the MAR projects in which teachers engaged provided evidence of the effectiveness of the PD model, as teachers took new ideas to which they were exposed (through Cohort meetings, external presenters, presenters brought in, their own investigation, or their peers), and applied them to their own teaching contexts. According to Timperley (2008), “it typically takes one or two years for teachers to understand how existing beliefs and practices are different from those being promoted, to build the required pedagogical content knowledge, and to change practice” (p. 15). The inclusion and format of the MAR projects ensured that changes in practice did not take a year or two to come to fruition. They occurred alongside of exposure to new ideas, and potentially even changes in beliefs and attitudes about mathematics instruction and learning.

Improvements in student learning outcomes. According to Timperley (2008), “success needs to be defined not in terms of teacher mastery of new strategies but in terms of the impact that changed practice has on valued outcomes” (p. 8). Along with the varied and numerous changes in teaching practices that were identified by Numeracy Cohort teachers, there were also many observations made about the impact of those changes on student learning outcomes. Despite the fact that student data were not analyzed as part of this study, teachers made observations and collected student data, themselves, as part of their MAR projects. Although some of the observations of teachers were only generally reported (e.g. “Students were engaged”), and although some teachers were uncertain about the impact of the interventions on student learning (e.g. Karen’s use of the Grade 9 exam, Emily’s use of foldables and projects, and Sierra’s question about the impact of project-based learning activities in comparison to time spent), many specific observations and examples were provided by teachers about positive impacts on student learning they experienced through the changes in practice they had made (e.g.

Emily's assertion that students were easily able to answer questions about truth tables on the provincial examination, John's description of a struggling student who excelled through the use of project-based learning, Ellen's assertion that 85-90% of her students could solve problems involving numbers to 20, and the Hutterian teachers' statement that students could extend their understanding of patterns to butterflies and buildings).

Four out of five of Guskey's (2000) levels of evaluation have been considered in this section of Chapter 6: participants' reactions, participants' learning, participants' use of new knowledge and skills, and student learning outcomes. Although the participants in the PD initiative (the Cohort teachers) provide much of the basis for evaluating the effectiveness of the PD model due to the fact that it is their professional growth that was being supported in the area of mathematics instruction and student numeracy, data were also collected from other sources to include the perspectives of the superintendent, the principals, and the facilitator of the PD initiative. Through these additional perspectives, teacher reactions, learning, use of new knowledge and skills, and improvements in student learning outcomes can be further examined. Guskey's fifth level of evaluation (organization support and change) can also be considered to both determine how professional growth was supported through the locally constructed PD model, and the impact of the model on the larger organization.

The Superintendent's Perspective about the Model's Effectiveness

While much of the interview conducted with the school division's superintendent was focused on challenges faced by the division and how the division's model attempted to mitigate such challenges (See Appendix B), one of the questions the superintendent answered dealt explicitly with the extent to which the PD model had supported teachers' professional growth in

the area of mathematics instruction and student numeracy (question 9). The superintendent provided the following response to this question:

Well, again, for me one of the big days was last May when everybody came in and presented to the admin. council on the different initiatives they were doing, the projects they were doing, and to see that each project had teachers collaborating in different schools, working together on this. And it just gave you a real sense of the teachers working together, trying methodologies that would give kids different opportunities to explore concepts, rather than just one way. It was very exciting and to hear the teachers present and being excited about continuing on in the next year. This year, I'm still, because I wasn't able to attend April 24th, I'm still looking forward to, you know, finding a time to get completely updated on that . . . Again, my individual discussions with teachers as I travel around to schools in the school division is that this has been outstanding. They don't want it to end. They want to keep working together. They're putting a real focus on this. And they are discovering more and more about their teaching and about ideas and impacting their teaching and learning, but also the teachers in their schools. And I think that's the next step for this is they'll be taking it to-, taking that initiative to improve the math teaching in their buildings. That's the logical next step. So, I think it's had a major impact . . . And I think that clearly there's been that impact as I mentioned before because other teachers are saying, "Hey, we'd like to have some collaborative learning in our area. How can we do that?" And these other groups have sprung up as a result of the numeracy initiative . . . people wanting to have a similar model.

The superintendent's answer to this question provides evidence that he valued the collaboration, networking, development of teaching strategies for differentiation of student learning, and teacher engagement in the project. It is also evident from his statements that he had experienced several positive comments about the initiative from teachers in the division. These comments, paired with his own experiences watching Cohort teachers present about their action research projects at the end of the first year led to his positive assessment of the PD model's effectiveness. In addition, other teachers in the division (who may have been aware of the Numeracy Cohort initiative) had requested funding and approval to start up their own grassroots collaborative cohorts focused on professional growth in the division. The model, according to the superintendent, was the division's "flagship of collaborative PD," and he noted that it would likely lead the way in terms of the direction of teacher PD in the division over the next few years. Finally, the superintendent's comments clearly indicate his desire to have the Numeracy Cohort initiative "scale up" or "branch out" to include other teachers in the division. Along with the April PD day hosted by the Numeracy Cohort teachers, the superintendent clearly described in his comment what he thought the next steps of the Numeracy Cohort would be – "to improve the math teaching in their buildings."

The Principals' Perspectives about the Model's Effectiveness

The focus group discussion held with the principals of the Numeracy Cohort teachers provided several insightful comments about the model's effectiveness in supporting teachers' professional growth in the area of mathematics instruction and student numeracy. It is important to note that the principals didn't speak specifically about the teachers in their schools or the effects of teacher interventions on student learning. Part of this was likely due to the instructions given at the beginning of the focus group discussion directing principals not to use the names of

specific teachers in their responses. It is also possible that not all of the principals were acutely aware of the work in which teachers engaged for their MAR projects as the teachers were unable to present to the administrative council at the end of the second year due to conflicts in meeting dates. The insight that was provided by principals during the focus group discussion, however, did bring to light several qualities of the model that generally fostered teacher professional growth. Some of their comments, although more broad, were also informed by the conversations and experiences they had had with the Cohort teachers in their buildings.

The first point that was raised by one of the Cohort principals regarding the model's effectiveness was that the Numeracy Cohort had fostered dialogue about numeracy in his school. The principal stated the following during the focus group discussion:

In my building, I have three people doing it. Fantastic. Yes, there was release time. You know we were happy to do it. You know, and I mean there was challenges sometimes getting three people, but as far as what it brought into the building, was really good. You know, there was a lot of talk - what we're doing and what things are happening. It made [us] more aware of numeracy in our building. So, in my perspective, it was really good. It was well worthwhile for us to put the money out for them to attend that.

From this principal's comments, it is evident that the Numeracy Cohort impacted teacher learning even outside of the teachers who participated. Conversation spread out into the schools of Cohort teachers, raising the issue of numeracy for other colleagues around them as well. The principal who made this point also noted that the Numeracy Cohort had physically brought worthwhile ideas and events into his building, such as the April PD day and the Hundred Day hosted by the early years teachers. Sean, a principal in a very small school who was also a

Cohort teacher, similarly supported this sentiment. Sean noted on more than one occasion that the times when teachers from his school were invited to join the Numeracy Cohort for PD sessions (for example when his teachers were invited to attend the day with the math consultant from an other division presenting on Guided Math) were both beneficial for his teachers and helpful to him as a part-time principal in charge of overseeing staff PD.

Another point raised during the focus group discussion with principals was that it was good to see teachers adopting an inquiry-based approach to teaching, essentially modeling the learning behaviors they wanted to see from their students. This point was made by a high school principal in following way:

I think the other thing, for me, and I know maybe it was a little different in the high school setting, but, we want our students, we want our learners to become more inquiry-based and more critical thinkers and not just do the surface part of numeracy and math. And I think what happened at the table with teachers, whether it was intended or not, that they really looked at the way they're teaching. And they're asking their own questions about how to promote and how to look at inquiry-based learning. So my understanding, correct me if I'm wrong, the majority of the teachers on the Numeracy Cohort basically came up with kind of a question and tried to answer it through their research and through the work that they did in kind of an inquiry-based model with maybe a little bit of action research and an action plan and things like that. . . And that's perfect because how does it fit into the divisional model? I mean we've put a lot of dollars into [presenter's name removed], and he was the one that said like if you want to try one thing, try something different, one thing, fail forward so you have a

supportive environment, and I can't-, like to have a Cohort that's ready to catch you if you fall, with the expertise and the knowledge in the numeracy area, I think is awesome. It's ideal. Yeah, for sure.

In addition to her point about engaging in (and modeling) an inquiry-based approach to teaching, the principal also raised two other important points in this passage. The first was that the approach fit into the divisional focus, including the work that the division had done that year with a presenter on deep learning who encouraged the educators in the division to make changes, try new things, and learn from their failures (fail forward). The second point she made in this passage, was that the structure of the Numeracy Cohort provided a supportive environment in which to fail, succeed, or gain new insight in the area of numeracy. Several other principals also raised this point during the focus group discussion. One of the elementary school principals stated it this way:

If the Cohort, the teachers that [are] participating in this cohort didn't feel as though the environment was safe, they wouldn't be here. And they need to feel as though they can make mistakes, try new initiatives, and when they make mistakes, come back to the Cohort meeting and explain why things went wrong, and then maybe some other teachers around the table can provide them with suggestions on how to improve or make changes next time so that it works better.

The importance of a safe learning environment was a recurring theme amongst the principal comments in focus group discussion, indicating its importance to the administrators in the division. Underlying this theme is an appreciation for taking risks and trying out new strategies. All of these things, together, provide insight into what principals thought was most effective about the PD model.

Another point that was made during the principal focus group discussion had to do with teacher isolation. Although the principals didn't refer to it the same way as teachers did, there was a recognition that sharing and collaboration through the Numeracy Cohort allowed for reduced teacher isolation. One elementary principal said the following:

I think it's important we don't, we often work in silos, alright? Back when I first started teaching, you were responsible for your classroom and your classroom only. And I had the attitude that once I had my classroom running the way that I wanted to have it run, I didn't care what anybody else did. Yeah, you know, keep out. I don't need any distractions coming in here. But now you have to have an open attitude and it has to be what's good for you is good for all. And now that we've had these teachers have the opportunities to have different relationships with different teachers around the division, I think it's just amazing. It's opened their eyes to what other teachers are doing.

This perspective about teacher isolation takes on a different tone than when teachers spoke of feeling isolated. As indicated by the principal's comment above, teacher isolation has an impact on the culture of a school and division as well. The reduction of teacher isolation through sharing and collaboration at face-to-face meetings, and through the MAR projects, allowed for ideas to diffuse through school walls and extend beyond the silos of individual teachers. This sharing and networking created potential for the larger system to benefit from the work of individuals, something that was clearly valued by the administrators.

The final point that was raised during the principal focus group discussion related to the effectiveness of the PD model in supporting teacher professional growth in the area of

mathematics instruction and student numeracy had to do with facilitation, focus and accountability. One of the principals noted the following:

I think it was good having someone who facilitated, that's sometimes a bit of a key. You know if they're just doing it on their own, it sometimes-, life get's busy right? Teaching gets busy and sometimes you-, unless you're focused, I think that might be a challenge.

Similarly, another principal said the following:

I think one of the other things that the PD model-, the Cohort idea, is it really emphasizes not only the support piece, but that you are-, um, the professional growth and the reflective piece. So often, we go to something and you, you're either on your drive home or whatever, you think "Oh yeah, that was really good." . . . , but then you get busy and things fall off the wayside. But this really refocuses you. Like if you know you're meeting, it refocuses you and you tend to teach to that, to make sure that, to ensure that that's happening.

Just as several of the teachers had indicated that the Numeracy Cohort had kept them focused on their goals and made them accountable for following through on their plans, the principals noted the importance of focus and accountability in the PD model and in PD more generally. The principals were aware that human nature and the many demands on teachers could lead to teachers losing focus on their goals, and they appreciated that the Numeracy Cohort, through its facilitator and ongoing structure, kept teachers focused on the educational improvements they wanted to achieve.

The Facilitator's Experiences with the Model and her Perspective About its Effectiveness

There were fourteen sets of facilitator notes collected as secondary data in this study. They contained notes about what happened at and between face-to-face sessions, conversations that were had with different divisional players about the Numeracy Cohort, plans for future sessions, and reflections about the successes and challenges I faced as a facilitator. As such, they contain a great deal of information about the effectiveness of the model from a facilitator's point of view. In order to look at this perspective, I have elected to separate this section into two parts: facilitator successes and facilitator challenges. Doing so allows for rich description about the model's effectiveness, including both effective elements and less effective features.

Facilitator successes. Evidence of the effectiveness of the PD model in terms of supporting teachers' professional growth in the area of mathematics instruction and student numeracy can be identified in the facilitator notes in several areas: bringing a variety of resources into the division, sending teams of teachers out to engage in PD together, on-site visits, reflection, flexibility in terms of responding to contextual needs, community-building, and the potential for scaling up the initiative. While several of these successes are linked to supporting teacher professional growth, some of them also served to make the Numeracy Cohort model more facilitative, inclusive, and robust.

Bringing in resources to the teachers in the division was one way the model was successful in supporting teachers' professional growth. As a facilitator, I shared mathematics strategies such as card games and warm-up activities with the Cohort teachers. I also shared articles on topics such as the seven mathematical processes, deeper learning and math talk; and created presentations for the Cohort teachers on topics such as the Manitoba PISA/PCAP test results, assessment strategies, using Google Forms to collect data, and Content-Focused

Coaching (West & Staub, 2003). I brought in presenters, including a Brandon University professor who presented on workstations and math consultant from another division who presented about Guided Math. Time was also secured to have a presenter on deeper learning (who had presented to the entire division at a divisional PD day) spend an afternoon with the Numeracy Cohort in order to help them think through ways to improve student learning. By bringing information to the teachers in the division either myself as a facilitator, or through presenters or articles, new ideas were infused into the work of Cohort teachers. It is evident from the number of teachers who focused on workstations as a strategy, that the information provided by presenters significantly shaped their initiatives and classroom practices. It is also evident in the previous section on teacher perspectives that the Cohort teachers valued several of the resources brought into the division. The facilitator notes support this point of view and also extend it in a couple of important ways. It is evident in the notes that as a facilitator, in addition to the infusion of new strategies and ideas about mathematics teaching and learning, I also valued the common understandings that were developed. For example, after the first face-to-face meeting, I wrote the following:

Together we managed to come up with a definition of numeracy:

Numeracy is . . .

The ability to competently and confidently decode, apply and analyze mathematical/numerical concepts to understand and solve real-world problems.

This wasn't the most exciting part of the day, but I think it was a valuable process.

Together we discussed and came to a consensus about what we believe as a group. I think this solidified our togetherness and gave us all a sense of what we are moving towards.

The definition of numeracy was generated using information presented about the seven mathematical processes, and was developed through much discussion as a group. Even though the definition was constructed at the first face-to-face session, some of the wording (the words competence and confidence in particular) could be seen in the MAR reflections provided by teachers throughout the initiative. Clearly the common understanding that was developed around the meaning of numeracy formed a foundation on which teachers could grow collaboratively as professionals. In addition to the infusion of new ideas and the development of common understandings, it was also evident in the facilitator notes that I valued the problematizing of beliefs, attitudes, and the process that resulted from having external people come into the division. After the math consultant's presentation on Guided Math, I wrote the following:

He was FABULOUS!!! Because we had talked on the phone and we both understand the whole notion that Daily 5 Math/Guided Math/LEARN/BUILD is not the answer on its own, but a structure, he hammered home the message that "Good teaching trumps everything," and these are structures, not the be all and end all. He said if you do centres and look close and it is "crap" going on, it is not better teaching. A good teacher with direct instruction is better. Good teaching is what is important. I loved how he brought this message home. I hope that he made the teachers think about what they put *in* their centres. I am also excited that we all have this common experience from which to draw. I can say "Good teaching trumps everything" and there is a whole experience to draw from when we plan our action research projects.

It is evident from this passage that both the development of common understandings and the problematizing of teaching practice were important to me as a facilitator. Another good example

of problematizing practices occurred when a presenter who came for a divisional PD day spent an afternoon with the Cohort teachers. Following his visit, I wrote the following in my facilitator notes:

I debriefed with [name removed] after everyone left and we talked about several things, which in hindsight were more me thinking out loud and giving background info. I told him that it was great that he was able as an outsider to ask such hard questions. My hands are tied a bit as a facilitator because if I come in asking them really hard questions or really insisting on super hard work, they will quit the Cohort. He agreed and said that he pushed them really hard. [Karen] had said to him that he was much more demanding today than he was yesterday (at the whole divisional day), and he agreed. He had to be nice there he said to bring people onboard. With us, he wanted to play more of a critical friend role so we keep moving forward and challenging our thinking.

The presenter had made some firm statements and asked the group a lot of difficult questions during his visit, including: “Good intentions are not enough. What evidence do you have teaching practice/student learning outcomes are improved?” and “What is your rate of spread/contagion/infection to other teachers?” He problematized the fact that the Cohort wasn’t “seeing practice” (in the classroom or through video) enough and suggested that the Cohort look at things from a student’s perspective in order to improve the whole system and experience for each child. These were challenging ideas and thoughts, and made me really question, as a facilitator, the effectiveness of what we were doing. I appreciated being made uncomfortable by an outsider and having the Cohort teachers feel uncomfortable as well. In particular, I

appreciated accomplishing this without having to be as critical myself, since I feared that I would lose their trust or they would quit the Cohort completely.

In addition to bringing resources into the division, another area that provided evidence of effectiveness in terms of supporting teachers' professional growth was the practice of sending teachers out to attend PD in small collaborative groups or teams. In the first year of Numeracy Cohort operation, the entire group of Cohort teachers attended a two-day workshop on Universal Design for Learning hosted by Brandon University. In reviewing the facilitator notes from the study, it is evident that I had significant hopes that the workshop would provide valuable information about meeting the needs of all students in the classroom. In the facilitator notes, I reflected on these hopes in the following way:

In booking the in-service, I thought it had the potential to meet many of the teachers' needs – How do we make learning math accessible to all of the students we teach? – An important question and one that is along the lines of those interested in engaging students, those interested in creating improved ownership, and those interested in looking at multi-grade/multi-level classroom with students who struggle in particular.

It was clear from the facilitator notes that in addition to having high hopes for the UDL workshop, after the workshop I was concerned that the workshop had not met the needs of the Cohort teachers. While I thought that strategies for meeting the needs of individual students would be explored, the workshop was more focused on the concept of UDL. As a result, I feared that the Cohort teachers did not find it useful. Through the facilitator notes recorded after the workshop, it is evident that on top of my fear that teachers did not find the workshop helpful, I

felt significant guilt and responsibility for both spending six thousand dollars on the workshop, and being the one who chose the workshop. In reflecting on my choice I wrote the following:

I recognize that the “availability” of this speaker during the Cohort year and in a place close enough to attend was a large part of this decision. The “availability” of the money from my superintendent was also a factor. I didn’t want to squander an opportunity for the Cohort teachers because in reality there aren’t that many outside opportunities that are accessible in our location. I made the mistake of trying to make the available speaker fit our goals. With the other presenters that came in, we found the speakers/presenters to meet our goals. This is a valuable lesson for me.

This quote from the facilitator notes is interesting for a couple of reasons. It is evident through words such as “squander” that I both felt guilt and a sense of waste around what I perceived to be a poor fit for the Cohort teachers. The quote also illustrates the acute sense of fiscal responsibility I felt as a facilitator. What is interesting, however, is that although I felt at the time like I had made a mistake that had resulted in a waste of time and potentially even a loss of credibility with Cohort teachers, in May, when the Cohort teachers reflected in small focus group discussions about their UDL experience, I found that many of them did take away some valuable things from the workshop, although some of the things they learned were not focused on numeracy. I wrote the following after the teachers discussed their experiences:

We talked about the things that we got from it [the UDL workshop] and I was very surprised this discussion went so well. A lengthy list of things people got from it was given. . . It made me feel so much better to hear that they took things away from the workshop.

From this quote, it is evident that my perceptions of waste were not entirely founded. The teachers in the Cohort taught a variety of subjects and despite the fact that the presentation did not include multi-grade, multi-level mathematics strategies as I had hoped, the Cohort teachers still found other ideas that were applicable to their teaching practices. Moreover, I noted another aspect of attending the workshop that was tremendously beneficial in the same entry about the UDL workshop:

We did manage to strengthen our group having gone together and formed some fundamental ideas together about what we think is important in a mathematics learning environment – feeling safe, assessing in many ways, teaching in diverse ways to varying learning styles, making learning accessible to all learners, communicating thinking in writing and in other ways, using big ideas as a starting point, etc.

It is clear from this description that although I was initially concerned about the workshop not meeting the needs of teachers, there were significant benefits to attending something as a team. Not only were the teachers able to take away valuable points related to their practices, but common understandings about quality mathematics learning environments resulted through their participation together. The view that collective experiences (such as attending workshops as a team) provides opportunities for common understandings to emerge continued to impact my decision-making as a facilitator, as well as the choices made by Cohort teachers into the second year of Cohort operation.

During the second year of Numeracy Cohort operation, there were several small groups that attended workshops related to their MAR goals. For example, the middle years group attended a problem solving workshop and booked a day to follow-up on what they had learned.

One of the early years groups attended a BER workshop on the topic of workstations and booked a follow-up day to physically construct workstation materials for their classrooms. The other early years group of three conducted a classroom visit to see Math Recovery in action in a teacher's classroom. This was the second time the group of three visited a classroom; they also went in the first year to see math rotations in action in a different teacher's classroom. What was different the second time, however, was that they also booked a day to collaboratively organize their Math Recovery materials for use with students. While the teachers' experiences collaboratively attending workshops related to their goals and engaging in follow-up activities that actually put into practice their newfound ideas have already been described, it is important to note the change that took place in facilitation the second year. The Numeracy Cohort teachers had indicated that they wanted new ideas and time for collaboration and follow-up in the first year. In response, the number of meetings were decreased the second year in order to accommodate release time for follow-up. Comments made by Cohort teachers at the end of the second year verified how I felt as a facilitator about the group workshops with follow-up time. They were beneficial in helping teachers access new ideas and implement them into practice immediately.

Another aspect of the PD model that I increasingly noted as effective over the two-year period was the inclusion of on-site visits with teachers. Interviewing teachers in their own schools provided valuable information about the needs of teachers and the extent to which the model was meeting their needs. Teachers were able to show me things as they spoke about their learning, something I found very valuable as a facilitator. For example, when I spoke with Amy about her math rotation model, she took me to her classroom and showed me how she had the students and materials set up. During the first year of the initiative, I also went into Kelly and

Janice's classrooms to see their math rotations in action. After my visit, I wrote the following in my facilitator notes:

Both of them were really smiling and although I could feel a bit of nervousness, I think that I accomplished what I really wanted. I got to see what they were doing in their rooms, the changes that they had made and how they were coping with challenges they were facing. I got to see what the challenges were at least in a quick snapshot (help/EAs, trouble deciding what to do with very weak students). This gives me an idea about what to bring to the sessions. It would be nice to look into building plans for very weak students as a topic. Had I not come into [Janice's] room, I never would have developed an understanding of this issue for her as an educator. There is something very important about the act of viewing a teacher's classroom.

It is clear from this comment that the classroom visits in which I engaged were powerful experiences for me as a facilitator. They helped me understand the work in which teachers were engaged, as well as the contexts in which they taught.

In the second year of the initiative, my on-site visits changed somewhat as Cohort teachers participated differently in their collaborative activities. Many of the collaborative groups that formed elected to attend an external PD opportunity and then book release time to follow up on what they had learned. I found myself wanting to be present to witness and provide support to teachers as they reflected on new information and planned changes to their teaching practice around both new strategies and their action research plans. While I wasn't able to attend every meeting that was held by the collaborative groups, I did manage to visit two sessions in which middle years teachers were reflecting on the problem solving workshop they attended and

planning real world projects, the session in which early years teachers created workstations after attending a workstation workshop, and the session that the three early years teachers planned to organize their Math Recovery resources. Each of the on-site visits provided me with enlightening information about the work in which the teachers were engaged, and in some cases, I was able to provide support to teachers as they planned their action research projects. The following passage was written after I visited Kelly, Janice, and Amy as they worked on organizing their Math Recovery materials on a release day.

I went and visited [Kelly], [Janice], and [Amy] today as they got together to work on their Math Recovery programs. [Amy] told me she works with four grade 1-3 students. She currently has 3 slots a cycle to work with them. She has done an assessment and analyzed the stage they are at (from the Math Recovery program). [Amy] thinks this is really only good for grade 1-5. She said the disruptions like being away for in-services or Christmas concerts etc. cause too much disruption to her program. Sometimes it is a week or more between when she gets to see students. Ideally, she thinks every day would be much better. Today, she is planning on putting together materials to use in the sessions with her students. (There are certain things she needs to copy or make to do activities with students) Getting together with [Janice] and [Kelly] to do this is helpful to her. Time to develop her program and the materials she needs helps her focus the path she will take students on. [Kelly] and [Janice] said they have assessed all of the grade 3's in their class. Subtraction is weak. They have copies of the assessment they did. They showed it to me and explained what it showed about students. They showed me one student who when asked to order numbers in the 50s etc. had them

completely randomly ordered. When asked if she was sure, the student flipped two numbers around (that really did not make it any better).

It is evident from this passage that on-site visits enabled me to gather significant information about the interventions on which teachers were working. Teachers shared their observations about the changes they were making, as well as their thoughts and reflections about student learning. In this case, the teachers even shared actual student work in order to discuss observations they had made. In addition to accessing information about the work of teachers, the on-site visitations with collaborative groups also allowed me to provide support to teachers as they designed materials, assessments, or data collection tools for use in their classrooms. I noted after my visit with the middle years teachers, for example, that I felt that I had really pushed them to think about collecting data about student engagement, rather than relying on impressions. This “push” I believed had led them to develop the exit slips that they later found helpful in assessing the extent to which students were more engaged in their learning.

Reflection was another significant contributor to the effectiveness of the PD model. In addition to reflecting on their goals and interests in the initial interviews, teachers continued to reflect on their progress through their MAR forms and reports, through the interviews that were conducted three times over the two-year process, and through a variety of written and oral reflection opportunities provided at face-to-face sessions. Opportunities for reflection at face-to-face sessions included collaborative goal setting on chart paper, oral reports about individual or collaborative action research projects, quiet written reflections, and focus group discussions guided by questions. While the model initially included the use of online reflections, it was found that teachers preferred to engage in reflecting on their progress orally, as was evident in the comments made by several of the teachers. In reviewing all of the reflections collected as

data, it is evident that oral reports on their action research projects were much more effective in terms of eliciting thoughtful responses from some teachers than the MAR forms. While several of the teachers indicated that they didn't like the forms, and while some of the teachers either didn't submit all of the forms (or submitted forms with minimal reflection evident on them), oral reflections were often very well developed. This finding was significant in terms of meeting teacher needs. While the MAR forms were often considered as helpful in keeping them focused, teachers preferred to reflect on their progress orally. Quiet written reflections completed at face-to-face sessions also resulted in insightful, reflective comments, however. When teachers were given time to sit quietly and write reflections at the sessions, all of them participated, and the majority of the comments illustrated significant depth of thought about their work, their learning, and the model. It is difficult to determine if one form of reflection was the best, or the worst, given that teachers have a variety of preferences and ways of thinking. Some of the teachers used the MAR forms to reflect on their action research very well, some did not. Most of the teachers disliked online reflections in general. Most of the teachers engaged in quality reflective discussion during interviews, focus group discussions, and oral reports about their MAR projects. Most of the teachers also engaged in quality, critical reflection about their practice, their action research, and the PD model during quiet reflection time provided at face-to-face sessions. What is more likely than one of the ways of reflecting being the best way, is that there were a variety of reflective processes integrated into the teachers' experiences that allowed them to engage in critical reflective thought. The facilitator notes collected for this study indicated that another important feature that increased the effectiveness of the model was its responsiveness to teachers, contexts, and situations. In addition to being able to choose their own MAR topics, several of the other features of the PD model were flexible and responsive, including the

planning of face-to-face sessions. After the initial interviews and session with teachers, I emailed everyone I knew in the province that might be able to help the teachers with the areas of interest that had been described by teachers including: hands-on activities, games, and rotation-based mathematics structures. I described this in my facilitator notes following the first face-to-face session with teachers:

After Sept. 25th, I did a couple of things to follow up on discussions I had with teachers at the session and in the initial interviews. [Janice] and [Kelly] wanted to see someone actually using a Daily 5 approach so that they could get ideas to implement their own version. Also, there was a lot of interest in incorporating hands-on activities and games. I sent out emails to literally anybody I could think of at the department etc. about finding resources for these things. As it turned out, I got from [name of department consultant removed] the name of a teacher in Carman who is doing it and managed to get [Kelly] and [Janice] in contact with her.

This visitation turned out to be very beneficial for the teachers involved (see Kelly and Janice and Amy). I also noted in my facilitator notes that I was able to find a presenter to come in and show the group of teachers (at a face-to-face session) how to set up and use workstations in a classroom:

Another thing that came up as I emailed everyone I know is that [professor's name removed] at BU came forward, willing to work with the teachers on creating workstations. I ended up scrapping most of my plans for this session (last session I thought we would look at our own stories, look at MAR process, introduce the online environment, look at conducting classroom observations, and

look at analyzing student data). I had even given an article on collaboratively looking at student work as a reading for today to spur on conversation about analyzing student data together/collaboratively as a tool for professional learning and development. I was forced to pare this down as [professor's name removed] was willing to come in and show the cohort how to develop quality workstations. She was not available much and happened not to be teaching and could come Oct. 30th. I decided it was a great opportunity and fit in nicely with the Daily 5 idea cohort teachers wanted to integrate so I jumped at the chance. I decided that in the AM we would have [professor's name removed] in and then in the PM I would push through introducing the online environment, and an overview of the MAR process and classroom observations/data collection.

It is evident from this passage that a great deal of flexibility was necessary to respond to both the needs of teachers and the availability of resources. As is evident in several of the reflections teachers made about the model, however, many of the components in the model that were developed in response to teachers' expressed interests and needs were deemed the most beneficial by the teachers in terms of changing their teaching practice.

In addition to features of the Numeracy Cohort model that supported teacher learning, the facilitator notes illuminated several successes that also allowed the model to be more facilitative, inclusive, and robust. One way the model was successful was in its ability to be flexible and responsive in terms of solving problems related to time conflicts. When challenges arose surrounding the teachers (and a teaching principal) participating on in-school PD days, a decision was made to invite all of the teachers in the very small schools to participate in the Cohort activities for the day. When participation on in-school PD days the first year caused conflicts for

Cohort teachers who didn't want to miss out on things happening in their own schools, changes were made to the Cohort meeting structure. During the second year, fewer in-school PD days were used and better communication was shared about important events such as the April PD day hosted for divisional teachers by the Cohort. I wrote the following in my facilitator notes about my attempt to head off this issue through better communication:

Last year when I did the in-service day with [consultant's name removed], the biggest success was that we brought in other teachers in the division and we truly had a good morning that day. The down side was a couple of members weren't able to attend because [principal's name removed] had booked a presenter that day and he wanted his teachers to attend what was going on in his school. Again this is a problem using in-school PD time. Different offerings essentially fragment the focus of the teachers in the Cohort, making it difficult to maintain the cohesiveness of the group. Since I knew this might be a problem again on Apr. 24th, I wanted to preempt the problem by talking to principals and finding out what their plans were.

After getting a poor response from emails, I ended up phoning the principals to explain what was happening on the April PD day. The result of phone calls was that the principals agreed to allow their Cohort teachers to attend the April PD day, as well as any other teachers in their schools who were interested, despite the fact that they had their own PD sessions planned in their schools that day. The fact that over forty teachers attended the day in the end provides evidence of the effectiveness of the better communication during the second year.

Community building was another feature of the PD model that significantly contributed to its effectiveness in supporting teachers' professional growth and the inclusiveness and strength

of the model overall. In reviewing the content of face-to-face sessions, it is evident that a deliberate attempt was made to develop a sense of community amongst Cohort teachers through the activities that were used. Every face-to-face session contained introductory and/or concluding activities that were focused on community building. The facilitator notes that were kept indicated that these activities were successful in developing relationships between Cohort members. The following passage is taken from the facilitator notes recorded after the first Cohort session:

I was very nervous going into the session and wasn't sure how people would react to my ideas or the others in the group. As it turned out, everyone was very positive. In the resume activity, partners used humour and there was a lot of laughter. Groups gave themselves colorful names (Huttrisch, North Enders, High Rollers, The Old Crotchety Ones, M&M), and shared personal information that was fun – like one used to be a baton twirler, two had wives from the US, one sings in a band, etc.) This really was a great way to get to know each other. At the end, the Snowball activity was a hit. We all laughed and had fun and the comments were interesting, insightful and surprisingly positive . . . These activities were absolutely essential to building community and created common experiences about which we can now talk.

Community building activities such as the ones described in this passage allowed for relationships to form between Cohort teachers that otherwise might not have formed. They also allowed for stronger relationships to form between the Cohort teachers and myself as a facilitator. This was, perhaps, most significantly demonstrated through my observations of the Hutterian teachers. At the beginning of the process, they largely stuck together and I found

myself wondering if their needs were being met. In the second year of the Numeracy Cohort initiative, Mark and John separated, working with different groups of teachers. Without developing relationships with other teachers and a sense of safety with the group, this would not have been possible. It is evident in the facilitator notes that I noticed an increased openness with Mark in particular over the two year period, noting that I had teased him about getting stuck in the snow the first year, and noting that I was honored to be invited into his home to see his cheese operation and meet his wife during one of my visits to his community. While relationships between people are likely to develop naturally as they work together over a two-year period, it is clear that attention was paid to building community in this PD model. It is also clear that the building of community was an important part of teachers being able to effectively collaborate together.

The final aspect of the PD model that provided evidence of its effectiveness, particularly in terms of being robust and sustainable, was the opportunity for scaling it up to include more teachers in the division than those involved in the Numeracy Cohort. As has already been described, the teachers in the division hosted a PD day to share their knowledge with other teachers in the division in April of the second year. This day was well attended as I indicated in my facilitator notes following the session:

In the end we ended up with 42 people registered. I think that is a great turnout. 30 of them were not Cohort people. [Mark] was sick at the last minute and the board member who was supposed to be there was sick at the last minute so we had 40 in attendance. That is 44% of the division!

The April PD day that was hosted by Numeracy Cohort teachers allowed for other teachers in the division to benefit from what the Cohort teachers had done as action researchers. Moreover, it

built further connections in the division between teachers around the topic of numeracy. Several of the non-Cohort teachers that attended the session indicated that the day was extremely beneficial, thanking the Cohort for their sharing and planning.

Facilitator challenges. Although the facilitator notes indicate that the Numeracy Cohort model was effective in many ways in terms of supporting teachers' professional growth in the area of mathematics instruction and student numeracy, there were also several challenges noted with regards to the effectiveness of the model. The challenges evident in the facilitator notes provide insight into those parts of the model that were less effective, allowing for a more thorough and balanced response to the second research question. The facilitator challenges that emerged through data analysis in this study can be placed into several categories: meeting the needs of a broad range of teachers; tension about how to best spend face-to-face time; my expertise as a facilitator; my health; principal support; teacher commitment and engagement in the process; goal clarity and focus; and recruitment, retention, and sustainability of the PD model. By describing the nature of these challenges from the facilitator's point of view, a more detailed picture of the model's effectiveness in terms of supporting teachers' professional growth can be painted.

Meeting the needs of a broad range of teachers was one of the most obvious challenges from a facilitation point of view in the PD model. Because the model was designed to include teachers from all of the public schools in the division and two of the Hutterian schools, the range of grade levels, interests, experience levels, and contexts included in the Cohort of teachers was necessarily broad. Meeting the needs of such a diverse group of teachers was a challenge as a facilitator. For example, teachers who were new to the profession, division, or even grade level had distinct needs from those teachers who had had a similar teaching assignment for a decade.

For new teachers, the need for strategies and resources was palpable, whereas some of the veteran teachers wanted to hone strategies or ideas that were already being used in their classrooms. Similarly, there was significant diversity with regards to grade levels taught on the Numeracy Cohort. As has already been described, teachers ranged from Grade 12 Pre-calculus mathematics teachers to Kindergarten teachers on the Cohort, all of whom had unique contexts and professional learning needs. Although the MAR projects allowed individual teachers to make changes to practice based on their own interests and contexts, designing face-to-face sessions for the broad range of teachers on the Cohort was a constant tension for me as a facilitator.

Another area in which I experienced significant tension as a facilitator was decision-making about the best way to spend face-to-face time with teachers. It is evident in the facilitator notes that I struggled with how much time to spend providing new strategies and ideas, and how much time to spend engaging in collaborative planning or MAR projects during these sessions. As the online environment crumbled as a method of reflecting on their learning and work, I found myself trying to include opportunities for goal setting and reflection at face-to-face sessions as well. I also struggled with trying to get teachers to consider theory or research in relation to their practice, and to consider data collection as a way to learn from their work. While much of the decision-making around these considerations took place intuitively, based on the ongoing feedback of teachers, it is evident in the facilitator notes that I felt tension around both what to focus on as a group, and how much time to spend on each component.

A third challenge for me, as a facilitator, was my own expertise in the areas of mathematics instruction and facilitation. In several places in the facilitator notes, I made reference to areas in which I felt I lacked expertise, such as how to improve Grade 3 subtraction

skills, how to use technology to collect student data, or how to get teachers to effectively use data to improve their teaching practices. I also made reference to several things I did to develop knowledge in specific interest areas such as researching and developing math games, learning about using math talk to promote student learning, investigating the use of workstations and Guided Math, analyzing PISA/PCAP test results, and learning how to use Google Forms to collect student data. While the development of knowledge in these areas made the model responsive to the needs of teachers, there was a significant downside to having to develop expertise while facilitating the initiative with only a quarter time position. After analyzing PISA and PCAP results and creating a presentation to share my knowledge with Numeracy Cohort teachers, I wrote the following:

A quarter time isn't really enough for this. I think I spent at least 10 hours preparing for an hour spent at the meeting on the 3rd. This would be equivalent to 2 weeks of my Numeracy Coach time. In essence, I spent a lot of my prep time and some time on the weekend to get this done. This is potentially a problem with such limited time for the position.

The 0.25 FTE Numeracy Coach position, combined with very little experience with elementary mathematics instruction or PD facilitation, created a situation that made facilitation challenging. In order to deal with this challenge, I brought in other presenters to work with Cohort teachers, sent teachers out to see presenters in teams, and spent a significant amount of time learning about topics myself. I also tried to access supports in the division, particularly in the area of technology, to help the Cohort teachers meet their goals and to help me as a facilitator. While I was able to obtain support to get the SharePoint site up and running for the Cohort, I found that the pioneering nature of the PD project meant that there were not always significant resources

available to help me as a facilitator. There had not been any use of SharePoint for example, as an interactive site for discussion in the division prior to my attempt to use it this way. Similarly, no teachers in the division had asked for support regarding student data collection using technology such as Google Forms. Because these were things that hadn't been asked for, there was a significant learning curve for technology coordinators and technicians as well. This meant that a large amount of time was required for me to learn about the technology, and for those charged with technology support to help me. Lack of expertise was a challenge for me as a facilitator, not because it was a personal flaw (as no person could reasonably have all of the knowledge needed to facilitate such a diverse group of people), but because it was something that I had to overcome on an ongoing basis in my work with the Cohort. The nature of this challenge is important to note as initiatives of this size and scale are subject to the limitations of people and time inherent in their structures.

A fourth challenge that I experienced as a facilitator, and one that has already been described in some detail in Chapter 5 (see section on teacher workload), was my own health. As previously described, I struggled with stress and exhaustion over the two-year period, particularly around times of critical workload stress such as report card times and semester changeovers. In reviewing the facilitator notes focused on times of stress and health issues, three main points were evident. The first was that when my health was impacted, my ability to run quality face-to-face sessions and engage in the work of facilitation was impeded. The second point that emerged was that I spent an inordinate amount of time engaging in organizational tasks. For example, I noted on several occasions that I was worried about coffee or lunch arrangements, something that added to my stress and impacted the amount of time I was able to spend planning or working with teachers. The third point that emerged during times of stress

and health issues was the difficulty I had around managing my own teaching responsibilities in conjunction with my facilitation responsibilities. In addition to report cards and planning for new semesters, events like parent-teacher interviews created obstacles for me in terms of facilitation. On two separate occasions, I was responsible for facilitating sessions for elementary teachers at the same time as my own high school parent-teacher interviews were being conducted. While I was able to solve this problem by getting permission from my principal to do parent-teacher interviews at a different time or via telephone, managing both activities at the same time added to my workload and stress level. As mentioned in Chapter 5, the issues that I experienced surrounding my health point to a cause for concern when implementing models that involve dual roles. When teachers are put into part-time facilitation roles, workload, time conflicts, and potentially even stress and health issues can result.

Principal support posed another challenge for me as a facilitator attempting to support teachers' professional growth. While several of the principals were very helpful and willing to support the Cohort in any way possible, there were also several instances in which I struggled to get support from principals. It is apparent from the facilitator notes that a lack of support from principals came in several forms, including the following: failing to attend informational or sharing sessions about the Cohort; not responding to questions or emails about the Cohort; asking teachers to miss Cohort sessions for field trips, other PD sessions, or to be acting administrator for principals' absences; not keeping up to date with the action research work in which the Cohort teachers in their buildings were engaged; and refusing (or making it difficult to obtain) school-based funding for release time, workshops, or resources related to teachers' action research projects. The issue of principal support is clearly complex in nature; there are many reasons why a principal would not be able to attend an information session, respond to an email,

or have sufficient funds for a teacher to attend a workshop. Moreover, the lack of support should not be interpreted as negative or malicious, simply as the absence of support in certain instances, recognizing that there are many factors at play in such complex situations.

The challenge of principal support is noteworthy for several reasons. As was already stated in Chapter 5, the accessing of school PD budgets exacerbated some of the funding challenges that already existed in the school division around the use of school-based funds. Inconsistencies between principals and schools, difficulties accessing money late in the year versus early in the year, failure to ask at all for funds when PD was too expensive, and competitiveness for PD funds were all exacerbated by the added strain the Numeracy Cohort put on school budgets. While serious issues only arose in two of the schools, the perceived lack of principal support (due to refusal of funding) had a significant impact on the teachers involved and on me as a facilitator. I found myself acting as a negotiator between teachers and principals on many occasions, and the frustration level of both the teachers involved and me (as facilitator) was extremely high during times of refusal. In addition to principal support for funding, other areas for which there was an absence of principal support also impacted me as a facilitator. Communication was difficult at times when principals did not attend information or sharing sessions designed to provide information to administrators. Due to their lack of attendance, principals were sometimes unaware of steps that needed to be taken on their part, or even of the work in which Cohort teachers were engaged in the division.

Teacher engagement and commitment to the process also posed challenges to supporting teachers' professional growth as a facilitator. Lack of teacher engagement and commitment was evident in several places in the facilitator notes, including the following documented behaviors: opting out of attending sessions due to other conflicting PD opportunities, lack of interest,

weather, student events, or teaching concerns; not being fully engaged and on task at face-to-face sessions; coming late to or leaving early from meetings; not completing MAR forms at all or lack of critical reflection on MAR forms; failing to follow through with MAR plans; and opting out of posting materials and reflections on SharePoint. Again, it should be noted that teacher engagement and commitment to the process is complex, and there are many reasons why teachers might demonstrate some of these behaviors over a two-year period that have nothing to do with engagement or commitment. As a facilitator, however, my perceptions about teacher engagement were noted on many occasions. Part of the reason for this was my preoccupation with meeting the needs of the Cohort teachers. Teacher behavior was one of the things that informed my practice as a facilitator as I attempted to determine if the needs of teachers were being met and what to focus on at future sessions. In addition to informing my practice as a facilitator, teacher engagement and commitment to the process also impacted the learning of Cohort teachers individually and collaboratively. While there are many examples at the beginning of this chapter of MAR projects engaged in by teachers that resulted in professional growth, changes in teaching practice, and positive results with students; there are also several examples of goals and action research projects that were not followed through on, and several examples of teachers engaging in minimal critical reflection about the results of their interventions. These missed opportunities for professional growth were a cause for concern for me as a facilitator. In addition, when teachers opted out of attending sessions, or didn't engage fully in face-to-face sessions or for the full amount of time available at sessions, further opportunities for growth and learning were impacted. Finally, while using the SharePoint site for critical reflection, learning, and sharing had significant other challenges, one of the primary reasons for its demise was lack of teacher engagement and commitment to its use. This is in no

way meant to suggest that teachers should have followed through on goals in which they lost interest or engaged in a platform for reflection that didn't meet their needs. It is, however, meant to raise the issue of teacher engagement and commitment to the process as a potential challenge or limiting factor for me as a facilitator attempting to support teachers' professional growth in the area of mathematics instruction and student numeracy.

A seventh challenge I faced as a facilitator was a lack of clarity and focus with regards to the goals of the Cohort, my own goals as a facilitator, and the goals set by teachers for their MAR projects. At the beginning of the process, it was evident that teachers struggled with articulating both the division's goals and their own goals with regards to numeracy. While a few teachers were able to indicate exactly what their goals for the year were, none of the teachers related their goals in the beginning to the division's numeracy goals. Most of the teachers struggled in the beginning deciding what they wanted to focus on for their MAR projects, and this led to significant changes in focus during the first year of Cohort operation. As a result, there was somewhat broken continuity in learning.

In reviewing the facilitator notes, it is evident that I, too, lacked clarity and focus about my own goals and the goals of the Numeracy Cohort. While some of this can be attributed to being responsive to the needs of teachers, there was significant change in what I was focused on over the two-year period. For example, at the beginning of the process, I was focused on building community and finding presenters to come in and talk to teachers about workstations and rotations. It is evident in the second year that I was more focused on collecting data to inform decisions about practice. One glaring example of the difficulties with focus I had as a facilitator of the project occurred in the notes I recorded in April of the second year after a

follow-up Skype session I attended with the presenter who had worked with the Cohort the previous year. After the session, I wrote the following:

On April 30th, we had a Skype session with [presenter's name removed]. . . At the session, in addition to talking about assessment/grading and grade 9 transition, he directly gave a few pointers to the Numeracy Cohort including:

- It's not about action research, it is about improving practice
- We are doing network improvement. This takes time. We need to learn how to do this.
- We need to be careful not to lose focus – keep group clarity
- How can [division name removed] “do” network improvement?
- Ask over and over again:
 1. What are you trying to accomplish?
 2. How will we know that a change is an improvement?
 3. What change can we make that will make this improvement?
- We are in a cycle of continuous improvement. We get used to failing and we are learning how to learn together. This is what improvement practice is going to look like everywhere some day.

As indicated earlier, I appreciated the opportunity to be made uncomfortable by someone outside of the division because the moments of discomfort allowed for growth on my part. It was this interchange with the presenter that made me question the overall purpose and clarity of our goals as a group. The meeting after the Skype discussion with the presenter, I brought the three questions (above) back to teachers to help clarify our goals as a collective. I posted the questions on chart paper and asked the group to collectively brainstorm answers to them. Following the meeting, I wrote the following about the experience in my facilitator notes:

This brainstorming session led into the planning discussion for next year which took place before and after lunch. Some interesting things came out of it.

- I thought it was interesting that in addition to improving teaching and learning, the group understood part of their goal was to build leadership capacity in the division, and to build PD and collaboration opportunities. Considering where we started, the vision of the group is much clearer!

- The third question was easier to answer than the second. The Cohort generally seemed to feel that if the goals were to provide PD, provide opportunities for collaboration, develop leadership capacity, and to improve teaching and learning, they should scale up, include other teachers, share ideas with others at staff meetings, and encourage classroom visits. It is interesting that they felt that branching out was necessary if they were going to create PD and collaborative opportunities. In addition, it seems that they felt that we are so small, collaboration with another division might help bring in leadership (shared consultant), new strategies/ideas, and collaboration for isolated teachers like high school teachers who still find it difficult to collaborate with only one or two people in the division even teaching similar things. Finally, to improve student outcomes, they felt that something needed to be done for kids who are struggling.
- After identifying the third question responses, we went back to the second question and said, well how will we know we have accomplished this. They were able to see that student learning was in need of data collection, indicating that student samples and benchmarks should be collected and analyzed. In addition, the Cohort would know that their goals had been met if they collected feedback from teachers, parents, admin, students, etc., as well as by looking at the number of initiatives coming forward (small groups like the Daily 5 group for example).
- This activity was terrific for focusing the group on what our collective goals were. Teachers digressed frequently into their own or their group's goals (e.g. Math Recover/Workstations/Projects) and had to pull themselves up to the level of the Cohort. We all mentioned that these questions could/should be answered at every level – individual, collaborative groups, and Cohort. This is an important discovery in my opinion. Separation and clarity should probably be sought with regards to these three levels of goals.

It is evident from this passage that clarity and focus was previously lacking in the initiative. It is also evident that as a facilitator, I learned a lot about creating clarity and focus with such a diverse group. While movement towards greater clarity and focus in goals could be seen as a success of the initiative, it can also be seen as a challenge. If greater clarity had existed at the beginning of the initiative, it is likely that teachers' professional growth could have been better supported.

A final way that clarity and focus of goals was an challenge for me as a facilitator was in trying to get teachers to set more student-focused goals (as opposed to teacher-focused goals)

through their MAR projects. While many of the goals at the beginning of the process were focused on implementing particular strategies or routines in the classroom (e.g. workstations, rotations, interactive notes, student quizzes, etc.), there was some movement towards more student-focused goals as time went on (e.g. improving student engagement, ownership, and connections to the real world; improving mental math, subtraction, or basic fact recall, etc.). It is evident in the facilitator notes that I struggled with getting teachers to embrace the idea of collecting data to inform their instruction. In one entry in my facilitator notes the second year I wrote the following:

Forms getting sketchier/not as well done. I can't help but think this is because THEY don't feel it is for THEM. They are just doing it because I have asked them to. . . This makes me wonder if the process is worthwhile or not. Is it the form that is the problem? I get the feeling that the teachers are struggling with staying focused on their MAR projects, and really don't have or don't make the time to really reflect. I need to find this out. How can I make this process more meaningful for them? How do I get them to get to the point of actually looking at student work and reflecting deeply about the changes they are making and how those changes are impacting student learning?

It is evident in this passage that getting teachers to focus not only on what they planned to do through their MAR projects, but also on what the impact of their changes in practice was a struggle for me as a facilitator.

The final area of challenge for me as a facilitator in terms of supporting teacher professional growth had to do with recruitment, retention, and the sustainability of the model. The way teachers were recruited for the initiative impacted teacher learning in several ways.

Because teachers were recruited by their principals (who had heard about the Numeracy Cohort at an administrative council meeting), there was significant confusion when teachers were asked to be a part of the Cohort. In many cases, principals asked teachers if they would like to take part, and teachers really didn't know for what they were signing up, except for the fact that the focus was on mathematics and numeracy and it was a PD opportunity. In some cases, teachers referred to being "voluntold" to be part of the Cohort by their principals, and while they appeared to be happy to participate, hadn't really asked to be part of the initiative. The result of the scattered recruitment process, from a facilitator's point of view, was that I was very worried about teachers' commitment to the process. I was continuously concerned teachers might quit if I asked hard questions or pushed their thinking too much. As a result, I was reluctant to address negative behaviors or to criticize the level of critical reflection I saw from teachers. As a facilitator, retention of teachers on the Cohort was an enormous concern. If teachers quit, continuity would be lost and I felt that the initiative would have been a failure. While it is true that only one teacher left the Cohort over the two-year period, and that it was because of a change in his job description (he no longer was going to teach mathematics) rather than a decision to leave the Cohort, the fear of teachers leaving inhibited my ability to be the critical friend I had hoped to be as a facilitator. By extension, it is likely that I was not able to fully support teacher professional growth in a way that I might have been if teachers saw their participation in the Cohort as more of a privilege than an obligation or favor.

Sustainability of the Numeracy Cohort model, as well as retention of teachers in the Cohort, was also an area of concern from a facilitator's point of view. When the initiative began, it was funded for one year. The fact that funding was secured on a year-to-year basis for the initiative meant that part of my focus as the facilitator had to be put on the long-term vision of

the model. As a result, I spoke a few times a year with the superintendent of the division about how things were going and what the future plans for the Numeracy Cohort might look like in the division. At the end of the second year, the sustainability of the model became an extremely important issue when, despite having secured a third year of funding for the initiative, I resigned from my position in the division to take another job. At this point in time, the superintendent was faced with having to make a decision about how to continue the initiative without me as a divisional employee. I was also tasked with providing feedback about the Cohort's wishes for the coming year. After the Cohort's final meeting in the second year, I wrote the following in my facilitator notes about the feedback I had received from the Cohort teachers:

In the end the group said two main things. The first was that they felt there should be 3 full Cohort sessions next year – they felt that the group would lose focus and contact unless these were in place. In between they felt that they should each have a pot of money to engage in outside PD with follow-up collaboration (or whatever else they needed to meet their goals – buy materials, supplies, books, etc.). The second main thing was that they felt very strongly that my position as Numeracy Coach should be filled and not left empty with me volunteering from BU. They felt that the facilitator needed to be in the division, that they didn't want to lose divisional funding for the initiative, that they had a good thing going they didn't want to ruin it, and that this fit with the Cohort goal of developing leadership capacity.

In the end, despite at least one other Cohort teacher volunteering to step up into the facilitator position, a decision was made not to hire another facilitator, but to continue the Cohort by using other divisional resources and external resources that could be leveraged by the division. Due to

the fact that data collection for this study ended at the end of the second year of Numeracy Cohort operation, data were not available to look at how the third year of Numeracy Cohort operation actually unfolded. Follow-up research into the trajectory of the initiative after the two years examined in this study would be useful in order to determine the extent to which the model was sustainable.

Discussion about the superintendent, principals', and facilitator's perspectives

The perspectives of the superintendent, principals, and facilitator verified many of the teachers' experiences and perceptions about the effectiveness of the PD model. For example, the superintendent identified teachers' exposure to new concepts and collaboration as things that garnered positive reactions from the teachers who participated in the initiative. Principals also indicated that they felt that the establishment of an inquiry-based approach; a safe and supportive environment in which to learn; reduction of teacher isolation; and facilitation, focus and accountability were important, effective, features of the model that supported teacher learning. As a facilitator, I also identified successes around bringing in a variety of resources into the division (e.g. impacting practice, developing common understandings, and problematizing beliefs and attitudes), sending teams of teachers out to PD opportunities (as collective experiences), and community-building activities. These facilitator successes, and the aspects of the model identified by principals and the superintendent, align with the broad categories of effectiveness identified by teachers that have already been discussed earlier in this chapter (community/collaboration, content, time and resources, autonomy, and focus/accountability).

The previous discussion about the model's effectiveness in relation to the teachers' experiences and perspectives drew on Guskey's (2000) five levels of evaluation: participants' reactions, participants' learning, organization support and change, participants' use of new

knowledge and skills, and student learning outcomes (pp. 79-81). Although four of the five levels were discussed in detail already, the third level (organization support and change) requires the perspectives of divisional players (other than the teachers) to fully consider the model's effectiveness. By examining the support provided by the school division through the locally constructed model, and by considering how the initiative fostered organizational change, further evidence of the model's effectiveness can be established.

Organization support and change. According to Guskey (2000), several questions can be used to consider a PD model's effectiveness in terms of organization support and change:

- What was the impact on the organization?
- Did it affect organizational climate and procedures?
- Was implementation advocated, facilitated, and supported?
- Was the support public and overt?
- Were problems addressed quickly and efficiently?
- Were sufficient resources made available?
- Were successes recognized and shared? (p. 80)

These questions highlight the importance of both adequate support for PD initiatives, and the role of teacher PD in educational reform (Reeves, 2010). Moreover, they provide a guide for examining the ways in which teacher professional growth was supported by the division through the locally constructed model, and how the model, in turn, affected change within the division.

In terms of impact on the organization, it was evident through the superintendent's comments that the Numeracy Cohort had changed the way teacher PD was structured within the division. The superintendent referred to the Numeracy Cohort as the division's "flagship of collaborative PD," and indicated that cohorts in other areas such as French and physical literacy

had sprung up in similar formats. In his own words, the superintendent stated, “I think it’s had a major impact,” a strong statement about the influence of the model on teacher PD in the division. The fact that the PD model fostered change within organizational PD structures is important. The Numeracy Cohort initiative raised the prominence of collaborative inquiry as a form of effective PD within the division, potentially creating conditions for support of this type of PD in the future. As a result, teachers involved in the Numeracy Cohort and other teachers in the division could see both public support for this form of PD, as well as new opportunities for collaborative learning that didn’t previously exist.

Another area of change in terms of the organizational climate emerged during the focus group discussion with principals. One of the principals noted that the model had fostered dialogue between Cohort teachers and non-Cohort teachers about mathematics instruction and student numeracy in his building. This dialogue occurred in the staff room, and during staff meetings, as teachers talked about the work in which they were engaged. Other principals also indicated that their teachers had shared some of the projects they were working on at staff meetings in their schools. Together with the in-school PD day hosted by Cohort teachers where they shared their work with a group of divisional teachers, an interesting strength of the Cohort model was identified; teacher professional growth was not only supported for Cohort teachers, but also for other teachers with whom the Cohort teachers had contact.

The implementation of the PD model was advocated, facilitated and supported to a great extent; however, this aspect of the model also involved some of the most significant challenges. The facilitator challenges described in this chapter indicate that issues with communication and organization during teacher recruitment for the Numeracy Cohort led to concerns about teacher commitment to the process and principal support in some cases. While the Numeracy Cohort was

advocated for at many levels (Numeracy Coach, superintendent, principals), the lack of clarity and focus with regards to the direction of the initiative in the beginning stages contributed to challenges throughout the two-year process. It was noted in the facilitator challenges that if greater clarity had existed at the beginning of the initiative, greater support could likely have been provided for teacher professional growth in the area of mathematics instruction and student numeracy. For this reason, advocacy and support for the initiative were both strengths and challenges.

Facilitation of the Numeracy Cohort, as previously mentioned in Chapter 5, was critical to the success of the PD model. The support provided through the Numeracy Coach position, as indicated in the facilitator successes described in this chapter, adds to the strength of this assertion. As a facilitator, I was able to support teacher professional growth in many ways: by bringing in presenters and resources to the division; by facilitating external workshops, visitations and collective PD experiences; by engaging in community-building; by visiting teachers in their teaching and learning contexts; and by fostering reflection about MAR projects and classroom practice. These areas of support were identified as positive and valued by teachers through their identification of relevant content, resources, community/collaboration, and focus/accountability as critical to their growth as professionals. While I identified challenges with the 0.25 Numeracy Coach position in terms of meeting a broad range of needs, the limitations of my own limited experience, and issues I experienced with my health and wellness; the importance of facilitation in terms of supporting teacher professional growth was apparent through the comments of teachers, principals, the superintendent, and my own facilitator notes. This supports literature in the field of teacher PD that suggests that leadership is an important standard for professional learning (Learning Forward, 2011). The Numeracy Cohort model,

illustrates not only the complexity of the role of the facilitator in promoting teacher professional growth, but also the numerous and varied ways facilitation plays a role in effective teacher PD.

The Numeracy Cohort had varied results when it came to solving issues quickly and efficiently. Some issues such as conflicts with in-school PD days (such as conflicts with religious holidays or the hollowing out of very small school staffs for PD days) were addressed quickly by making changes in schedules or inviting other teachers to participate, while other issues (such as support from school PD budgets) were not so easily addressed. While the Numeracy Coach role allowed me to be creative and flexible in responding to the contextual needs of teachers and schools, limitations existed in terms of what could be done to solve emergent problems.

In terms of providing sufficient resources, both the description of the funding model in Chapter 5 and the descriptions of resources provided through the Numeracy Cohort initiative (e.g. bringing in external presenters, ongoing face-to-face meetings, funds and release time to attend workshops together or collaborate, books and materials) support the assertion that significant resources were provided to support the initiative and teacher professional growth. While the limitations of these resources posed some challenges (e.g. funding through school PD budgets, pressure and stress related to the 0.25 FTE Numeracy Coach position), teachers both appreciated and acknowledged the importance of the time and resources they received as part of their participation in the Numeracy Cohort. Again, this supports literature in the field that suggests that time and resources are important supporting elements in effective PD models (Bredeson, 2002; Goos et al., 2011; Guskey, 2003; Learning Forward, 2011; Timperley, 2008).

The final question posed by Guskey in the list of questions related to organizational support and change (above) has to do with recognizing and sharing successes. The Numeracy Cohort model incorporated facilitator presentations to the school board and the sharing of teacher

successes with the administration council. It also saw the sharing of teacher successes at a divisional PD day hosted by Cohort teachers at the end of the second year. This aspect of the model was significant in garnering the support of principals, the superintendent, and even the school board. Such support was critical for both the scaling up of the initiative and the sustainability of the model over time. The presentations made by teachers also provided the impetus for completing MAR cycles and engaging in critical reflection.

Conclusion

The extent to which the model was effective in terms of supporting teachers' professional growth in the area of mathematics instruction and student numeracy can be seen through the four perspectives examined in this chapter. In addition to identifying five broad categories of effectiveness (community/collaboration, content, time and resources, autonomy, and focus/accountability), Numeracy Cohort teachers related specific areas of learning and changes in their beliefs and attitudes about mathematics instruction and student numeracy. Through the MAR projects they engaged in, Cohort teachers made many changes to their teaching practices, and identified some of the impacts such changes had on student learning outcomes. Evidence of organization support and change could be found in the changes to the structure of teacher PD that were described in the division, such as the move to more collaborative PD models incorporating cohorts of teachers. Significant support was also noted through the facilitation provided by the Numeracy Coach position, the provision of sufficient resources, and the sharing of successes. While Guskey's (2000) five levels of PD evaluation are general in nature, they provide a framework for analyzing and understanding the locally constructed model's effectiveness. Evidence of teachers' perceptions of effectiveness, teachers' learning, organization support and

change, teachers' use of new knowledge and skills, and improvements in student learning outcomes all contribute to an understanding of the extent to which the model was effective.

The locally constructed PD model will be examined through a social constructivist lens in Chapter 7 in order to address the third research question. Findings from the data collected for the study will identify social constructivist principles evident in the Numeracy Cohort model design, and their contributions towards teacher professional growth. Chapter 8 will conclude the thesis with a look at the study's contribution to the research problem and implications for practice, theory and future research.

Chapter 7 - Contributions of Social Constructivist Principles to Teacher Professional Growth Through the PD Model

In this chapter, I address the third research question in the research study: How do social constructivist principles contribute to teacher professional growth through the locally constructed rural PD model? As previously mentioned in Chapter 3, I engaged in the process of distilling the learning theory down to three fundamental areas or constructs through an examination of key literature in the field of social constructivism: social context, social interaction, and human engagement. Within these fundamental constructs, I also identified six principles of social constructivist learning: the dynamic nature of social context, the individual learner as situated within social contexts, social interaction as required for individual construction of meaning, collective generation of meaning, assistance by more competent others, and human action as mediated through tools. The categories and principles identified from the literature I reviewed on social constructivism provided the groundwork for looking at the locally constructed rural PD model through a social constructivist lens. They also provided the structure for this chapter. By examining the data from the study and relating it to each of these principles, I was able to describe how the principles were evident in the rural PD model, and how they were linked to teacher professional growth.

The data that were used to answer the third research question (as outlined in Figure 4 in Chapter 3) included all of the primary data in the study (superintendent's interview, principal focus group discussion, and teacher focus group discussion) in which participants were invited to theorize about the contributions of social constructivism to teacher learning and model effectiveness, as well as several forms of secondary data collected for the study (facilitator notes and artifacts). While participants were invited to theorize about the contributions of social

constructivism, the chapter is primarily my theorizing about it as a researcher. I drew on the viewpoints of participants in my response where they were available and applicable to the research question.

This research question makes a contribution to the field in two important ways. The study, and more specifically the answer to the third research question, illustrates how social constructivist principles are manifested in the context of a teacher PD model situated within a rural setting. Moreover, it strengthens the argument that social constructivism, as a learning theory, is a theory that can be meaningfully used as a basis for designing effective teacher PD in a rural setting, and as a basis for understanding the effectiveness of teacher PD in a rural setting (like the effectiveness of the specific teacher PD model inquired into in this study). This chapter – the response to the third research question – provides such an argument.

Social Context

From a social constructivist perspective, the context in which learning takes place is of critical importance. According to Palincsar (1998), postmodern constructivist perspectives reject “the view that the locus of knowledge is in the individual” (p. 348). Rather, a social constructivist view of learning and understanding recognizes that such processes are inherently social (Palincsar, 1998), and that the context in which learning takes place has consequences on the learning that takes place (Postholm, 2012). There are two fundamental ways that social context can be seen as important to the learning process: through its dynamic nature, and through the situated nature of the learner. Each of these will be discussed in separate sections below.

The dynamic nature of social context. According to Palincsar (1998), “learning and development take place in socially and culturally shaped contexts, which are themselves constantly changing; there can be no universal scheme that adequately represents the dynamic

interaction between the external and internal aspects of development” (p. 354). From this point of view, learning and context are inextricably linked together. Moreover, the contexts in which learning take place are continually evolving. Teacher PD, like other forms of learning, takes place within contexts that are continuously changing. The subtleties and undercurrents in the immediate social group of teachers engaging in PD, the personal and professional lives of teachers, the students and classroom contexts in which the teachers work, the school contexts in which teachers engage in their work, and the divisional and community contexts in which the schools exist – all of these are dynamic in nature and constantly changing. No PD context is ever the same as another, and the interrelatedness of contextual influences can never be fully understood.

In addition to the dynamic nature of the multiple contexts at work within teacher PD, there is also another dynamic factor - professional development, thought, learning, and knowledge are also phenomena that are socially constructed and continuously changing (Palincsar, 1998; Pitsoe & Maila, 2012). Even the concept of what constitutes professional development is fluid in nature, having many different meanings in different social contexts. Just as Cobb and Bowers (1999) discuss that sociomathematical norms are established within mathematics classrooms that encompass concepts such as “what counts as a sophisticated mathematical solution, and an acceptable mathematical explanation” (p. 8), norms around what constitutes appropriate professional development exist that are both socially constructed and dynamic in nature.

The dynamic nature of social context was evident in the data in this study in several ways. The first way it was evident was through changes at multiple contextual levels in the study. At the classroom level, teachers noted changes in students in their classrooms, including

student ability levels, and in their own teaching practices used in the classroom. As detailed through the individual summaries of teacher experiences in Chapter 6, individual student differences and preferences continuously changed the dynamics of the classroom contexts in which teachers worked. Partially in response to this, and partially in response to their learning experiences, teachers made several changes to their teaching practices through their participation in the Numeracy Cohort initiative, further demonstrating the changing and dynamic nature of the classroom context. Along with classroom contexts, the dynamic nature of social contexts within schools was also evident in the study. Variations in substitute availability and support received from principals between schools and even over time within the same schools were reported by teachers over the two-year period. In addition to differences between school contexts, these changes made the dynamic nature of individual school contexts apparent in the study. Evidence was also available from the study to support the existence of dynamic change at the divisional level. The entire Numeracy Cohort model represented ongoing change in the division in the area of teacher PD. Both the development of the model as a departure from existing PD practices in the division, and the ongoing fluid nature of the model, itself, provided evidence of the dynamic nature of teacher PD within the division. Even the creation of a new 0.25 FTE position for facilitation of the Numeracy Cohort, and my decision to take another position outside of the division two years later provide evidence of the dynamic nature of the divisional context, as social relationships changed and the culture of both the division and the Numeracy Cohort was affected by changes at the divisional level. More broadly, at the provincial level, while somewhat beyond the parameters of the study, evidence of change was also apparent through such things as the recent inclusion of numeracy grants at the provincial level, changes in funding levels over time, and the comments made by teachers about the reduction of provincially provided PD

opportunities in the areas of mathematics (see Chapter 5). The dynamic nature of the nested contexts in which teachers were engaged as educators and as learners, themselves, was apparent in the research study. The learning process for Cohort teachers was impacted by the dynamic social contexts that existed at all levels of the organization – at the classroom level, at the school level, at the divisional level, and at the provincial level.

A second way that the dynamic nature of social context was evident in the research study was through the emergent and dynamic nature of the Numeracy Cohort model. As was described in detail in previous chapters, the model was designed to function within the rural context of the division in order to mitigate challenges faced with respect to accessing and providing meaningful teacher PD. As a result, the structure of the model was tentative, malleable, emergent in nature, and was expected to change over time in order to both mitigate challenges and to address the unique and specific needs of the teachers who participated in it. As a result, the model did change significantly over the two-year period, as was evident in the data in the study. The most significant changes that took place with regards to the structure of the PD model were changes in critical friends pairings, changes in the number of face-to-face sessions per year to minimize conflicts with in-school PD offerings, the development of small group external PD sessions as preferred ways of engaging in the acquisition of new strategies, the incorporation of follow-up sessions after small group sessions and other activities, the incorporation of school visits into the model, and the minimization of the online component of the model. Although these changes have already been described in significant detail elsewhere in the thesis, the dynamic nature of the PD model, itself, is clearly evident in the quantity and depth of structural and operational changes that took place over the two-year period.

A third way that the dynamic nature of social context was evident in the research study was within the Numeracy Cohort itself. Cohort teachers, the Numeracy Coach, and others that had influence on the initiative socially and culturally shaped the context within and around the Numeracy Cohort, and therefore the experiences and learning of teachers. The experiences of teachers as described in Chapter 6 provide evidence of growth and change individually and in collective groups within the Numeracy Cohort, offering insight into the dynamic nature of the Numeracy Cohort as a social context. As outlined in *Figure 8*, collaborative relationships changed over the two-year period, and through the data in the study, such as the MAR projects and interviews conducted with teachers, the effect of those relationship changes can be seen on both teacher learning and teaching practices. Along with the changes in the collaborative relationships of teachers that could be seen, several examples of changing social dynamics could also be seen in the facilitator notes in the study. These changes included the increasing development of community, the establishment of a learning environment in which teachers felt safe to share ideas and concerns, and changes in my role as facilitator within the group. Although these changes are all described in significant detail in Chapter 5 and 6, it is worth noting that together, the changes teachers made to practice, the changing collaborative relationships between teachers, and the changing dynamics I experienced as a facilitator of the group all provide evidence of the dynamic nature of the social context in which the Numeracy Cohort existed and functioned.

Having established how the dynamic nature of social contexts was manifested within the context of the rural PD model in the study through changes in multiple contextual levels (classroom, school, division, province), changes in the Numeracy Cohort model structure and operations, and changes in the relationships amongst Cohort teachers and myself as facilitator, I

now turn to how this important social constructivist principle contributed to teacher professional growth through the locally constructed rural PD model. During the focus group discussion with principals, one of the principals noted that a strength of the Numeracy Cohort initiative was its ability to help teachers find ways to deal with the complex and dynamic nature of teaching when she said the following:

Teaching is so complex . . . complex in that the way kids/students learn, and the way teachers teach, the interaction between the two, and if you go in with that whole model of here it is, I'm going to teach it and you're going to learn it and if you don't, whatever, you're going to be done. I think the Cohort is promoting that reflection piece that I spoke about earlier, trying new things, trying to make a very complex occupation, dealing with complex individuals that are different the next day.

The principal's comment gets at the heart of the reality for teachers in the division and more generally – the contexts in which they work are complex and continuously changing. The Numeracy Cohort was designed with this in mind. The dynamic nature of the multiple contextual levels in which Cohort teachers worked and engaged in learning opportunities necessitated an increased sensitivity to the contexts in which teachers worked, the unique needs of teachers within those contexts, and more broadly, the intersection of contexts and needs within the Numeracy Cohort model. Such an increased sensitivity required careful listening to the feedback of teachers in order to adapt the PD model to the needs of teachers. It was this process of responding to the needs of teachers and allowing the PD model to authentically change and emerge that allowed more authentic collaborative groups to form, that allowed groups to begin to attend PD sessions as teams with follow-up sessions afterwards, and that changed the number

and timing of face-to-face sessions to better meet the needs of teachers. The collaborative groups that emerged and the work in which they engaged together, particularly during the second year, were some of the most valued parts of the PD model in terms of reducing teacher isolation, building a sense of community, and changing teaching practice (as evident in Chapter 6).

As the relationships between those involved in the Numeracy Cohort and the model itself evolved, so too did the norms and practices around teacher PD in the division. At both the divisional level, and at the level of teachers in the division, ideas about what effective PD involved, what counted as PD, and what it meant to be involved in PD underwent change. As previously described (see Chapter 6), the superintendent of the division indicated that the Numeracy Cohort model had changed the way people in the division saw PD, and others had begun asking to develop Cohorts around topics of interest in the division. In addition, through comments like those of Karen (see Chapter 6), it was evident that for some teachers, their perceptions about what counted as PD shifted throughout the process. While it is difficult to link specific teacher professional growth to the changes in divisional attitudes towards PD, it was evident from the superintendent that the future direction of PD in the division was likely to include cohort models. This was a departure from the way PD had been provided in the past and had the potential to continue to reduce teacher isolation and allow for the diverse needs of teachers to be considered in PD initiatives. In the case of Karen, the freedom to engage in self-directed PD (including creating new materials and analyzing assessments) was clearly something she found beneficial for her practice. As such, teacher PD as a socially constructed phenomenon was evident in the study. Divisional leaders and teachers alike experienced the dynamic nature of such phenomena first hand, and used the changing and emergent nature of teacher PD to reimagine teacher professional growth.

The individual learner as situated within social contexts. Palincsar (1998) notes the following about the relationship between sociocultural contexts and the individual from a social constructivist point of view:

From social constructivist perspectives, separating the individual from social influences is not regarded as possible. The sociocultural contexts in which teaching and learning occur are considered critical to learning itself, and learning is viewed as culturally and contextually specific. (p. 354)

Within social constructivist frames of thought, the individual is situated within social contexts, and individual learning that takes place cannot be separated from the context in which it occurs. Learning, in essence, results from, and is inextricably linked to, the contexts in which learners exist and interact.

In addition to the immediate sociocultural context in which learning takes place, individuals are also part of increasingly broader social contexts that also impact the learning process such as school contexts, divisional contexts, community contexts, provincial contexts, or even the broader field of education. Just as the individual cannot be separated from the immediate context in which learning takes place, they can also not be separated from the broader social contexts of which they are a part that impact the learning process.

It is for this reason that many suggest that contexts and the specific needs of teachers should determine and guide teacher PD (Patton et al., 2012; Pitsoe & Maila, 2012). The multitude of social contexts in which teachers are situated as learners must all be considered in the planning of teacher PD models and opportunities. Their classroom contexts, school contexts, divisional contexts, and the social context of the collective must all be considered in order to

provide learning opportunities that are sensitive and relevant to the needs and unique contexts in which they teach.

The Numeracy Cohort initiative, itself, was designed around the consideration of the divisional context in which teachers were situated. As was outlined in detail in Chapters 4 and 5, the entire model was designed to mitigate the challenges faced in the division with regards to accessing and providing meaningful teacher PD. The fact that the division began the initiative with consideration of the contextual influences on teacher PD in the division, and the fact that the division sought to draw on local strengths and mitigate challenges, speaks to the significance of this social constructivist principle in terms of its importance in the field of rural teacher PD. Rural contexts have to be considered in relation to individual teacher PD as teachers are situated within them as well as the classroom, school, community, and divisional contexts in which they operate. As previously described, the Numeracy Cohort model did several things in consideration of the rural context in which teachers were situated including: creating leadership capacity through the creation of the 0.25 FTE position, recruiting teachers from geographically diverse areas in the division, incorporating the use of critical friends or partners, getting teachers together in a variety of ways for face-to-face content and collaborative learning, sending teams of teachers out to PD sessions, incorporating the use of self-directed MAR projects, incorporating an online component in the model, and obtaining feedback on an ongoing basis from teachers through interviews and oral or written reflections. The results and discussion related to the first research question in this study (see Chapter 5) suggest that consideration of the rural challenges faced in the division led to the division's ability to overcome many challenges to a significant extent, thereby providing meaningful opportunities for the division's teachers through the initiative. Moreover, the results of the second research question (see Chapter 6)

suggest that the model was effective in several ways of supporting teachers' professional growth in the area of mathematics instruction and student numeracy. Consideration of rural contexts, including challenges faced within them, is of critical importance in the field of education, not only because teachers are situated within them, but because the link between individual learning and context cannot be separated.

In addition to consideration of the divisional and broader rural context of the Numeracy Cohort initiative, evidence of consideration of multiple levels of contexts in which teachers were situated was also apparent in the study. In the case of the Numeracy Cohort initiative, Cohort teachers were situated within the immediate social context of the Numeracy Cohort, as well as their own classroom, school, and community contexts. While the Numeracy Cohort was a common context in terms of the shared experiences that teachers engaged in, the classroom, school, and community contexts that teachers were also situated within were largely unique (with the exception of the few teachers that shared the same school contexts and/or community contexts). The broader contexts in which all individuals involved in the initiative were situated included the divisional and provincial educational contexts, as well as the increasingly broader field of education beyond Manitoba's borders. *Figure 9* (below) represents the multitude of contexts in which Cohort teachers were situated.

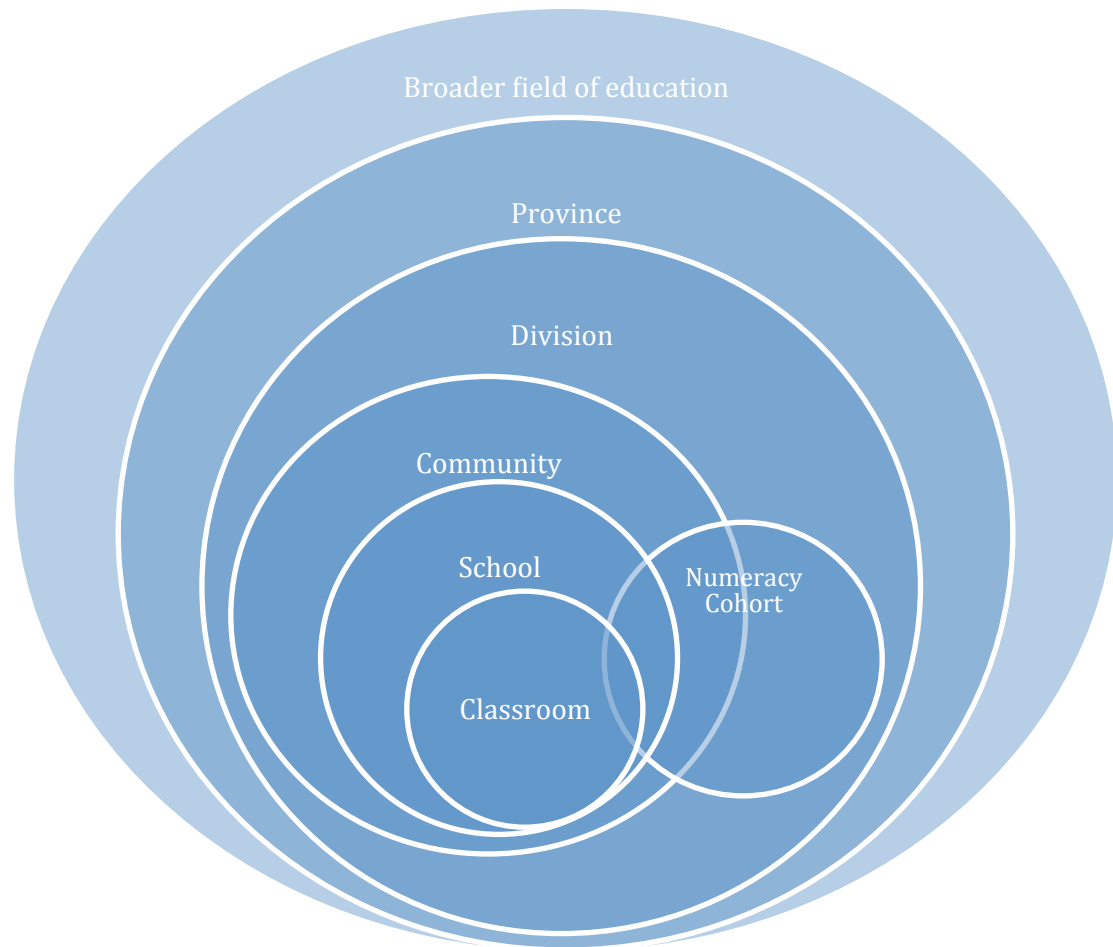


Figure 9: Multiple contexts in which Cohort teachers were situated.

One of the things that becomes visually clear in *Figure 9* is the way that the Numeracy Cohort is both situated within the division, province, and broader field of education, but more along side of the community, school, and classroom communities within which Cohort teachers were situated.

This was in large part due to the divisional level of the Numeracy Cohort Model. While many professional learning communities exist within the school contexts of teachers, the divisional context necessitated broader connections within the division in order to form meaningful collaborative partnerships. While the reasons for this have already been described in detail in Chapters 4 and 5, when looking at the situated nature of individual learners within the context of the rural teacher PD model that was the subject of the study, it becomes apparent that the

immediate context of the Numeracy Cohort was unique in its relationship with the other contexts in which Cohort teachers were situated. This may partially explain the concern I had as a facilitator with understanding the classroom, school, and community contexts of Cohort teachers in order to address their contextual needs as educators. While the geographically diverse recruitment of teachers allowed for teachers to engage in PD with others who taught similar subjects and at similar grade levels, it also meant that Cohort teachers were members of different schools and communities. As a result, more effort was required to learn about the individual contexts teachers were situated within, and significant differences existed between the contexts of teachers involved in the initiative. Several of the challenges I faced as the facilitator of the Numeracy Cohort, including meeting the needs of a broad range of teachers, my own limitations with regards to expertise in a variety of areas, tension about how best to spend face-to-face time, and varying levels of commitment, focus and support were related to differences in contexts (classroom, school, and community) in which Cohort teachers were situated. In many cases, it was the attempt to consider these contexts in the design of PD opportunities that presented the most significant challenges for me as a facilitator.

In reviewing data from the study, it was evident that attention was paid to the classroom, school and community contexts of teachers in a variety of ways in order to support teacher professional growth. In terms of these contexts, information was gathered about the teaching assignments, classroom needs, school dynamics, and community contexts of teachers at various stages of the initiative. This information gathering allowed for topics of interest to emerge for consideration for future sessions, as well as potential MAR projects to emerge for individuals or collaborative groups. Interviews, written and oral reflections, on-site visits, goal setting exercises and the MAR projects themselves all contributed to individual and collective

consideration of the multiple contexts of teachers. It was through these activities that topics such as culturally appropriate mathematics activities for Hutterian students, multi-grade activities for multi-grade classroom and school contexts, and strategies for helping struggling students with numeracy skills emerged. As already mentioned in Chapter 6, some of these emergent interests and foci resulted in significant growth in terms of both teacher learning and changes in classroom practices.

In addition to the divisional, community, school, and classroom contexts of teachers, attention was also paid to the immediate learning context of the Numeracy Cohort throughout the initiative. As previously mentioned, community-building activities, opportunities for collaboration and dialogue, and the establishment of a safe and trusting environment in which teachers could express ideas or try out new strategies were all part of the consideration of the immediate learning context in which Numeracy Cohort teachers were situated. Charts about the content of face-to-face sessions (see Appendix F) included community-building components at each meeting and opportunities to share, discuss, reflect, and build relationships. Comments from teachers indicated that the safe and trusting environment was critical to the learning that took place and various comments from teachers noted that collaborative opportunities were an important part of their learning (see Chapter 6).

Social Interaction

What separates social constructivist theory from constructivist theory is a fundamental understanding of the importance of social interaction as critical to the learning process. Social constructivists believe that individual learning is inextricably linked to social interaction, that knowledge can be co-constructed by members of a community of learners, and that learners can be assisted by more competent others through social interactions within a community of learners.

Each of these important principles of social constructivism contributes to an understanding of the importance of social interaction in both individual and collective knowledge construction.

Social interaction as required for individual construction of meaning. One of the most important principles in social constructivist learning theory is an acknowledgement of the interrelatedness between social interaction and the individual construction of meaning.

According to Richardson (1997):

Social constructivists have a very different view of the process of the construction of knowledge than Piagetians. They do not focus, primarily, on the individual, but view the social as instrumental, if not essential, in both the construction and appropriation of knowledge. (p. 7)

From this point of view, the individual does not just take in information. Rather, social interactions are necessary for learning to occur. Richardson (1997) notes the following:

The sociocultural form of this conception derives primarily from L. S. Vygotsky (see Davydov, 1995; Moll, 1990; Wertsch, 1991). Within this framework, the development of an individual relies on social interactions. It is within this social interaction that cultural meanings are shared within the group, and then internalized by the individual. (p. 8)

Viewing learning from a social constructivist, or more specifically a sociocultural, perspective necessitates an understanding of the relationship between social interactions and individual knowledge construction. From such a point of view, “learning involves the negotiation of meaning” (Cobb & Bowers, 1999, p. 11) as individuals interact within social contexts and appropriate understandings through the process.

In terms of the research study, the interrelatedness of social interaction and individual knowledge construction could be seen through the design of the Numeracy Cohort model, through the feedback provided by teachers about the model's effectiveness, and through the descriptions provided by teachers about their own learning. In terms of the PD model's design, the importance of social interaction was evident in the way the overall model attempted to create social interaction by building a cohort of teachers from across the division to engage in learning together. The creation of the Numeracy Cohort provided a social context (and social interaction) that didn't previously exist in the division. The inclusion of critical friends pairings and face-to-face sessions also provided opportunities for teachers to engage with other teachers, and to individually and collectively construct new understandings through their interactions.

Teacher feedback about the effectiveness of the model (as previously described in Chapter 6) included comments about a reduction in feelings of isolation, as well as an appreciation for collaborative opportunities, particularly with other teachers who taught similar grade levels and subject matter. Teachers cited community and collaboration as critical to the effectiveness of the model, and appreciated the networking and sharing opportunities that were afforded them through the initiative. All of these comments made by teachers are rooted in the importance of social interaction in the learning process. In addition to these, the abandonment of the online platform as a tool for social interaction in favor of face-to-face contact and interaction further illuminates the importance of social interaction in the learning process for teachers. Changes such as this, and the move towards small group teams attending workshops with follow-up sessions together, illustrate how the model evolved to include more interaction between teachers, and how this interaction was both requested and appreciated by teachers as they engaged in the learning process.

The importance of social interaction and its contribution to the effectiveness of the model could also be seen in the individual and collective feedback provided by teachers about their learning. As outlined in Chapter 6, many of the teachers described things they individually had learned as part of their participation in the Numeracy Cohort. Many of the things individual teachers reported learning were linked to social interactions and collaboration with other teachers. Just as one early years group discussed the impact of classroom visitations and collaborating on Math Recovery strategies, the other early years group discussed tremendous learning about math workstations when they attended a workshop together and followed it up with a day of collaboration, creation, and interaction. Middle years teachers similarly noted significant learning about project-based learning as they attended a problem solving workshop together, designed and carried out project-based learning strategies as a collective, and engaged in follow-up discussions and activities together. The senior years teachers, two of the most isolated teachers in the division in terms of isolation from colleagues teaching similar courses, noted that they had learned a lot about what was going on in the division. In addition, one of the senior years teachers indicated that problems with timetables prevented them from working together on the same courses at the same time, and the lack of interaction was a challenge in the model for her.

In addition to learning that stemmed from collaboration with other teachers, a few teachers also described additional learning that occurred through social interaction with other teachers, but not necessarily through collaborative efforts. For example, Carl noted that he had had significant support from other teachers like Carol and Ellen, which was invaluable to him as a new teacher. He indicated that the interaction with other teachers had allowed him to ask questions he had as a new teacher in several areas. While many of these conversations were

informal in nature, what emerged from the study was that they were critical to teacher learning. In the focus group discussion with teachers at the end of the two-year period, Carol said the following in response to the question asked about social constructivist principles evident in the model:

Where it says the establishment of collaborative, safe learning environment - we talk about things very freely, but building a relationship with the people in the Cohort has made that easier. Whereas again, even if you have time, a little bit of time, I think over the year, or the years, you've built that safe environment. Well I tried this, and I'm not scared to say I tried we failed and it didn't work. Does anybody have any better ideas? What do you think I did wrong? You've built that in with that time with all these people. And with that, you have a connection to make a fast phone call. "Hey guess what? This worked super!" or "Hey, don't try that" or "If you try it, be prepared for this to happen" and go on from there.

Carol's comment illustrates both the importance of the establishment of a collaborative, safe learning environment in which teachers felt free to take risks, and the importance of informal conversations between teachers that promoted individual and collective learning. By creating space for teachers to engage in social interactions on an ongoing basis, trust was developed, leading to opportunities for growth.

The interrelatedness of social interaction and individual learning is an important principle when thinking about learning from a social constructivist perspective. Evidence from the research study suggests that consideration of social interaction through model design and through the experiences that are planned for and enacted with teachers is of critical importance. So too are informal opportunities for interactions. Links can be made between teacher feedback about

the effectiveness of the model and opportunities for social interaction that were provided.

Moreover, connections can be drawn between the social interactions teachers engaged in and the learning they reported as a result of their participation.

Collective generation of meaning. Knowledge is co-constructed within social interactions through the negotiation of meaning amongst members of a learning community.

Given that reality is seen to be created via processes of social exchange and is historically situated, social constructivists are interested in the collective generation of meaning among people. Therefore, the characteristic feature with a view to knowledge is relational, tentative, and largely perceptual. (Pitsoe & Maila, 2012, p. 320)

Social constructivists are concerned with more than individual knowledge generated through social interaction; they are interested in the ways in which social interactions lead to the collective generation of understanding amongst people.

One of the interesting extensions of thinking about the collective generation of meaning is the belief that the whole is “greater than the sum of its parts” (Pitsoe & Maila, 2012, p. 320), meaning that the collective has capabilities that extend beyond what, individually, members of that a community are capable. According to Palincsar (1998), the move from cognitive perspectives towards social constructivism included a desire to distribute the cognitive work: “Researchers hypothesized that by drawing upon a larger collective memory and multiple ways in which knowledge could be structured among individuals working together, groups could attain more success than individuals working alone” (p. 349). From this point of view, it is through the collective capacities of individuals that engage in social interactions that the collective benefits.

Interactions with others that have different ways of thinking allow for new knowledge to emerge that would not otherwise be possible.

Collective generation of meaning was evident in several ways in the Numeracy Cohort PD model. As described in Chapter 6, teachers who participated in the initiative co-constructed a definition of numeracy together (see Facilitator successes). As previously mentioned, I appreciated the formation of common understandings as a facilitator, feeling that they provided a foundation on which collaborative work could emerge, and a common vocabulary that the collective could use and understand. The fact that both the early years group and Karen used the phrase “competent and confident” in their reflections (see Chapter 6) suggests that the co-constructed definition did impact the vocabulary of some of the participants, and that this terminology had moved into the vernacular of teachers. While the extent to which the co-constructed definition impacted teachers’ thinking about numeracy is unclear, the use of the phrase months later suggests that there was an impact on teacher understanding to some degree.

Along with the explicit co-construction of a definition of numeracy, data from the study suggested that there were also other less formal collective meanings established through the social interactions of Cohort teachers, including: the value of workstations and project-based learning as learning tools in the mathematics classroom, possibilities for creating multi-grade and culturally relevant classroom activities, the relevance of Programme for International Student Assessment [PISA] and Pan-Canadian Assessment Program [PCAP] results for teachers, an understanding of different school contexts and players in the division in terms of mathematics instruction, and new understandings about what PD could look like in the division. These examples of less formal collective meanings generated through the social interactions of the group emerged through similarities in comments made by teachers engaging in reflections about

the model, the process, and their own learning. While not all of the examples were identified by all of the teachers, all of the examples were mentioned by several participants at varying points over the two-year initiative, indicating their prevalence and importance.

The Numeracy Cohort model's structure was created, in part, to increase collaborative opportunities for teachers in the division as was described in Chapters 4 and 5. The inclusion of ongoing face-to-face opportunities, critical friends pairings, and collaborative MAR projects fostered the collective generation of meaning throughout the two-year initiative. When asked about the social constructivist elements evident in the model, and how they contributed to teacher professional growth within the local context, the superintendent of the division started by saying the following:

I think that's the biggest impact of something like this. It's - you have this collaborative group that's constantly, whether it's starting with constructing a definition, a working definition of numeracy, to then how does that look in a grade one context, in a grade nine classroom, in a grade twelve classroom, in a middle years project-based environment? And what they've done is- this dialogue that's going on, these ideas that are being debated, discussed, turned over, tried, discarded, improved upon, all those things just, to me, it's very much a-, you know, a constructivist plan.

This comment provides insight into how collective generation of knowledge took place within the Numeracy Cohort initiative. Each of the teachers brought to the group their own contextual backgrounds and experiences, and as concepts were engaged with, they “debated, discussed, turned over, tried, discarded, improved upon” the ideas before them, using their own experiences, contexts and strengths to add to the collective understanding of the Numeracy

Cohort, whether it was about the meaning of the word numeracy, or the usefulness of project-based learning strategies in the classroom. Through this process, ideas were broadened and extended through the teacher interactions, allowing the individual and collective understandings described in Chapter 6 to emerge.

Assistance by more competent others. Another important social constructivist principle linked to social interaction is the belief that learners can be assisted by more competent others within their Zones of Proximal Development (Postholm, 2012; Vygotsky, 1978). This principle is linked with social interaction because it is through interaction with the more competent other that learning takes place. Within the context of teacher PD, more competent others may be colleagues, workshop leaders, facilitators, external teachers, or other resource persons (Postholm, 2012). Such people provide new ideas that rub up against existing beliefs and understandings, allowing for learning to occur. Karen, a high school teacher involved in the Numeracy Cohort initiative identified how colleagues or other teachers could perform this function in a focus group discussion question directed at the ways in which social constructivist principles contributed to teacher learning:

I think that a really big deal is that we are working with other people so you're getting to - that whole way you're learning, you're discovering what somebody else is doing and you're being able to take that, you reflect on it, um sometimes it is quite different than what you're doing, or you're going "I don't know if I can make that work" and you're thinking about it, reflecting on it. And then you're basically you're learning, you're changing, you're evolving, and you're upping the quality of your practice.

In this comment, Karen clearly identifies the process she felt she went through as she came into contact with ideas from colleagues and other teachers who shared ideas with the Numeracy Cohort. This process involved the interaction between the ideas and practices of others and her own understandings and teaching practices, allowing her to change and evolve as a teacher.

According to Richardson (1999), the role of a teacher educator involves both the introduction of new knowledge and facilitation of an environment that allows teachers to link their own experiences with new knowledge:

Within a constructivist teacher education environment, the teacher educator's role often is that of a facilitator. She facilitates the participants' learning and making of meaning and creates an environment that allows participants to link their background knowledge to the material that is being discussed. The teacher educator also is responsible for ensuring that new formal knowledge enters into the conversation. This does not mean that the teacher educator is always the one to introduce formal knowledge; it could be introduced in numerous ways. (p. 160)

Although Richardson's focus was on teacher education programs in this quotation, the same can be said for in-service teachers. As outlined in Chapter 5, one of the rural challenges teachers identified was isolation from new ideas in the field of education. This challenge was addressed by bringing in presenters on a variety of topics, sharing information at face-to-face sessions, providing opportunities for collaboration and sharing, organizing classroom visitations, sending teams of teachers out to workshop sessions, and arranging follow-up time for them to get together afterwards. As a facilitator, I was able to assist teachers by organizing these opportunities. The descriptions contained in Chapter 6 suggest that many of these experiences resulted in teacher learning as teachers engaged with "more competent others" such as presenters

brought in, colleagues in the Numeracy Cohort, other teachers outside the division, workshop facilitators, or myself as Numeracy Coach.

The role of the facilitator as a “more competent other” (Postholm, 2012, p. 406) is an important phenomenon in the field of teacher PD. Facilitators of teacher PD have a complex role to play as they attempt to both provide new knowledge and develop an environment in which teachers can engage with new information. Pitsoe and Maila (2012) refer to the role as that of an artist, describing the nature of a role that is dependent on context and relationships. Similarly, in an article that examined the collective knowledge and experience of twelve experienced teacher PD facilitators, Patton et al. (2012) noted that there are “tennis shoes required” (p. 522) in that effective facilitation requires a constructivist approach that acknowledges what teachers bring to the table, that learning is an active process, and that learning is a social process (p. 526). They advocate for an approach that that draws on the assets and needs of teachers, rather than prepackaged one-size-fits-all content that reinforces “complacent, passive, and compliant learners” (p. 531). Patton et al. (2012) describe the importance of the “pedagogy of facilitation” (p. 523), including: the importance of building “lasting personal and professional relationships between teachers” (p. 529), hearing the voices of teachers, “situating ongoing PD within a supportive community to foster risk-taking and shared responsibility” (p. 530), being adamant that the experiences were social in nature and relevant to teachers, and introducing “disequilibrium while creating an environment in which teachers felt safe, supported, and free too make mistakes without judgment” (p. 530). All of these aspects of the role of the teacher PD facilitator allow the facilitator, as a “more competent other,” to assist teachers in the learning process.

The data in this study were particularly rich around the role of the facilitator due to the facilitator notes that were kept as part of the process. As previously described in the facilitator successes section (see Chapter 6), evidence of the model's effectiveness in supporting teachers' professional growth in the area of mathematics instruction and student numeracy was found in several areas: bringing a variety of resources into the division, sending teams of teachers out to engage in PD together, on-site visits, flexibility in terms of responding to contextual needs, community-building, reflection, and the potential for scaling up the initiative. While Chapter 6 provides evidence of the success these actions and model attributes had on supporting teacher learning, they can also be viewed through the lens of PD facilitator as a "more competent other" (Postholm, 2012, p. 406) assisting teachers in the learning process. The actions I took as facilitator, along with the actions of other PD facilitators in the field, such as those interviewed by Patton et al. (2012), paint a picture of what a facilitator as "more competent other" looks like in the context of teacher PD. It was evident through data in the study (see Chapters 5 and 6) that this role involved several critical features, including: creating opportunities for new information and existing beliefs to interact, understanding the contexts of teachers, cognitive flexibility and responsiveness to feedback from teachers, providing opportunities for reflection, building relationships, building a safe and trusting community, challenging existing beliefs, developing accountability, and maintaining the focus of the group. It was also evident through the facilitator challenges expressed in Chapter 6 that meeting the needs of a broad range of teachers, making decisions about how best to use face-to-face time, my own expertise as a facilitator, and helping teachers set meaningful goals were complex areas of my role as facilitator that made it difficult to be the "more competent other" that assisted teachers in their learning.

The social constructivist belief that learners can be assisted by more competent others within their Zones of Proximal Development (Postholm, 2012; Vygotsky, 1978) is a key principle that can be examined in the context of teacher PD through models such as the Numeracy Cohort. Whether the “more competent others” (Postholm, 2012, p. 406) were Numeracy Cohort members, presenters brought in, the Numeracy Coach, workshop facilitators outside the division, or other teachers; every piece of learning identified in Chapter 6 was at least partly made possible by them. As a result, the concept of assistance by more competent others is both a fundamental part of social interactions within the context of teacher PD, and a contributing factor for both collective and individual knowledge generation.

Human Engagement

The learner, from a social constructivist perspective, must be actively engaged rather than passively compliant if significant learning is to take place (Palincsar, 1998; Postholm, 2012). According to Palincsar (1998), verbal interaction is key in promoting such active engagement. Although human engagement is often viewed as implicit in social interaction, the degree to which learners participate in social interaction, and engage in allowing new ideas and ways of thinking to rub up against their existing knowledge and beliefs, varies amongst learners. According to Postholm (2012), “teachers must have a will to learn” (p. 424). In the context of teacher PD, perhaps the most significant contributors to professional growth are the desire to learn and the willingness to engage in actions and thought within the context of the learning community.

In the case of the Numeracy Cohort, varying levels of engagement between Cohort teachers and even for the same teachers over time were observed. The stories of teachers expressed in Chapter 6 indicate differences in the number of projects undertaken by teachers, the

variety of interest areas expressed by teachers, the willingness of teachers to collaborate with others, and the amount of planning and energy spent outside of Cohort meetings on their MAR projects. While engagement is a complex topic, it was evident in the study that increased levels of engagement resulted in increased learning. For example, when early years teachers were highly engaged in learning about workstations and incorporating them into their practices in the second year, they organized a workshop to attend together and follow-up sessions to put into practice what they had learned. These teachers (see Carol and Ellen) also noted some of the most insightful comments about how substitute teachers and outsiders had seen improvements in student learning, and shared video footage from a classroom to help others in the Cohort understand their work, discoveries, and learning.

Human action as mediated through tools. The question of how, exactly, human beings actively engage in learning is an important consideration. One perspective stemming from the work of Vygotsky considers the use of tools and signs:

The second Vygotskian theme that Wertsch (1991) has identified is that human action, on both the social and individual planes, is mediated by tools and signs – semiotics. The semiotic means include: “language; various systems of counting; mnemonic techniques; algebraic symbol systems; works of art; writing; schemes, diagrams, maps and mechanical drawings; all sorts of conventional signs and so on” (Vygotsky 1981, p. 137). These semiotic means are both the tools that facilitate the co-construction of knowledge and the means that are internalized to aid future independent problem-solving activity. (Palincsar, 1998, p. 353)

From this point of view, it is through the use of tools such as language, dialogue, and writing that human beings engage with others and with new ideas, allowing them to generate individual and

collective understandings, and to use these understandings in their lives. Similarly, Postholm (2012), describes the use of cultural artifacts as tools for learning:

Facts are not transferred to the learners, but the learners appropriate their own meaning relating to the content by means of cultural artefacts. Cultural artefacts may, in this context, be language used in conversation, or the learner may be in dialogue with a text. Teaching teachers with this perspective as a the guide would often require a dialogue between the previous experiences teachers have, their tacit perception of pedagogy and the educational content they interact with in their training. (Postholm, 2012, p. 406)

Postholm's (2012) article, which is specifically about teacher PD, addresses the problem of what tools and signs can be used for mediation of human action within the context of teacher PD.

Postholm (2012) notes that there is interconnectedness between reflection and action, as well as between thoughts, emotions, the will of a person, and action. As a result, reflection, dialogue, and metacognitive awareness are critical components of effective professional development in terms of promoting the self-directed learning of teachers. Within the context of teacher PD, this means that teachers need to be engaged in active learning experiences about content that is meaningful to them, and that they must be encouraged to engage in reflection and dialogue about their experiences (Patton et al., 2012). Tools that promote reflection and dialogue, thereby allowing new ideas to interact with existing understandings and beliefs, are of critical importance in teacher PD contexts.

In an article about the use of video supported reflection in teacher PD, McCullagh (2012) describes the use of video as a mediating tool for teacher learning, noting that "video enriches dialogue and collaboration and therefore acts as a mediating tool for reflective practice" (p. 138).

For McCullagh, the use of video in teacher PD enriches the social practices of teachers as they engage in interaction and communication about what they observe. Observing video can cause “dissonance between what they observe in the video recording and their own memory-based perception of the same event” (p. 145), thereby beginning the learning process. Growth can continue as teachers then engage in changing practice as a result of their observations and interactions within the group. McCullagh’s (2012) example of video as a mediating tool for teacher learning illustrates one way of enriching the social interactions, including reflection and dialogue, of teachers engaging in learning together. An interesting area of study could be to analyze articles about teacher PD to collect examples in order to understand the many ways that social interactions can be enriched in PD settings through the use of tools such as video.

Data from the study suggest that several tools were utilized to help teachers individually and collectively examine existing practices and beliefs, and to engage with new ideas about mathematics instruction and student numeracy. Cohort teachers engaged in dialogue at all face-to-face sessions through a variety of strategies. As outlined in the table in Appendix F, opportunities for dialogue were fostered through the activities that were planned. Some of these opportunities included goal-setting activities, community building activities, collaborative brainstorming activities, directed discussion about new topics (brought in by articles, presenters, Numeracy Coach, other teachers), scheduled sharing of progress on MAR projects, the accessing of time and resources to visit the classrooms of other teachers outside the division, the inclusion of small group follow-up sessions after teams of teachers attended workshops, and the encouragement of informal conversations at face-to-face meetings. Cohort teachers also engaged in a significant amount of reflection through their participation in the initiative. Reflection was incorporated into the Cohort structure in a variety of ways, including: three sets of semi-

structured interviews with the Numeracy Coach (and their critical friend or partner where possible), several opportunities to provide written reflections online and at face-to-face sessions, though the reflection portions of their MAR forms and their reports about their MAR projects, in discussions at face-to-face sessions focused on reflection about the process, and through their sharing with the administration council and other teachers at the Cohort run PD day in the second year.

One of the most significant tools for enriching the amount of dialogue and reflection in which teachers engaged was the use of MAR projects in the Numeracy Cohort initiative. Just as McCullagh (2012) identified the ability of video to enrich the social interactions of teachers engaging in PD, the MAR projects used in the rural PD initiative profoundly enriched the social interactions of Cohort teachers. The MAR projects were directly related to the contexts and goals of teachers, and promoted collaborative inquiry. As a result, collaborative teams formed around similar interest areas, thereby enriching the interactions between teachers. Opportunities for dialogue increased as teachers shared their work with others, and invited comments and questions about their experiences. Opportunities for reflection about strategies and their own teaching practices were also enhanced through the inclusion of the MAR projects in the initiative, as teachers thought about an area they wanted to work on, tried something new, and reflected on how it went.

While language, dialogue, and reflection are important tools for human engagement in the learning process, what was evident from the study was the way in which small action research projects served to enhance social interactions within the PD context. This finding suggests that it is a worthwhile endeavor in designing PD opportunities to look at additional tools that have the ability to enhance dialogue and reflection in particular. Through the use of video,

action research, or another tool that enhances opportunities for dialogue and reflection, teachers engaging in PD can experience more opportunities for new ideas to rub up against existing beliefs and understandings. The result may be more robust learning opportunities for teachers engaging in PD initiatives.

Conclusion

In conclusion, looking at the locally constructed teacher PD model in this study through a social constructivist lens is a complex task. Sean, a participant in the Numeracy Cohort (and the research study) described his experience the following way:

I think just in general, like the, we're kind of following a different pedagogy, like instead of the banking method of learning, we're not going to a PD and having information deposited into our heads, we're actually reflecting on it and then doing something with it. We're being immersed in a social situation where we're working with our colleagues and using, whether it's information brought to us or whether we're learning it from talking with our colleagues, we're actually immersing ourselves in activities to pick up and get professional development that way. So it's like a-, so in that way it's more of a social constructivist view of learning.

Within Sean's comment, elements of social context, social interaction, and human engagement can be identified. Teachers in the model were necessarily part of multiple nested contexts. They were immersed in a social context promoting social interaction and engagement in the learning process. By examining the role of social context, social interaction, and human engagement in supporting teacher professional growth in the Numeracy Cohort, a variety of implications for the design of future teacher PD models can be considered.

In terms of social context, the study verified the dynamic nature of the multiple social contexts in which teachers were situated. Change took place at all levels during the initiative: at the classroom level, at the school level, in the community, in the division, and in the province. Findings from the study suggest that recognizing and being sensitive to the dynamic nature of the multiple contexts in which teachers are situated can allow those designing PD models (particularly in rural areas) to create models that better support teacher learning and that have the capacity to evolve as the multiple contexts of teachers continue to change. At the same time, perceptions of teacher PD, which are also dynamic in nature, have the potential to evolve in ways that allow for a reimagining of what PD can be in a variety of contexts.

In terms of social interaction, the study suggests that looking for ways to foster social interaction, particularly in rural divisions and in areas with the most isolated teachers, is a valuable strategy for supporting teacher professional growth. The locally developed rural PD model in this study recruited from diverse geographical areas, employed critical friends pairings, and held ongoing face-to-face sessions in which planned and unplanned social interaction supported teacher professional learning. Examining ways to create new opportunities for social interaction is potentially a worthwhile consideration for those in charge of designing teacher PD opportunities.

Another important finding in the study related to social interaction had to do with the generation of collective meanings amongst Cohort teachers. Teachers participating in the initiative co-constructed meaning around fundamental ideas related to numeracy in both formal and informal ways. These common understandings were important in terms of developing common vocabulary and experiences with which teachers could communicate and construct their own understandings. One of the implications of this finding is the suggestion that those planning

and facilitating teacher PD explicitly pay attention to the foci of collective meaning making, as well as methods for developing collective understandings. Strategies such as co-constructing definitions can provide powerful experiences that change the vocabulary and thinking of teachers. As such, they are important considerations for those interested in designing or studying teacher PD.

A final finding in the study related to social interaction was that teachers were assisted by a variety of more competent others, including other Numeracy Cohort members, presenters brought in, the Numeracy Coach, workshop facilitators outside the division, and other teachers. This assistance occurred as teachers were introduced to new ideas and encouraged to allow those ideas to rub up against their existing knowledge and beliefs. The role of the facilitator as a more competent other emerged through the study as critical to the success of the model, particularly in terms of organizing learning opportunities for teachers (e.g. bringing in presenters, sending teams of teachers out to engage in PD together, organizing classroom visits, planning face-to-face sessions), conducting on-site visits, creating opportunities for dialogue and reflection, managing a variety of contexts and needs, building community, and maintaining the focus of the group. What also emerged were the importance of informal conversations and the establishment of a collaborative, safe learning environment in which such conversations could occur. The findings in the study suggest that those charged with the task of designing and facilitating teacher PD opportunities pay attention to both formal and informal learning opportunities for teachers; the establishment of a collaborative, safe learning environment; and potential more competent others from which expertise may be drawn that challenges teachers to reflect on their own teaching practices.

The final category of social constructivist principles considered in this chapter was related to human engagement and the use of tools as mediators for human action. Teachers in the study engaged in a variety of activities that promoted dialogue and reflection, thereby supporting the learning process. The study highlighted the importance of such tools for mediation of human action and learning. One of the critical findings in the study was the potential for MAR projects to act as mediating tools for learning, just as McCullagh (2012) cited the potential of video to enrich dialogue and collaboration, making it a mediating tool for reflective practice. More research into other possible mediating tools in teacher PD contexts would be illuminating. At a basic level, this finding suggests that those designing PD opportunities for teachers should consider tools that support engagement, interaction and reflection.

Through an examination of principles related to social context, social interaction, and human engagement, and their existence and contributions to teacher professional growth in the Numeracy Cohort model, better models of teacher PD can be imagined. In addition, the six principles identified in this chapter provide a valuable lens through which other PD models might be examined in order to understand their effectiveness. Social constructivist learning theory is a meaningful tool for both designing teacher PD models and for understanding the effectiveness of existing PD models.

Chapter 8 – Implications for Practice, Theory, and Future Research

The research findings from this study are not generalizable to other contexts due to both the bounded nature of case study, and the situated nature of learning more generally. Social constructivist theory, which recognizes the inextricable link between context and learning, would suggest that the learning that took place in this research study is linked to and dependent upon the rural context in which it was conducted, the social interactions that took place within the context, and the meaning making that took place individually and collaboratively amongst participants. Certainly no context is the same as the rural school division in this study, and no future participants in a rural teacher PD initiative will be exactly the same as those in this study (inclusive of their teaching contexts and professional needs). What then can be drawn from the study in terms of implications for practice, theory, and future research?

By returning to the conceptual framework, the assumptions on which the study was founded, and the purpose of the study, implications from this study for other contexts can be drawn. The study was based on three primary propositions: (1) that rural divisions as organizations face challenges in providing meaningful PD for teachers and that teachers face challenges in accessing meaningful PD in rural contexts; (2) that rural leaders can construct local solutions to the challenges they face by leveraging the unique strengths that exist in their local contexts in order to conceptualize and implement PD models that mitigate the challenges they face and support teachers in meeting their instructional goals; and (3) that effective teacher PD, rural or otherwise, has generally agreed upon characteristics in the field of education that should guide the development of any PD model or opportunity in order to increase the likelihood of improving teaching practice and student learning outcomes. Together, these propositions sought to address the problem of *how* rural school divisions and teachers might go about creating locally

specific models of PD that lead to a provision of effective and meaningful PD for teachers and that mitigate the challenges faced in providing effective PD, both within the specific local context. The strength of the findings of the study are in the identification of the challenges faced by the division and its teachers due to the rural context of the division, the ways in which the Numeracy Cohort model was able to mitigate some of the challenges experienced by the division and its teachers, the characteristics of the PD model that were effective in terms of supporting teacher professional growth, and the identified role of social constructivist principles in the model's effectiveness. While not generalizable, what was learned in this study about the particular locally constructed rural teacher PD model and the processes and principles involved may be transferable to or useful in other settings (Marshall & Rossman, 2011), giving consideration to the respective local situation. Ultimately, it is up to those reading the study to construct or identify the connections that can be made to a different context of interest.

The challenges faced by the division and its teachers in providing and accessing meaningful PD both fell within the four categories that were drawn from literature on rural challenges (funding, geography, staffing, and contextual differences), and provided an example of such challenges from a specific rural context. As a result, the study has theoretical implications for the field of rural education – namely that these categories are a meaningful way to look at rural challenges to teacher PD. In addition, the Numeracy Cohort model attempted to mitigate several of the challenges faced within the division, illuminating several promising practices that have the potential to be effective in other contexts as well. Some of these promising practices are outlined in *Figure 10* below.

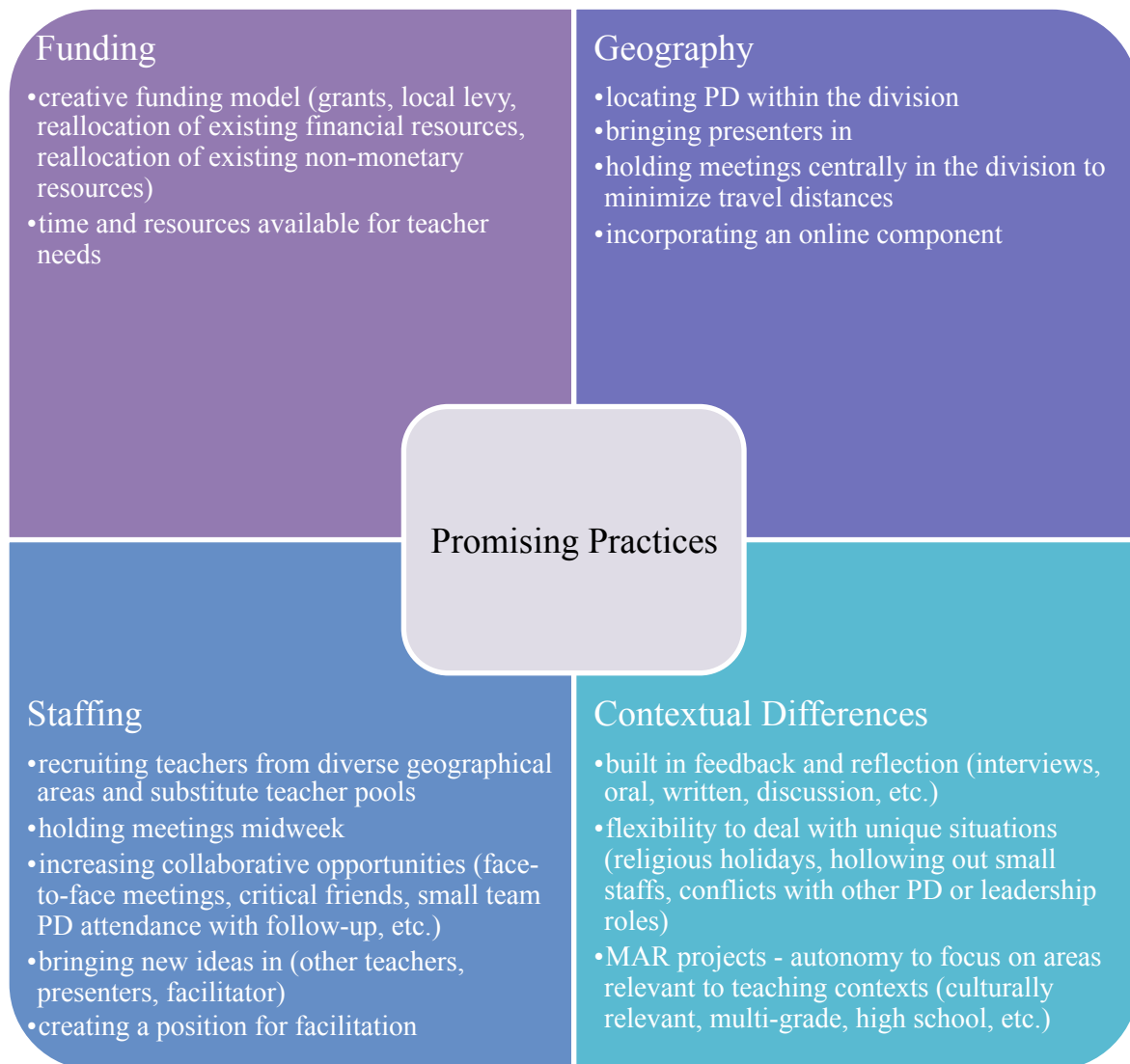


Figure 10. Promising practices

As the findings in Chapter 5 suggested, the Numeracy Cohort initiative was able to mitigate several of the challenges the division and its teachers experienced in providing and accessing meaningful PD. The promising practices outlined in *Figure 10* provide insight into how the division in this study was able to successfully mitigate some of these challenges and might be therefore of interest to rural divisions that might be seeking to engage in similar work. Where similarities between other rural contexts and the division in this study exist, the practices outlined above may be useful.

In terms of the effectiveness of the locally constructed teacher PD model that was the subject of this study, there are several implications. In addition to the teachers' identification of community/collaboration, content, time and resources, autonomy, and focus/accountability as effective characteristics of the PD model, several effective characteristics related to social constructivist learning theory were also identified in the study. For this reason, the study contributes to literature in the field of effective teacher PD by suggesting additional characteristics of effective PD, and by suggesting that social constructivist learning theory is a useful consideration in both the design of teacher PD models and in their evaluation. Moreover, at the local level, the study provides valuable information to the school division about successful features of the teacher PD model and challenges faced in the division both in regards to its rural context, and in regards to the implementation of the PD model. Such information has practical implications for the future construction of PD models in the division.

As previously mentioned in Chapter 3, the research study described in this thesis has several limitations, including its lack of generalizability to other contexts, its limitation to data collected from a two-year period, and its use of teacher self-reporting of student learning outcomes. More research into the challenges faced by other rural divisions with regards to the provision of effective teacher PD and into other rural teacher PD models, including the ways they attempt to draw on local strengths and mitigate local challenges, would provide a stronger foundation on which to build theoretical and practical understandings about the field of rural teacher PD. Similarly, more longitudinal research about rural PD models, and research that examines the effectiveness of PD on student learning outcomes (as reported by student data) would also be valuable.

The conceptual framework on which the study was founded suggested that rural divisions consider local strengths, local challenges, existing types of PD models, and generally accepted characteristics of effective teacher PD in the construction of local PD models within their contexts (see *Figure 1*). While findings from the study suggest that such considerations, in addition to a consideration of social constructivist principles, were valuable in the context examined in this research study, research into how these considerations are valuable in other rural contexts would be fruitful. Such research has the potential to expand existing knowledge about the strengths and challenges that exist in rural contexts with regards to the provision of effective teacher PD. It also has the potential to identify other elements of PD models that are effective in mitigating rural challenges and supporting teacher professional growth, including other promising practices such as those identified in this study. Future research of this nature would both test and expand the conceptual framework identified in this study.

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Appendix A – Semi-Structured Interview Questions Used for Teachers (Project-Generated Data)

Fall Interview Questions (September, 2013)

The following questions were the questions used for semi-structured interviews conducted primarily in September, 2013 to collect data as part of the PD project implemented by the division. The goal of this data collection was to obtain information about the project participants in order to plan PD experiences that would meet their professional needs. Although the original intent of the interviews was for project-related purposes, permission was requested for their use in this research project through a letter of informed consent and consent form.

1. What is your teaching background? How long and where have you taught? What subjects and grades have you taught?
2. Describe your professional development experiences over the past two years. What was the most effective professional development you have attended? What made it effective for you?
3. Have you experienced any barriers to accessing professional development? [e.g. Issues related to funding (available money, cost to you personally), geography (distance and time required for travel, not having staff nearby), staffing (changes in staffing that breaks up collaboration, lack of availability of subs, teacher isolation, lack of curriculum coordinators/resources), or context (attitudes towards attending PD, lack of available PD in your interest area, lack of appropriate PD formats)] Please explain.
4. If you could design your own professional development experience, what would it include as key elements (e.g. Working with a colleague to plan teaching strategies together, participating in a PLC, learning about theory and applying it to your own classroom practice, etc.)
5. Describe your school and divisional numeracy goals. What is happening in your school currently regarding working towards those goals?
6. Describe your own goals regarding numeracy, mathematics teaching, and student learning in mathematics.
7. Describe the collegial environment in your school. Do teachers work together on collaborative tasks? Are you part of any of these collaborations?
8. You are what I refer to as “critical friends” or partners. You have volunteered/been nominated to participate in this project or Cohort together. Tell me about your background with each other. How long have you worked together? What (if anything) have you collaborated on in the past? Why did you choose to work together on this project? What goals/perspectives do you share?
9. You indicated that you are interested in working towards _____ as an individual goal. How do you think you will know if you have achieved that goal? What will your practice look like? What will you see from students if that goal has been met?
10. What information, resources, activities do you think you will need to meet your goals? What role do you envision this Cohort taking in helping you meet your goals? How might members of the Cohort support you in achieving your goals?
11. If you could design your own professional development experience, what would it include as key elements

Spring Interview Questions (June, 2014)

The following questions were the questions used for semi-structured interviews conducted in June, 2014 to collect data as part of the PD project implemented by the division. The goal of this data collection was to obtain feedback from teachers in order to assess the extent to which their professional needs were being met, the extent to which the project was meeting its objectives, and for use in future planning. Although the original intent of the interviews was for project-related purposes, permission was requested for their use in this research project through a letter of informed consent and consent form.

1. Can you describe some of the things you have learned as a result of participating in this Cohort?
2. Do you feel that your attitudes and beliefs about teaching mathematics have changed as a result of your participation? How have they changed?
3. Do you feel that your teaching practice has changed as a result of participation in this Cohort? How has it changed?
4. Can you describe to what extent (if at all) you were able to collaborate with your critical friend/partner? Alternatively, did you have the chance to collaborate with other cohort members? What did this collaboration look like? How did it help you?
5. What types of student data (if any) did you utilize during this past year as part of your participation in the Cohort? How did you use the data? Do you intend to continue collecting this sort of data? What role do you see student data playing in your teaching in the future?
6. What (if any) improvements in student learning outcomes have you noticed in your classroom? Describe what changes you made that resulted in these improvements?
7. At the beginning of the process, you identified your goals to be _____. To what extent do you feel that your professional needs have been met as a result of participating in the Cohort? To what extent do you feel your goals were achieved?
8. Describe which parts of the Cohort professional development structure were most beneficial to you (e.g. Working with a critical friend/partner, observing classes, receiving feedback, online reflections, face-to-face sessions on particular topics, reading and reflecting on articles, conducting mini-action research projects, etc.). In what ways were they beneficial? Which parts do you feel were the least beneficial? What made them less effective for you?
9. At the beginning of this process, you identified the following barriers that you had experienced in accessing meaningful professional development: _____. Which, if any, of these barriers has the Cohort addressed for you? In what ways were they addressed?
10. What suggestions do you have for making this process more effective in meeting your needs, improving teaching practice, and improving student learning outcomes in the second year of operation?

Second Year Interview Questions (May/June, 2015)

The following questions will be the questions that will guide the semi-structured interviews to be conducted in May or June, 2015 to collect data as part of the PD project implemented by the division. The goal of this data collection will be to obtain feedback from teachers in order to assess the extent to which their professional needs have been met, the extent to which the project is meeting its objectives, and for use in future planning. Although the primary intent of the interviews was for project-related purposes, permission was requested for their use in this research project through a letter of informed consent and consent form.

1. Can you describe some of the things you have learned as a result of participating in this Cohort?
2. Do you feel that your attitudes and beliefs about teaching mathematics have changed as a result of your participation? How have they changed?
3. Do you feel that your teaching practice has changed as a result of participation in this Cohort? How has it changed?
4. Can you describe to what extent (if at all) you were able to collaborate with your critical friend/partner? Alternatively, did you have the chance to collaborate with other cohort members? What did this collaboration look like? How did it help you?
5. What types of student data (if any) did you utilize during this past year as part of your participation in the Cohort? How did you use the data? Do you intend to continue collecting this sort of data? What role do you see student data playing in your teaching in the future?
6. What (if any) improvements in student learning outcomes have you noticed in your classroom? Describe what changes you made that resulted in these improvements?
7. At the beginning of the process, you identified your goals to be _____. To what extent do you feel that your professional needs have been met as a result of participating in the Cohort? To what extent do you feel your goals were achieved?
8. Describe which parts of the Cohort professional development structure were most beneficial to you (e.g. Working with a critical friend/partner, observing classes, receiving feedback, online reflections, face-to-face sessions on particular topics, reading and reflecting on articles, conducting mini-action research projects, etc.). In what ways were they beneficial? Which parts do you feel were the least beneficial? What made them less effective for you?
9. At the beginning of this process, you identified the following barriers that you had experienced in accessing meaningful professional development: _____. Which, if any, of these barriers has the Cohort addressed for you? In what ways were they addressed?
10. Would you like to see the Numeracy Cohort continue in the future? What suggestions do you have for making it more effective in meeting your needs, improving teaching practice, and improving student learning outcomes?

**Appendix B – Semi-Structured Interview Questions for Superintendent
(Research-Generated Data)**

1. Your background experiences may help shed light on your perspectives as a rural superintendent. Could you give me a brief description of your background (positions held etc.) so that I can better understand what experiences you draw from in answering my questions?
2. What challenges does the division face in providing effective PD for teachers?
3. What challenges do you think divisional teachers face in accessing effective PD?
4. What were the division's goals in creating the Numeracy Cohort (the PD model)? How does it fit within the broader PD context within the division?
5. What funding/financial considerations have been made in developing this model?
 - a. How has PD been financed in the past? What changes in financing PD took place to implement this model?
 - b. What funding barriers has the division faced in providing effective teacher PD in the past? Was the PD model designed to mitigate any of these funding barriers? If so, how? Were they effective?
 - c. What has been the impact on the financial cost of PD for the division as a result of implementing this model? (What were the PD costs before and after implementation?) What is your opinion about the cost versus benefits of the PD model in terms of funding?
6. What geographical/logistical matters did you have to consider in creating the model? Can you describe how the PD model tried to mitigate any geographical barriers? To what extent do you feel the model has been successful?
7. Can you describe the decisions around staffing that you made to implement the PD model? Were any of these changes in staffing designed to mitigate challenges faced by the division with regards to the provision of PD for teachers? If so, to what extent do you think they were successful?
8. What do you feel is unique about this school division? How is the context of the division both different than other rural divisions and similar? How do you feel contextual differences in this division contributed to the creation of the PD model? Can you comment on any challenges posed by the local context and whether or not any of the challenges were addressed through the Numeracy Cohort initiative?
9. From what you know about Numeracy Cohort activities over the past two school years, how do you feel the PD model has supported teachers' professional growth in the area of mathematics instruction and student numeracy?
10. What social constructivist elements do you see within the Numeracy Cohort/PD model and how do you feel they contribute to teacher professional growth within the local context?

Appendix C – Focus Group Discussion Questions for Principals (Research-Generated Data)

Opening script to be read:

I would like to thank each of you for contributing to this very important discussion. Your feedback is extremely valuable and important. Before we begin, I would like to set some ground rules for the discussion. It is important that you do not talk about specific teachers in your responses. Feel free to discuss your own experiences as much as you would like, but please refrain from making statements about particular teachers in your responses. Do you have any questions? Thank you again. We will spend approximately 6-7 minutes on each question. Let's begin.

1. Your background experiences may help shed light on your perspectives as a rural administrator. Could we just go around the table and in about a minute, could you give me a brief description of your background (positions held, places worked, years in current position etc.) so that I can better understand what experiences you bring to this conversation?
2. What challenges do you feel a small rural division like this one faces in providing effective PD for teachers (financially, geographically, in terms of staffing, or even in terms of the local context)?
3. As principals, you are at times responsible for the provision of PD for your staff? What challenges do you face in providing PD opportunities for your teachers?
4. What challenges do you think rural teachers face in accessing effective or meaningful PD?
5. Over the past two years, the school division has implemented a Numeracy Cohort, which is a PD initiative in the specific area of numeracy. How does the initiative fit within the broader PD structure of the division? What do you see as the strengths and challenges of this initiative from an administrator's perspective?
6. How do you think the Numeracy Cohort initiative has addressed some (if any) of the challenges facing rural divisions, administrators, schools, or teachers, through its design?
7. From what you know about Numeracy Cohort activities over the past two school years, how do you feel the PD model has supported teachers' professional growth in the area of mathematics instruction and student numeracy?
8. A social constructivist view of teacher PD recognizes:
 - teaching as a complex activity
 - teacher PD as a fluid, emerging construct
 - the interrelatedness between the individual and his/her environment
 - the interrelatedness between existing beliefs and future actions
 - learning as constructed as opposed to transmitted
 - the importance of context on the learning process
 - the importance of discovery and inquiry-based active participation
 - the art and importance of leadership/facilitation
 - the importance of teacher-directed learning
 - teacher PD as a lifelong, inquiry-based, collegial activity
 - the importance of language and dialogue on the learning process

- the importance of reflection and dissonance/disequilibrium on the learning process
- the establishment of a collaborative, safe learning environment

What social constructivist elements do you see within the Numeracy Cohort/PD model and how do you feel they contribute to teacher professional growth within the local context?

9. What do you think should be changed about the PD structure or Numeracy Cohort generally moving forward. What do you hope to see in the future? What constructive thoughts do you have about ways the Cohort could be improved? What would you like to see continue? Do you have any thoughts about how this model could look long term?

**Appendix D – Focus Group Discussion Questions for Cohort Teachers
(Research-Generated Data)**

1. What challenges do you feel a small rural division like this one faces in providing effective PD for teachers (financially, geographically, in terms of staffing, or even in terms of the local context)?
2. What challenges do you think rural teachers face in accessing effective or meaningful PD? What challenges have you faced personally?
3. How do you think the Numeracy Cohort initiative has addressed some (if any) of the challenges facing rural divisions, administrators, schools, or teachers, through its design?
4. To what extent do you feel the Numeracy Cohort has been effective in meeting teachers' needs in the area of mathematics instruction and student numeracy? What has it done well and where has it fallen short?
5. A social constructivist view of teacher PD recognizes:
 - teaching as a complex activity
 - teacher PD as a fluid, emerging construct
 - the interrelatedness between the individual and his/her environment
 - the interrelatedness between existing beliefs and future actions
 - learning as constructed as opposed to transmitted
 - the importance of context on the learning process
 - the importance of discovery and inquiry-based active participation
 - the art and importance of leadership/facilitation
 - the importance of teacher-directed learning
 - teacher PD as a lifelong, inquiry-based, collegial activity
 - the importance of language and dialogue on the learning process
 - the importance of reflection and dissonance/disequilibrium on the learning process
 - the establishment of a collaborative, safe learning environment

What social constructivist elements do you see within the Numeracy Cohort/PD model and how do you feel they contribute to teacher professional growth within the local context?

**Appendix E – MAR/Detailed Planning Forms
(Project-Generated Data)**

Name: _____ **Mini Action Research Form** Date: _____

Plan	Act
Reflect	Observe

² Adapted from the work of Cathryn Anne Smith (2014).

Detailed Planning Form

Grade/Subject:	Unit/Topic:
Curricular Outcomes:	Other Outcomes:
Action Plan/Steps:	
Considerations and Resources:	

Appendix F – Table Outlining Content of Face-to-Face Sessions

Year 1 (2013-2014)

Session	Organizational/Cohort Things	Building Community	New Content/Ideas/Strategies	Mini Action Research
September – Met with all cohort members and their critical friend/partner to get to know them and to identify their goals for the year/their practice.				
September 25	Binders Distributed My goals/cohort goals Discussed dates/logistics of meetings and made plans to fill in paperwork after meeting	Warm up partner resume Snowball fight	Defined numeracy Card Games – Sums to 10, differences 7 Mathematical Processes Effective Mathematics Instruction (what it is)	Filled out planning sheet – included their goals, what our definition of numeracy means for their goals, what small step will I take first to begin my journey and what steps will be required in the future
October 30	Introduced the online SharePoint interface Explained plan to go see BU professor's students at BU on Nov. 22 Introduced online forms for mini action research	Tweets Activity	BU professor – creating quality workstations Article on teacher moderation – collaborative assessment of student work	Introduced mini action research form. Began planning first mini action research project (to be posted) Introduced classroom observation form Mini action research plans/progress to be shared on Dec 4
November 22 (at BU – not really a face-to-face meeting)			Access to resources and work stations created by BU professor's students	
December 4	Mini Action research reports Checking in feedback form Collaborative brainstorming activity – how can we better use online and classroom components?	Since we last met . . . Checking in feedback form Collaborative brainstorming activity – how can we better use online and classroom components?	Lucy West – Content-Focused Coaching Model – focuses on view of what quality mathematics lessons look like (videos) Generate, Sort, Synthesize strategy	Mini Action research reports Collaborating with a partner to develop a math lesson (cycle 2)
January 31 st	Mini action research reports	Trustee was able to attend and hear about our progress.		1.5 hour session at divisional in-service. Cohort teachers shared their first cycle of action research plans and began thinking about a second round.
March 21 st – HS PD day/Elementary admin day				High school teachers attended in-school PD or worked on their numeracy mini action research projects.
April 11 th – Elementary PD day/HS admin day				Elementary teachers attended in-school PD or worked on their numeracy mini action research projects.
April 25 th	Preparing for UDL workshop in Brandon (content and logistics) Preparing for our meeting with the principals Quiet Reflection – reflection about the year and suggestions for the future		Math consultant from another division came and introduced us to the concept of Guided Math. He also discussed the importance of quality lessons and groupings in mathematics classrooms.	

May 12th/13th		Attending the in-service together was a valuable team-building enterprise.	UDL workshop in Brandon – we were introduced to UDL and ways of planning for numeracy and literacy development in our classrooms.	
May 21 st	Preparing for and sharing with our admin council (our cohort experiences this year) Focus group discussions about this year and next Future planning	Reflecting on the year Planning for next year	Follow-up to UDL workshop	Making plans for next year.
June – Interviews with critical friend/partners to reflect on the year in the cohort and identify future plans				

Year 2 (2014-2015)

Session	Organizational/Cohort Things	Building Community	New Content/Ideas/Strategies	Mini Action Research
September 23	Binders Distributed to 2 new members Year plan discussed Fall meetings planned for Feedback on SharePoint Goal Setting	-Introductions – 2 new members -Individual reflecting on goals -Finding common ground (finding commonalities in groups between goals) Goal Setting Activity – Spend a Buck (to help prioritize goals) Concluding activity: Help Wanted Ads – the perfect partner? Skilled person wanted?	I shared a PPT of notes from when I attended Deep Learning (and organizational change) workshop with presenter in August.	Planning time was devoted to discussing and beginning the first round of mini action research plans (2 hrs)
Various Dates (Oct./Nov.)	3 Groups formed: EY1 – Focus on Guided Math/Workstations – attended BER workshop Nov. 4 th and had a follow-up day Nov. 7 th where they built workstation bins, activities, and materials to get at specific learning strategies (e.g. Counting on, Doubles plus one, etc.)	EY2 – Focus on Math Recovery – Got together on Nov. 28 to discuss and compare their Math Recovery Program(s) and to build a binder of ready-to-use resources so they could be ready to make use of their one-on-one time with students.	MY – 4 teachers went to Problem Solving Workshop on Oct. 9 th and met together on Oct. 10 th as a follow-up. Built project-based learning activities, and developed exit-slips for data collection. Modified existing project to encompass multi-grade situations.	
October 21 – AM with cohort, PM with presenter (on deep learning)	Summary Poster – Shared work with each other and with presenter in PM. 1) Who you are 2) What you believe in/wonder about 3) Your goals 4) How will you know your goals have been met? 5) Where are you currently in the process?		<ul style="list-style-type: none"> Interacted with Deep Learning presentation the day before by: <ul style="list-style-type: none"> Identifying 3 aha moments Discussion about key ideas/things that resonated Read and discussed several research-related articles In the afternoon with presenter, we talked about the Numeracy Cohort, what our role is, what we are trying to do, and how we know we are successful (or not). 	<ul style="list-style-type: none"> Half hour or so of collaboration time on MAR projects. Time to organize what the next step is.

January 30 th – Session at divisional PD day		A chance to get together to check in and to support each other.	In the afternoon I did a session on using Google Forms to collect student data (to inform practice). A couple of Cohort teachers attended.	Reporting on first round of MAR projects this year.
Mar. 3 rd	Planning time for Apr. 24 th – Planning what we will share about our work – time to put ideas together (followed up by a conference call 1 ½ weeks before the presentation)	Concluding Activity – One Word Summary	Assessment strategies PISA/PCAP results shared and discussed – problems shared	Around the table reports – what is new since Jan. 30 th Some planning for next steps and an invite for teachers to take a day to continue working on MAR projects between now and our next meeting.
Various Dates	EY1 Planned a divisional Hundred Day at GES. They planned activities and had students from around the division attend.	EY2 Continued with their work on Math Recovery. They did a classroom visitation.	MY teachers got together to revamp and recreate a project to follow up on the Shopping Spree. They developed a new project on planning a vacation and prepared some of their materials for April 24 th .	
Apr. 24 th (ES – divisional day of sharing [scaling up])	<p>Numeracy Cohort teachers shared with other teachers in the division at an in-school PD day. 40 teachers were in attendance (out of 90 in the entire division).</p> <p>AM</p> <p>Candy looked at the following essential questions, sharing with the group:</p> <ul style="list-style-type: none"> • How do I help students develop math vocabulary? • What is it exactly that the Math Cohort does? • How do I help students develop strong mental math skills? • What is numeracy? • What do we need to do to improve student numeracy skills in our classrooms? Schools? Division? <p>She shared some strategies (math warm-up, math songs/raps, games – Baby Krypto, Game Show Math, Card Games) as well as information about the Cohort and the PD model developed by the division.</p> <p>PM</p> <p>EY teachers shared multiple strategies they had developed (e.g. Daily 5 Math/Rotations, math vocabulary folders, games/manipulatives) and had teachers “make-and-take home” some items/strategies for their own classrooms. MY teachers shared their Real-World Application projects that they had developed and used in their classrooms. They also shared other strategies/games by running their own rotations for an hour (e.g. Mathopoly, Educreations, various games)</p>			
June 2 nd	Reflected on the past year (even 2 years) Discussed what we want next year to look like (Candy leaving)	Debriefing from April 24 th (Shared Snowball responses, discussed what went well and what people have said about the day)	Discussed presenter’s message from the Skype call. Specifically, we considered his 3 questions: 1. What are you trying to accomplish? 2. How will we know that a change is an improvement? 3. What change can we make that will make this improvement?	Developed summaries (PPT) for Candy to share at Admin. Council meeting June 17 and at a board meeting.
June – Interviews with critical friend/partners to reflect on the year in the cohort and identify future plans				

Appendix G – Code Book after First and Second Cycle Revisions

Code	Level	a priori	Emergent Action	Code description
Challenges to Providing Effective TPD	1	a priori		Challenges faced by rural divisions and teachers in proving and accessing effective teacher PD
Contextual Differences	2	a priori		Challenges in providing and accessing effective teacher PD related to contextual differences.
Access to PD put on by other organizations	3		emergent	Contextual attempts to access PD put on by other organizations
Agility of small division	3		emergent	The ability of a small division to make changes to adapt in an agile way to needs, initiatives, etc.
Competing PD opportunities	3		emergent	Difficulties that arise when two or more PD opportunities compete for time/space/money/etc.
Competitiveness between schools and principals	3		emergent	Contextual evidence of a spirit of competitiveness between schools and/or principals within the division
Desire to be inclusive	3		emergent	Evidence of division's desire to include all students, staff, schools, etc.
Desire to capitalize on strengths	3		emergent	Evidence of division's desire to capitalize on the strengths that exist within the division.
Desire to engage in improvement	3		emergent	Evidence of teachers, principals, superintendent, or division to engage in improvement
Difficulty with blended learning	3		emergent	Contextual difficulties with the adoption of a blended learning model
Drawing on the internal resources	3		emergent	Contextual efforts to use existing internal resources for other improvement such as the PD model under study
Hutterian Schools	3		emergent	Contextual difference related to several Hutterian Schools and their differing structures, sizes, and values
Local Board Perceptions and Support	3		emergent	Evidence of support or perceptions of support by the school board or of the school board (towards PD, teachers, programs, etc.)
Multilevel classroom context	3		emergent	Professional development models that focus specifically on multilevel classroom contexts
Professionalism and PD Engagement	3		emergent	Issues related to teachers not actively engaging in PD, preparing for PD, or professionally contributing to their own or others' PD.
Relevance teacher needs	3		emergent	Both references to PD that does not meet teacher needs as well as PD that is relevant to teacher needs and/or responsive to their needs.
School Administrator support	3		emergent	Evidence of administrator support within local schools and/or generally
Sending teachers out to bring back ideas	3		emergent	Contextual efforts to bring ideas into the division through sending teachers out to acquire and bring back new PD ideas.
Very small schools	3		emergent	Contextual strengths and challenges as related to very small school contexts.
Desire to be in classroom (move to sub under staffing)	2		emergent	Teacher, parent, or board desire to have teachers in the classroom. (moved to subcategory of staffing)
Funding	2	a priori		Challenges in providing and accessing effective teacher PD related to funding.
Grants	3		emergent	Funding through grant applications
Local Levy	3		emergent	Funding as provided through the local municipal levy
Provincial Funding Formula	3		emergent	Funding as provided by the province through the Provincial Funding Formula
Reallocation of existing funds	3		emergent	Reallocation of existing funds to new areas
Reallocation of existing non-monetary resources	3		emergent	Reallocation of non-monetary resources to new areas
Support for PD spending from Board	3		emergent	Funding allocated by the board in divisional budget that indicates a support for spending on teacher PD
Support from school budgets	3		emergent	Funding provided for teacher PD from local school budgets
Very small school budgets	3		emergent	Funding provided in very small schools and issues related to the scale of small school budgets.
Geography	2	a priori		Challenges in providing and accessing effective teacher PD related to geography.
Distance to City	3		emergent	Challenges related to travel to major centres such as Winnipeg, Brandon, or other cities
Costs of bringing people in	4		emergent	Challenges related to the cost of bringing outside presenters into the division to speak to teachers.
Hotel Costs	4		emergent	Challenges related to the cost of hotels/accommodation when teachers access external PD
Mileage to external workshops	4		emergent	Challenges related to the cost of mileage when teachers access external PD
Safety on Highway	4		emergent	Challenges related to poor weather or teacher (feelings of) safety when travelling to external PD
Time required for travel	4		emergent	Challenges related to the time required to travel to external PD - time away from home and family obligations for example.
Travel costs incurred by teachers	4		emergent	Challenges for individual teachers when they incur individual monetary costs for travelling to external PD
Attendance within Division	3		emergent	Challenges related to travel to PD that is offered within the division itself.
Mileage for inter-divisional travel	4		emergent	Challenges related to paying for or accessing mileage for inter-divisional travel
Teachers incurring mileage costs to collaborate	4		emergent	Challenges related to incurring personal cost for travelling to collaborate with other teachers within the division
Weather and safety	4		emergent	Challenges related to poor weather or teacher (feelings of) safety when travelling to divisional PD.
Staffing	2	a priori		Challenges in providing and accessing effective teacher PD related to staffing.
Desire to be in classroom	3		emergent	Teacher, parent, or board desire to have teachers in the classroom.
Impact of PD on personal lives of teachers	3		emergent	Challenges related to the impact of PD on the personal lives of teachers
Isolation	3		emergent	Teacher isolation. Being either isolated from other teachers generally, or specifically isolated from teachers who teach the same subject matter/grade level.
Leadership Capacity	3		emergent	Challenges related to leadership capacity within small rural divisions.
Admin have many hats to wear	4		emergent	Issues related to the breadth and depth of responsibilities born by rural administrators (principals and the superintendent)
Fewer formal leadership positions	4		emergent	Issues related to the relative lack of leadership positions (curriculum specialists and coordinators, PD coordinators, vice principals, assistant superintendents, etc.) in small rural divisions.
Principal as responsible for PD	4		emergent	Issues related to the difficulty principals have with some any responsibilities, including the staff development of his/her teachers.
Role of Numeracy Coach	4		emergent	Challenges related to the establishment and staffing of a PD leadership position such as the Numeracy Coach in the model under study.
Smaller pool from which to draw	4		emergent	Issues related to having a smaller pool of people from which to draw for leadership positions.
New Teachers	3		emergent	Items related to the unique needs of new teachers within the local context.
Recruitment	3		emergent	Challenges related to the recruitment of teachers in small rural divisions.
Retention and job satisfaction	3		emergent	Issues related to the retention of staff in rural areas. Includes both retaining teachers employed in the division (from going elsewhere) and topics on wellness and job satisfaction on the part of teachers.
Substitutes	3		emergent	Issues related to having adequate substitute teachers for PD to occur.
Teaching Load	3		emergent	Includes the number of courses teachers are assigned, new courses, and courses for which teachers do not feel adequately prepared.
Characteristics of Effective PD	1	a priori		Characteristics of teacher effective PD considered effective by teachers or through literature on teacher PD
Aligned with district goals	2	a priori		Teacher PD that is aligned with the goals of the school district/division
Aligned with school goals	2	a priori		Teacher PD that is aligned with school goals
Aligned with teacher goals	2	a priori		Teacher PD that is aligned with the individual and/or collaborative goals of teachers
Collegial Collaborative learning environment	2	a priori		Teacher PD that requires teachers to work collegially and collaboratively together towards their learning. Includes sections about "critical friends" and collaborative projects.
Engages teachers in active learning	2	a priori		Teacher PD that requires teachers to be actively involved in their own learning as opposed to passive recipients of information.
Exposure to new ideas	2		emergent	Exposure to presenters and topics from outside the division. External knowledge brought in.
Focused on student learning	2	a priori		Characteristics of teacher PD that involve a focus on student learning outcomes
Job-embedded	2	a priori		Teacher PD that is embedded within the work day of teachers and that involves working within the frame of what they do as a teacher in their classroom.
Leadership	2	a priori		Leadership for teacher PD both as a leader/facilitator and through divisional leadership for an initiative.
Facilitator	3		emergent	Items related to the importance of the role of the facilitator on the PD model.
Mechanism for evaluation	2	a priori		Evaluation of teacher PD models through the use of interviews, surveys, reflections, focus group discussions, etc.
Networking	2		emergent	Items related to the importance of networking for the professional development of teachers.
Ongoing	2	a priori		Teacher PD that occurs beyond the scope of one or two days. Ongoing teacher PD takes place over months, and even years.
Resources	2	a priori		Resources provided for teacher professional development including time, money and physical resources such as books, manipulative, and other learning materials.
Scalable	2	a priori		Teacher PD that can be extended to other/all staff over time. While a small group may begin the process, the process can be scaled up to include many more or all teachers.
Sustainable	2	a priori		Teacher PD that can be sustained over a long period of time.
Evidence of Effectiveness	1		emergent	Items that indicate the effectiveness of the PD model under study in terms of several factors.
Attendance	2		emergent	Refers to teacher attitudes as related to activities as it relates to effectiveness and perceptions of effectiveness on the part of teachers.
Improvements in Student Learning Outcomes	2		emergent	Descriptions of improvements in student learning as evidenced by teacher reports
Perceptions of meeting PD needs	2		emergent	Expressed perceptions of the extent to which the PD is meeting teacher needs (by teachers)
Teacher beliefs and attitudes	2		emergent	Evidence that suggests that teachers' beliefs and attitudes about teaching or learning have changed
Teaching strategies	2		emergent	Refers to strategies that teachers mention that they have added to their teaching practices through the Cohort opportunities. Also includes facilitator perceptions of incorporating teaching strategies in relation to overall theory about the teaching of mathematics.
Facilitator (moved under Char of Effective PD - Leadership)	1		emergent	Items related to the importance of the role of the facilitator on the PD model.
Models of Teacher PD	1		deleted	Models of teacher PD existing in the literature on teacher PD
Collaborative Models	2	a priori	deleted	Those teacher PD models that require one or more teachers to work together towards professional learning.
Arts-based	3	a priori	deleted	Collaborative models incorporate the use of the arts to explore learning opportunities for professionals.
Coaching	3	a priori	deleted	Collaborative models that involve the use of coaches to work as equals in the classrooms of teachers towards the improvement of instruction.
Collaborative inquiry groups	3	a priori	deleted	Collaborative models that involve groups of teachers inquiring into how they might improve teaching and learning together
Involvement in a development or improvement process	3	a priori	deleted	Collaborative models that involve teachers participating in another development or improvement process
Mentoring	3	a priori	deleted	Collaborative models that involve more experienced teachers mentoring new teachers.
Observation Assessment	3	a priori	deleted	Collaborative models that involve the observation of other teachers in addition to assessment of practice or feedback.
Training	3	a priori	deleted	Models that involve the dissemination of particular skills to teachers.
Complex models	2	a priori	deleted	Those models that incorporate many forms of teacher professional growth. e.g., They may include collaborative inquiry groups, mentors, and workshops all within one model.
Blended	3	a priori	deleted	Models that blend more than one learning mode such as online and face to face learning.
Individual models	2	a priori	deleted	Those teacher PD models that look at the development of an individual teacher.
Professional Growth Plans	3	a priori	deleted	Individually-directed plans for growth determined by teachers. These plans often require teachers to set and report on their own learning goals and accomplishments towards such tools over the course of the year.
Multilevel classroom context (moved to contextual differences)	1		emergent	Professional development models that focus specifically on multilevel classroom contexts
Networking (moved to char of effective PD)	1		emergent	Items related to the importance of networking for the professional development of teachers.
New Teachers (moved to staffing challenges)	1		emergent	Items related to the unique needs of new teachers within the local context.
Participant Backgrounds	1		emergent	Information about the background of the participants.
Principals	2		emergent	Background as related to a principal
Superintendent	2		emergent	Background as related to the superintendent
Teachers	2		emergent	Background as related to the teachers (separate level 3 nodes made for each teacher)
Participant Speaker	1		emergent	Identification of the speaker in each piece of data.
Principals	2		emergent	Each principal identified by a separate level 3 node.
Superintendent	2		emergent	Identifies the superintendent of the division as the speaker.
Teachers	2		emergent	Each teacher identified by a separate level 3 node.
Social Constructivist Teacher PD	1	a priori		Elements of a social constructivist view of teacher PD.
Accountability to the group and process	2		emergent	Recognizes the importance of accountability to the group and process on the learning process/TPD
Context	2	a priori		Recognizes the importance of context on the learning process/TPD
Discovery inquiry and active participation	2	a priori		Recognizes the importance of discovery, inquiry-based, active participation on the learning process/TPD
Existing beliefs and future actions interrelatedness	2	a priori		Recognizes the interrelatedness of existing beliefs and future actions in the learning process/TPD
Fluid and emergent	2	a priori		Recognizes the fluid and emergent nature of teacher PD
Individual and environment interrelatedness	2	a priori		Recognizes the interrelatedness of the individual and the environment in the learning process/TPD
Language and dialogue	2	a priori		Recognizes the importance of language and dialogue on the learning process/TPD
Leadership Facilitation	2	a priori		Recognizes the art and importance of leadership/facilitation in teacher PD
Learning as Constructed	2	a priori		Recognizes learning as constructed as opposed to transmitted.
Lifelong learning	2	a priori		Recognizes teacher PD as a lifelong, inquiry-based, collegial activity.
Reflection and dissonance	2	a priori		Recognizes the importance of reflection and dissonance/disequilibrium in the learning process/TPD
Safe environment	2	a priori		Recognizes the importance of a safe, collaborative/learning environment on the learning process/TPD
teacher-directed	2	a priori		Recognizes the importance of TPD being teacher-directed.
Teaching as complex	2	a priori		Recognizes that teaching is a complex activity requiring many different skill sets in an environment that is constantly changing.

Appendix H – Ethics Approval Certificate



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APPROVAL CERTIFICATE

May 13, 2015

TO: Candy Skyhar (Advisor T. Falkenberg)
Principal Investigator

FROM: Lorna Guse, Chair
Education/Nursing Research Ethics Board (ENREB)

Re: Protocol #E2015:038
"Inquiring into the Effectiveness of a Locally-Developed Professional
Development Model for Teachers in a Rural School Division"

Please be advised that your above-referenced protocol has received human ethics approval by the Education/Nursing Research Ethics Board, which is organized and operates according to the Tri-Council Policy Statement (2). **This approval is valid for one year only.**

Any significant changes of the protocol and/or informed consent form should be reported to the Human Ethics Secretariat in advance of implementation of such changes.

Please note:

- If you have funds pending human ethics approval, please mail/e-mail/fax (261-0325) a copy of this Approval (identifying the related UM Project Number) to the Research Grants Officer in ORS in order to initiate fund setup. (How to find your UM Project Number: <http://umanitoba.ca/research/ors/mrt-faq.html#pr0>)
- if you have received multi-year funding for this research, responsibility lies with you to apply for and obtain Renewal Approval at the expiry of the initial one-year approval; otherwise the account will be locked.

The Research Quality Management Office may request to review research documentation from this project to demonstrate compliance with this approved protocol and the University of Manitoba *Ethics of Research Involving Humans*.

The Research Ethics Board requests a final report for your study (available at: http://umanitoba.ca/research/orec/ethics/human_ethics_REB_forms_guidelines.html) in order to be in compliance with Tri-Council Guidelines.

Appendix I – Consent Form School Division

Dear Candy Skyhar,

I hereby give permission for you as a researcher to conduct the research study titled *Inquiring into the Effectiveness of a Locally-Developed Professional Development Model for Teachers in a Rural School Division* in [Division name removed]. I have reviewed the study outlined in the letter of informed consent, and am agreeing to the following (please check off all appropriate boxes):

- The researcher will utilize artifacts generated in her role as facilitator of the Numeracy Cohort, as well as notes she made while acting as facilitator of the Numeracy Cohort over the two year period (from September, 2013 to June, 2015) for research purposes.
- The researcher will approach all 14 teachers who have participated in the [Division name removed] Numeracy Cohort since September, 2013 via email (addresses to be provided at a later date by the division) to request their participation in the study. Participation may involve some or all of the following:
 - participation in a voluntary focus group discussion (which will be audio-recorded and transcribed for analysis) to be held on June 2, 2015 at 9 am at division office as outlined in the letter of informed consent.
 - permission to use artifacts they have created during their time as a member of the Numeracy Cohort
 - permission to use audio recordings of, and notes generated from, semi-structured interviews conducted as part of the Numeracy Cohort operations three times over the two year period
- The researcher will approach school principals in the division via email to participate in a voluntary focus group discussion (which will be audio-recorded and transcribed for analysis) to be held on July 17, 2015 at 9:00 am at division office as outlined in the letter of informed consent.
- The researcher will approach you, as superintendent of the division, via email to participate in a semi-structured interview (which will be audio-recorded and transcribed for analysis) to be held at a mutually agreeable time and place in May or June, 2015.
- All participants (teachers, principals, and superintendent) will be asked to sign informed consent letters indicating their rights and responsibilities during the study.
- The researcher will protect the confidentiality of participants in the manner described in the letter of informed consent.
- I may withdraw permission for the division employees to participate in the study at any time by notifying either the researcher or her advisor at the addresses provided. Participants will also have this same right.

In no way does this letter or my signature waive my legal rights nor release the researchers, sponsors, or involved institutions from their legal and professional responsibilities.

Superintendent's Signature

Date

Appendix J – Informed Consent Letter to Superintendent

[printed on U of M Faculty of Education letterhead]

[Date]

Research Project Title: Inquiring into the Effectiveness of a Locally-Developed Professional Development Model for Teachers in a Rural School Division

Principal Investigator: Candy Skyhar [contact information removed]

Research Supervisor: Dr. Thomas Falkenberg [contact information removed]

This consent form, a copy of which will be left with you for your records and reference, is only part of the process of informed consent. It should give you the basic idea of what the research is about and what your participation will involve. If you would like more detail about something mentioned here, or information not included here, you should feel free to ask. Please take the time to read this carefully and to understand any accompanying information.

Purpose of the Research

As you are aware, the Numeracy Cohort is an ongoing professional development (PD) model that has been operating in your school division for the past two years. The intent of the Numeracy Cohort is to provide effective PD opportunities for teachers, enabling them to improve mathematics instruction and student learning outcomes. In order to develop such a model, the unique rural context of the school division had to be considered, inclusive of both the unique strengths and inherent challenges faced within it. As a Ph. D. candidate, I am interested in studying the effectiveness of the model in three key areas which are outlined in the research questions below:

- (1) To what extent (if at all) is the specific locally-constructed PD model utilized in the rural school division able to mitigate the challenges faced by the rural division and its rural teachers in accessing meaningful PD?,
- (2) To what extent (if at all) is the model effective in terms of supporting teachers' professional growth in the area of mathematics instruction and student numeracy?, and
- (3) How do social constructivist principles contribute to teacher professional growth through the locally-constructed rural PD model?

The single case study research I have designed will inquire into these three areas by looking at multiple perspectives and a variety of data. By considering teacher, principal, superintendent, and facilitator perspectives, and by analyzing multiple forms of data, it is hoped that the three research questions above can be addressed. The study will inform not only the school division about the effectiveness of the PD model that has been implemented, but also the broader educational community, particularly those in rural contexts about potential solutions to

challenges faced in rural divisions, what effective PD might look like in rural contexts, and the importance of social constructivist principles in rural teacher PD.

Participation

This letter invites you to participate in a **semi-structured interview** that will be held at a mutually agreeable time and place in May or June, 2015. The semi-structured interview will take approximately one hour of your time, and will include questions about the Numeracy Cohort/PD model that has been implemented by the division. Questions will be provided, via email, in advance of the interview to facilitate familiarity with the questions being asked as well as time to consider responses. The interview will be audio recorded (on a digital audio recorder) and transcribed for analysis for the research study.

Risks and Benefits

As a participant in this study, you will be exposed to minimal physical, emotional, or personal risk. You may benefit from participating in the study through contributing your knowledge about the local PD model to what is collectively known about the model within the division, as well as through the satisfaction of knowing that you have contributed more broadly to the development of theory about rural education and rural professional development.

Deception

There is no deception in this study.

Feedback and Debriefing

As a participant, you will receive a summary of the study's findings once it is completed. You may choose to receive a copy via mail or email by selecting the appropriate box on the consent form.

Compensation

There will be no compensation for participating in this study.

Confidentiality

Please note that your choice to participate (or not) in this study is completely voluntary and will not be communicated to anyone by me. The primary data collected from the interview conducted with you for this research study will be stored on a password-protected computer in my home (digital data) or in a locked filing cabinet in my home (hard copy/paper copies). The only two people who will have access to the data are my advisor and myself. All data from the interview (digital and hard copy) containing names and other identifiers will be destroyed within three years of completion of my doctoral defense (approximately July, 2019), allowing me time to publish related academic articles and prepare for presentations. Digital data will be electronically erased while hard copy data will be shredded.

Due to the nature of this research, confidentiality cannot be guaranteed. Because the research will take place in a very small division in which many people are familiar with the identities of employees, there is potential for others to link participants with the research. This is especially true for you as the only person who holds your position. Moreover, other people outside of the school division may be aware of the division administrative structure, as well as the Numeracy

Cohort/divisional PD project, potentially linking participants with the research. While it is not possible to guarantee confidentiality, every effort will be made to protect the confidentiality of participants in any public or published results related to the study (oral, written, or online). Pseudonyms will be used for all participants, identifiers will be removed wherever possible, and the name of the school division will not be used in any form.

Dissemination of Results

The primary purpose of this research is to complete my doctoral thesis. As a result, the first dissemination of the results will be to my doctoral committee for mentoring and advising purposes. Subsequently it will be shared publically during my doctoral defense and through the publication of my dissertation. A report to the school division will be generated to communicate the findings of the study as well. Beyond the final dissertation and report to the division, I plan to share this research through a number of public venues to allow other researchers to learn from my experience. Public sharing may occur through academic and professional articles and presentations at academic and professional events like conferences.

Withdrawal

At any point you may withdraw from this study by contacting the principal investigator at the email address provided. If you choose to withdraw, your data will be destroyed and will not be used in the research study in any way. Please note that your decision to participate, not participate, or withdraw from the study at any time will have no effect whatsoever on your standing or your workplace environment. I understand that elements of coercion could be felt by you, particularly due to the fact that in addition to being a researcher in this study, I am also your colleague. Please understand that your relationship with me outside of the that as a researcher should not influence your decision to participate in any way. Participation (and continued participation) is completely voluntary.

Informed Consent

Your signature on this form indicates that you have understood to your satisfaction the information regarding participation in the research project and agree to participate as a subject. In no way does this waive your legal rights nor release the researchers, sponsors, or involved institutions from their legal and professional responsibilities. You are free to withdraw from the study at any time, and /or refrain from answering any questions you prefer to omit, without prejudice or consequence. Your continued participation should be as informed as your initial consent, so you should feel free to ask for clarification or new information throughout your participation.

The University of Manitoba may look at your research records to see that the research is being done in a safe and proper way.

Please check one of the following:

- I agree to participate in an audio-recorded interview about the Numeracy Cohort and for the resulting audio recordings and transcripts to be used in the research study being conducted by the researcher.

or

- I choose not to participate in the interview.

I wish to receive a summary of the results of the study via:

- email at the address _____

or

- mail at the address _____

Participant's Signature _____ Date _____

Researcher's Signature _____ Date _____

This research has been approved by the Education/Nursing Research Ethics Board. If you have any concerns or complaints about this project you may contact the Human Ethics Secretariat, Margaret Bowman, at [contact information removed]. A copy of this consent form has been given to you to keep for your records and reference.

Thank you for being involved in this research study. Please do not hesitate to contact me if you have any questions at all.

Sincerely,

Candy Skyhar
Principal Investigator

Appendix K – Informed Consent Letter to Principals

[printed on U of M Faculty of Education letterhead]

[Date]

Research Project Title: Inquiring into the Effectiveness of a Locally-Developed Professional Development Model for Teachers in a Rural School Division

Principal Investigator: Candy Skyhar [contact information removed]

Research Supervisor: Dr. Thomas Falkenberg [contact information removed]

This consent form, a copy of which will be left with you for your records and reference, is only part of the process of informed consent. It should give you the basic idea of what the research is about and what your participation will involve. If you would like more detail about something mentioned here, or information not included here, you should feel free to ask. Please take the time to read this carefully and to understand any accompanying information.

Purpose of the Research

As you are aware, the Numeracy Cohort is an ongoing professional development (PD) model that has been operating in your school division for the past two years. The intent of the Numeracy Cohort is to provide effective PD opportunities for teachers, enabling them to improve mathematics instruction and student learning outcomes. In order to develop such a model, the unique rural context of the school division had to be considered, inclusive of both the unique strengths and inherent challenges faced within it. As a Ph. D. candidate, I am interested in studying the effectiveness of the model in three key areas which are outlined in the research questions below:

- (1) To what extent (if at all) is the specific locally-constructed PD model utilized in the rural school division able to mitigate the challenges faced by the rural division and its rural teachers in accessing meaningful PD?,
- (2) To what extent (if at all) is the model effective in terms of supporting teachers' professional growth in the area of mathematics instruction and student numeracy?, and
- (3) How do social constructivist principles contribute to teacher professional growth through the locally-constructed rural PD model?

The single case study research I have designed will inquire into these three areas by looking at multiple perspectives and a variety of data. By considering teacher, principal, superintendent, and facilitator perspectives, and by analyzing multiple forms of data, it is hoped that the three research questions above can be addressed. The study will inform not only the school division about the effectiveness of the PD model that has been implemented, but also the broader

educational community, particularly those in rural contexts about potential solutions to challenges faced in rural divisions, what effective PD might look like in rural contexts, and the importance of social constructivist principles in rural teacher PD.

Participation

This letter invites you to participate in a voluntary **focus group discussion** that will be held on June 17, 2015 at 9:00 am at division office, which will be held during your regular release time for administration council meetings. In order to minimize the burden of the focus group discussion, the meeting will be held from 9:00 am – 10:00 am, before your Administrative Council meeting (which will begin at 10:00 am). The focus group discussion will take approximately one hour of your time, and will include questions about the Numeracy Cohort structure and effectiveness. If you choose not to participate in the focus group discussion, you may arrange to work at your regular location (or another location in the division) and arrive for the Administrative Council meeting at 10:00 am. In any case, the Superintendent will not know of your choice to participate or not to participate in the focus group discussion. Questions will be provided, via email, in advance of the focus group discussion to facilitate familiarity with the questions being asked as well as thoughtful discussion. The focus group discussion will be audio recorded (on a digital audio recorder) and transcribed for analysis for the research study.

Risks and Benefits

As a participant in this study, you will be exposed to minimal physical, emotional, or personal risk. You may benefit from participating in the study through contributing your knowledge about the local PD model to what is collectively known about the model within the division, as well as through the satisfaction of knowing that you have contributed more broadly to the development of theory about rural education and rural professional development.

Deception

There is no deception in this study.

Feedback and Debriefing

As a participant, you will receive a summary of the study's findings once it is completed. You may choose to receive a copy via mail or email by selecting the appropriate box on the consent form.

Compensation

There will be no compensation for participating in this study.

Confidentiality

Please note that your choice to participate (or not) in this study is completely voluntary and will not be communicated to anyone by me. Your superintendent will not know whether or not you chose to participate. If you choose not to participate in the focus group discussion, you may work in your school or at the division office in a different room while the focus group discussion is taking place. In addition, the superintendent of the division has agreed that your decision to participate, not participate, or withdraw from the study at any time will have no effect whatsoever on your standing or your workplace environment.

The primary data collected from the focus group discussion for this research study will be stored on a password-protected computer in my home (digital data) or in a locked filing cabinet in my home (hard copy/paper copies). The only two people who will have access to the data are my advisor and myself. All data from the focus group discussion (digital and hard copy) containing names and other identifiers will be destroyed within three years of completion of my doctoral defense (approximately July, 2019), allowing me time to publish related academic articles and prepare for presentations. Digital data will be electronically erased while hard copy data will be shredded.

Due to the nature of this research, confidentiality cannot be guaranteed. Because the research will take place in a very small division in which many people are familiar with the identities of principals, there is potential for others to link participants with the research. Moreover, other people outside of the school division may be aware of the division administrative structure, as well as the Numeracy Cohort/divisional PD project, potentially linking participants with the research. While it is not possible to guarantee confidentiality, every effort will be made to protect the confidentiality of participants in any public or published results related to the study (oral, written, or online). Pseudonyms will be used for all participants, identifiers will be removed wherever possible, and the name of the school division will not be used in any form.

Dissemination of Results

The primary purpose of this research is to complete my doctoral thesis. As a result, the first dissemination of the results will be to my doctoral committee for mentoring and advising purposes. Subsequently it will be shared publically during my doctoral defense and through the publication of my dissertation. A report to the school division will be generated to communicate the findings of the study as well. Beyond the final dissertation and report to the division, I plan to share this research through a number of public venues to allow other researchers to learn from my experience. Public sharing may occur through academic and professional articles and presentations at academic and professional events like conferences.

Withdrawal

At any point you may withdraw from this study by contacting the principal investigator at the email address provided. If you choose to withdraw, your data will be destroyed and will not be used in the research study in any way. Please note that your decision to participate, not participate, or withdraw from the study at any time will have no effect whatsoever on your standing or your workplace environment. I understand that elements of coercion could be felt by you, particularly due to the fact that in addition to being a researcher in this study, I am also your colleague. Please understand that your relationship with me outside of the that as a researcher should not influence your decision to participate in any way. Participation (and continued participation) is completely voluntary.

Informed Consent

Your signature on this form indicates that you have understood to your satisfaction the information regarding participation in the research project and agree to participate as a subject. In no way does this waive your legal rights nor release the researchers, sponsors, or involved institutions from their legal and professional responsibilities. You are free to withdraw from the study at any time, and /or refrain from answering any questions you prefer to omit, without

prejudice or consequence. Your continued participation should be as informed as your initial consent, so you should feel free to ask for clarification or new information throughout your participation.

The University of Manitoba may look at your research records to see that the research is being done in a safe and proper way.

Please check one of the following:

- I agree to participate in an audio-recorded focus group discussion about the Numeracy Cohort and for the resulting audio recordings and transcripts to be used in the research study being conducted by the researcher.

or

- I choose not to participate in the focus group discussion.

I wish to receive a summary of the results of the study via:

- email at the address _____
or
 mail at the address _____

Participant's Signature _____ Date _____

Researcher's Signature _____ Date _____

This research has been approved by the Education/Nursing Research Ethics Board. If you have any concerns or complaints about this project you may contact the Human Ethics Secretariat, Margaret Bowman, at [contact information removed]. A copy of this consent form has been given to you to keep for your records and reference.

Thank you for being involved in this research study. Please do not hesitate to contact me if you have any questions at all.

Sincerely,

Candy Skyhar
Principal Investigator

Appendix L – Informed Consent Letter to Teachers

[printed on U of M Faculty of Education letterhead]

[Date]

Research Project Title: Inquiring into the Effectiveness of a Locally-Developed Professional Development Model for Teachers in a Rural School Division

Principal Investigator: Candy Skyhar [contact information removed]

Research Supervisor: Dr. Thomas Falkenberg [contact information removed]

This consent form, a copy of which will be left with you for your records and reference, is only part of the process of informed consent. It should give you the basic idea of what the research is about and what your participation will involve. If you would like more detail about something mentioned here, or information not included here, you should feel free to ask. Please take the time to read this carefully and to understand any accompanying information.

Purpose of the Research

As you are aware, the Numeracy Cohort is an ongoing professional development (PD) model that has been operating in your school division for the past two years. The intent of the Numeracy Cohort is to provide effective PD opportunities for teachers, enabling them to improve mathematics instruction and student learning outcomes. In order to develop such a model, the unique rural context of the school division had to be considered, inclusive of both the unique strengths and inherent challenges faced within it. As a Ph. D. candidate, I am interested in studying the effectiveness of the model in three key areas which are outlined in the research questions below:

- (1) To what extent (if at all) is the specific locally-constructed PD model utilized in the rural school division able to mitigate the challenges faced by the rural division and its rural teachers in accessing meaningful PD?,
- (2) To what extent (if at all) is the model effective in terms of supporting teachers' professional growth in the area of mathematics instruction and student numeracy?, and
- (3) How do social constructivist principles contribute to teacher professional growth through the locally-constructed rural PD model?

The single case study research I have designed will inquire into these three areas by looking at multiple perspectives and a variety of data. By considering teacher, principal, superintendent, and facilitator perspectives, and by analyzing multiple forms of data, it is hoped that the three research questions above can be addressed. The study will inform not only the school division about the effectiveness of the PD model that has been implemented, but also the broader

educational community, particularly those in rural contexts about potential solutions to challenges faced in rural divisions, what effective PD might look like in rural contexts, and the importance of social constructivist principles in rural teacher PD.

Participation

This letter invites you to participate in the research study as a Numeracy Cohort teacher in three ways:

- 1) You are invited to participate in a voluntary **focus group discussion** that will be held on June 2, 2015 at 9:00 am at Division Office, which will be held during your regular release time for Numeracy Cohort meetings. In order to minimize the burden of the focus group discussion, the meeting will be held from 9:00 am – 10:00 am, before your Numeracy Cohort meeting (which will begin at 10:00 am). The focus group discussion will take approximately one hour of your time, and will include questions about the Numeracy Cohort structure and effectiveness for you as a Cohort teacher. If you choose not to participate in the focus group discussion, you may arrange to work at your regular location (or another location in the division) and arrive for the Numeracy Cohort meeting at 10:00 am. In any case, neither your principal nor the Superintendent will know of your choice to participate or not to participate in the focus group discussion. Questions will be provided, via email, in advance of the focus group discussion to facilitate familiarity with the questions being asked as well as thoughtful discussion. The focus group discussion will be audio recorded (on a digital audio recorder) and transcribed for analysis for the research study.
- 2) You are being asked for permission to use **artifacts you have created** as part of your participation in the Numeracy Cohort since September, 2013. These artifacts are itemized on the consent form below, and you may choose to allow none, some, or all of them to be used for research purposes for this study.
- 3) Finally, you are being asked for permission to use **audio recordings and notes made from the interviews you participated in** as part of the Numeracy Cohort in its first two years of operation. Although these interviews were originally conducted to collect feedback about the Numeracy Cohort and your perceptions about it for divisional purposes, I am now formally requesting to use these interviews (in the form of audio recordings and notes generated from them) as research data for my research study. Again, the interviews are itemized on the consent form below, and you may choose to allow none, some, or all of them to be used for research purposes for this study.

Risks and Benefits

As a participant in this study, you will be exposed to minimal physical, emotional, or personal risk. You may benefit from participating in the study through contributing your knowledge about the local PD model to what is collectively known about the model within the division, as well as through the satisfaction of knowing that you have contributed more broadly to the development of theory about rural education and rural professional development.

Deception

There is no deception in this study.

Feedback and Debriefing

As a participant, you will receive a summary of the study's findings once it is completed. You may choose to receive a copy via mail or email by selecting the appropriate box on the consent form.

Compensation

There will be no compensation for participating in this study.

Confidentiality

Please note that your choice to participate (or not) in this study is completely voluntary and will not be communicated to anyone by me. Your principal and superintendent will not know whether or not you chose to participate. If you choose not to participate in the focus group discussion, you may work in your school or at the division office in a different room while the focus group discussion is taking place. In addition, the superintendent of the division has agreed that your decision to participate, not participate, or withdraw from the study at any time will have no effect whatsoever on your standing or your workplace environment.

The primary data collected from the focus group discussion for this research study will be stored on a password-protected computer in my home (digital data) or in a locked filing cabinet in my home (hard copy/paper copies). The only two people who will have access to the data are my advisor and myself. All data from the focus group discussion (digital and hard copy) containing identifiers will be destroyed within three years of completion of my doctoral defense (approximately July, 2019), allowing me time to publish related academic articles and prepare for presentations. Digital data will be electronically erased while hard copy data will be shredded.

All secondary data collected (including any artifacts created by you as part of your participation in the Cohort, in addition to the audio files and notes generated from interviews you participated in over the past two years on the Cohort) will be copied by me digitally (or physically where necessary) for use in the research study. The copied data will also be stored on my password-protected computer in my home or in a locked filing cabinet in my home. The only two people who will have access to the copied secondary data will be my advisor and myself. All copied secondary data will also be destroyed within three years of completion of my doctoral defense (approximately July, 2019), again allowing me time to publish related academic articles and prepare for presentations. All original data that was collected by the division will be retained for divisional use. Only the copies of the data generated for research purposes will be destroyed. Digital data will be electronically erased while hard copy data will be shredded.

Due to the nature of this research, confidentiality cannot be guaranteed. The research will take place in a very small division in which many people are familiar with the identities of Numeracy Cohort teachers. Moreover, other people outside of the school division may be aware of the Numeracy Cohort/divisional PD project and could link participants with the research. While it is not possible to guarantee confidentiality, every effort will be made to protect the confidentiality of participants in any public or published results related to the study (oral, written, or online).

Pseudonyms will be used for all participants, identifiers will be removed wherever possible, and the name of the school division will not be used in any form.

Dissemination of Results

The primary purpose of this research is to complete my doctoral thesis. As a result, the first dissemination of the results will be to my doctoral committee for mentoring and advising purposes. Subsequently it will be shared publically during my doctoral defense and through the publication of my dissertation. A report to the school division will be generated to communicate the findings of the study as well. Beyond the final dissertation and report to the division, I plan to share this research through a number of public venues to allow other researchers to learn from my experience. Public sharing may occur through academic and professional articles and presentations at academic and professional events like conferences.

Withdrawal

At any point you may withdraw from this study by contacting the principal investigator at the email address provided. If you choose to withdraw, your data will be destroyed and will not be used in the research study in any way. Please note that your decision to participate, not participate, or withdraw from the study at any time will have no effect whatsoever on your standing or your workplace environment. I understand that elements of coercion could be felt by you, particularly due to the fact that in addition to being a researcher in this study, I am also your colleague and Numeracy Coach. Please understand that your relationship with me outside of the that as a researcher should not influence your decision to participate in any way. Participation (and continued participation) is completely voluntary.

Informed Consent

Your signature on this form indicates that you have understood to your satisfaction the information regarding participation in the research project and agree to participate as a subject. In no way does this waive your legal rights nor release the researchers, sponsors, or involved institutions from their legal and professional responsibilities. You are free to withdraw from the study at any time, and /or refrain from answering any questions you prefer to omit, without prejudice or consequence. Your continued participation should be as informed as your initial consent, so you should feel free to ask for clarification or new information throughout your participation.

The University of Manitoba may look at your research records to see that the research is being done in a safe and proper way.

Check all to which you agree:

- I agree to participate as a focus group discussion participant as outlined in the letter of informed consent and for the audio tapes and resulting transcripts from the focus group discussion to be used for research purposes in this study

I agree that the following artifacts from my participation in the Numeracy Cohort since September, 2013 may be used for research purposes:

- Mini Action Research forms (including documents and attachments)
 online and written reflections
 audio recordings from small group discussions of which I was a part
 audio recordings from oral Mini Action Research reports/summaries
 outlines of individual or collective goals
 presentation files and documents I created to share my experiences with other teachers or administrators

I agree that audio recordings and notes generated from the following interviews conducted with me as a member of the Numeracy Cohort may be used for research purposes:

- audio recordings and notes generated from the interview conducted in Sept./Oct., 2013
 audio recordings and notes generated from the interview conducted in June 2014
 audio recordings and notes generated from the interview conducted in May/June, 2015

I wish to receive a summary of the results of the study via:

- email at the address _____
or
 mail at the address _____

Participant's Signature _____ Date _____

Researcher's Signature _____ Date _____

This research has been approved by the Education/Nursing Research Ethics Board. If you have any concerns or complaints about this project you may contact the Human Ethics Secretariat, Margaret Bowman, at [contact information removed]. A copy of this consent form has been given to you to keep for your records and reference.

Thank you for being involved in this research study. Please do not hesitate to contact me if you have any questions at all.

Sincerely,

Candy Skyhar
Principal Investigator