

PROFESSIONAL LEARNING COMMUNITY IMPACTS ON STUDENT  
ACHIEVEMENT IN MIDDLE SCHOOL MATHEMATICS

by

Jessica M. Stuewe

---

A Research Paper Submitted to the Faculty of the DEPARTMENT OF MATHEMATICS  
AND SCIENCE

In Partial Fulfillment of the Requirements For the Degree of

MASTER OF SCIENCE IN ELEMENTARY/MIDDLE LEVEL MATHEMATICS

BEMIDJI STATE UNIVERSITY  
Bemidji, Minnesota, USA

March, 2012

**STATEMENT BY AUTHOR**

This thesis has been submitted in partial fulfillment of requirements for an advanced degree at Bemidji State University and is deposited in the University Library to be made available to borrowers under the rules of the library.

Brief quotations from this research paper are allowable without special permission, provided accurate acknowledgement of the source is indicated. Requests for permission to use extended quotations or reproduce the manuscript in whole or in part may be granted by Department/Program or the Dean, School of Graduate Studies when the proposed purpose is in the interest of scholarship. In all other instances, however, permission must be obtained from the author.

Signed: \_\_\_\_\_

\_\_\_\_\_

**APPROVAL BY THESIS/RESEARCH PAPER ADVISOR**

THIS RESEARCH PAPER HAS BEEN APPROVED ON THE DATE SHOWN BELOW:

\_\_\_\_\_

Dr. Todd Frauenholtz  
Committee Chair  
Professor of Mathematics

\_\_\_\_\_

Date

\_\_\_\_\_

Dean, School of Graduate Studies

\_\_\_\_\_

Date

Jessica M. Stuewe

**ABSTRACT**

The development of professional learning communities in middle level education is a relatively new and trendy concept sweeping the nation. School professional development committees are training large numbers of teachers through conferences, book studies and online webinars on how to collaborate to improve student learning. This research will explore the impact of the first year of implementation of a departmental professional learning community (PLC) on student achievement at the middle school level in the content area of mathematics. Student standardized test scores from 2010 and 2011 will be compared as a measure of success of the PLC. Teacher surveys are included as part of the study to create a “snapshot” of the professional climate in the school setting following the first year of PLC implementation. Results of this study will be shared with the investigator’s teaching team as well as the departmental PLC following completion of the study. Teacher and student confidentiality will be maintained.

Approved by:

\_\_\_\_\_  
Committee Chair  
Dr. Todd Frauenholtz

\_\_\_\_\_  
Date

\_\_\_\_\_  
Committee Member  
Dr. Glen Richgels

\_\_\_\_\_  
Date

\_\_\_\_\_  
Committee Member  
Dr. Derek Webb

\_\_\_\_\_  
Date

\_\_\_\_\_  
Graduate Faculty Representative

\_\_\_\_\_  
Date

## ACKNOWLEDGMENTS

I have many people to thank for helping me pursue this research. First, I owe the greatest thanks to my little growing family who kept me motivated to keep working on this project. My loving, devoted husband Luke, and our new baby are the light in my life.

Thank you also to my 6100 classmates and professor for helping me learn how to develop a research proposal and begin the research process. This was not an easy development for me. Their insights and suggestions helped me take the process one step at a time.

I also could not have tackled this project without the guidance of Dr. Todd Frauenholtz, who helped me focus all of my scattered ideas into one research plan. Thank you.

Thank you to the committee and graduate representatives for reviewing this work, and to the professors at Bemidji State University for their outstanding dedication to the development of quality mathematics teachers in the state of Minnesota.

Finally, thank you to the teachers who participated in the professional learning community who allowed me to use their experiences in this research.

## TABLE OF CONTENTS

<b>List of Tables .....</b>	<b>vi</b>
<b>List of Figures .....</b>	<b>vii</b>
<b>Chapter 1: Introduction .....</b>	<b>1</b>
Statement of the Problem .....	2
Research Questions .....	3
Significance of the Research Problem .....	3
Limitations and Assumptions.....	4
Definition of Terms .....	6
Summary Statement .....	10
<b>Chapter 2: Literature Research Review .....</b>	<b>11</b>
PLC and Reform in Education .....	11
What is a “Professional Learning Community?” .....	12
Why PLC? .....	14
Themes for developing PLC in Schools.....	15
Challenges of PLC.....	17
Investment in Change.....	21
Lesson Study.....	21
<b>Chapter 3: Interpretations.....</b>	<b>23</b>
This Too Shall Pass.....	23
Building Community.....	25
The Power of Collaboration .....	27
Support and Trust.....	28
<b>Chapter 4: Research .....</b>	<b>30</b>
Statement of Intent.....	30
Time for PLCs .....	31
Learning Atmosphere, Expectations, and Teacher Survey Results.....	32
Student Achievement Data and Growth (2010, 2011).....	36
Student Achievement Results and Calculations .....	37
<b>Chapter 5: Conclusions .....</b>	<b>46</b>

<b>Discussion.....</b>	<b>46</b>
<b>Teachers Investing in Themselves.....</b>	<b>46</b>
<b>What Next? .....</b>	<b>47</b>
<b>References .....</b>	<b>51</b>
<b>Annotated Bibliography .....</b>	<b>56</b>
<b>Appendix.....</b>	<b>69</b>
<b>NIH Certificate.....</b>	<b>69</b>
<b>IRB Approval .....</b>	<b>70</b>
<b>Debriefing Statement .....</b>	<b>72</b>
<b>Informed Consent .....</b>	<b>73</b>
<b>Teacher Survey .....</b>	<b>74</b>

**List of Tables**

Table 1

*Teacher Responses to Mathematics PLC Survey (p. 33)*

Table 2

*Student Scale Scores from 2010 and 2011 (p. 36)*

Table 3

*2010 6th grade scale scores compared to their 2011 7th grade sale scores (p. 37)*

Table 5

*MCA II & III Mathematics Achievement Levels and Proficiency (p. 38)*

Table 6

*Teacher Survey Responses, Spring 2011 (p. 76)*

Table 7

*Teacher Survey Responses, Winter 2012 (p. 77)*

**List of Figures**

Figure 1

*8th Grade Dispersion Calculations (p. 39)*

Figure 2

*Box Plots of 8th Grade MCA Test Results (p. 40)*

Figure 3

*7th Grade Dispersion Calculations (p. 41)*

Figure 4

*Box Plots of 7th Grade MCA Test Results (p. 42)*

Figure 5

*6th Grade Dispersion Calculations (p. 43)*

Figure 6

*Box Plots of 6th Grade MCA Test Results (p. 44)*



## Chapter 1: Introduction

The field of education is one that is ripe with acronyms and band-wagon approaches to reform. Every few years a “new” idea or approach to teaching and learning is developed that takes the entire profession by storm, only to lose popularity and be replaced by the next big idea before having a chance to fully develop or achieve the desired results. The constant push for improved standardized test scores because of political connections between test scores and funding puts school districts under immense pressure. The result is a constant coming and going of programs. One of the recent concepts taking education by storm is the concept of the *professional learning community* (PLC). This concept was first introduced in the business community as *the learning organization* through The Center for Organizational Learning, founded at MIT by Peter Senge in 1991 (Clanon, 1999). With much fanfare and touted success, it has made its way onto educator’s doorsteps, morphing to meet the needs of educators and focusing goals on student learning.

According to many research sources (Senge, 1990; DuFour & Eaker, 1998; Buffum, Mattos, & Weber, 2009), this concept may have some staying power that other popular trends in education have not. The basic idea of a PLC is for teachers to collaborate on a regular basis to focus on student learning. The main tasks of an educational PLC are to answer the following questions:

- 1) What do we expect students to learn?
- 2) How will we know students are learning?
- 3) What will we do if students do not learn?

This study will look closely at a rural northwestern Minnesota middle school (grades 6-8), that began implementing the PLC concept in all grades K-12 beginning in September, 2010 following disappointing results on the Minnesota Comprehensive Assessments (MCA) II the previous spring. Following a thorough review of research about PLCs, this research intends to compare the 2010 and 2011 MCA results to see if there is a positive impact on student achievement. Mathematics teacher survey responses will be reviewed to see if the learning environment improvement improved after the first year of implementing PLCs.

***Statement of the Problem***

School districts across the nation are aligning their philosophies with the PLC movement and looking toward teacher collaboration to improve standardized test scores. Time is of essence with any new reform. This research will examine what happens to one northwestern Minnesota school district's middle school state standardized test scores in the area of mathematics after the first year of PLC implementation.

Initially, the process of PLC implementation involves time spent setting norms, agreeing on goals, and then finally in working effectively toward those goals. All of this sets the foundation for the focus of the PLC: improving student learning. The kind of collaboration that directly impacts student learning may not happen the first year of the PLC. The first year is essential for providing a framework within which the teachers will work, but may not address exactly what kind of teaching and learning is happening in the classroom. This may be frustrating for members of the PLC. PLC development may be

seen as a waste of time to those who are not on board with the process. Because of this, sub-questions of this research focus on teacher reactions after experiencing the first year developmental stage of the PLC.

### ***Research Questions***

What impact does the first year of implementation of a PLC concept have on student achievement?

- I. Main Question: Are there improvements in student achievement (as measured by the MCA III test scores) after the first year of PLC implementation?
- II. Sub-questions:
  - A. Does the PLC implementation contribute to an overall improvement on the professional atmosphere in the school?
  - B. Is this reflected in classroom expectations and student achievement?
  - C. After focusing group energy on developing the PLC, do teachers feel like the PLC is focused on improving student learning?
  - D. Has the PLC helped to support the classroom teacher in developing better teaching strategies to address concerns when students aren't achieving?
  - E. Are teachers communicating and meeting with each other on a regular basis?

### ***Significance of the Research Problem***

Schools across the nation are under pressure to increase student achievement as measured by state standardized tests. Student test scores are tied to funding, which is punitive in nature instead of rewarding. Low student test scores yields strict consequences and less funding for districts from the state government. Districts are

looking for ways to generate higher achievement with fewer resources and PLCs offer an “affordable solution.” There are a wealth of resources citing the use of PLCs as a vehicle for student academic improvement and growth in successful school districts. This research proposes to examine student academic achievement after the first year of PLC implementation. Such a quick return on an investment in the staff would not only be impressive, but could promote further teacher buy-in and perhaps continued and increased improvement across the district, state, and region in subsequent years.

***Limitations and Assumptions***

The problem with new reform in education is determining the timeline necessary for changes to have the desired impact. Changes in student mathematics scores may not be evident after only a year of PLC implementation. This research is limited in that it will examine results from only three grade levels (6, 7, and 8) from one school district. Because this is a first-year implementation, it will only use data from the 2010 and 2011 Minnesota Comprehensive Assessments. The test scores will only be reviewed from the mathematics portion of the standardized test. The teachers involved in this study will be the mathematics teachers of the students who took the standardized tests.

There are confounding variables in this study that may impact the results that are out of the researcher’s control:

- The researcher is one of the mathematics teachers included in this study, but will be on maternity leave for about two months of the school year while the PLC is being implemented.

- The 2010 MCA results will be from the MCA II test, which was given to students in paper-pencil form and in which students took the test in classrooms. The 2011 MCA tests will be the updated MCA III test administered in the same fashion as the previous year with one exception: only one form of the test will be available in 2011.
- One of the sixth grade teaching positions was filled by a long-term sub over the 2010-2011 school year.
- Several authors on PLC's (DuFour, DuFour, Eaker & Many, 2010; DuFour & Eaker, 1998; Nathan, 2008) suggest meeting at least weekly in order for the team to develop the necessary tools for a PLC to be successful. This PLC implementation begins with teachers meeting, in 55-minute time slots bi-weekly. This may impact the speed at which teachers experience impacts on student learning/achievement in the classroom. After two months of bi-weekly meetings, the school's site council voted to arrange weekly meetings for all PLC groups.
- Fostering an environment of trust between teachers and providing time for teachers to ask better and more complex questions is essential to a healthy school (Nathan, 2008). Meeting time for staff collaboration has been carved out of the contracted teaching day. In this middle school, PLC meeting time was made available by shifting teacher supervisions and sharing prime time (student advisory or home room time with students) responsibilities. Not all teachers were initially happy about losing time with their prime time students.

- Because of the emphasis on the improvement of mathematics test scores in the district, this school has experienced other changes that may also contribute to changes in student test scores. These include: an added paraprofessional in a select number of classrooms where students who had low test scores are taught, purchasing iPad technology for students to practice test problems using Study Island (an on-line sample test program designed to prepare students for standardized testing), and a shift in eighth grade textbooks from Pre-Algebra to Algebra 1 Concepts part-way through the school year.

In choosing the MCA tests as a tool to measure student achievement, this research assumes the test accurately measures what a student understands in mathematics and that scores are unbiased and valid. It assumes all student scores involved in this study are from students who were taught primarily by the teachers who are involved in the implementation of the professional learning community. It assumes that all students taking the standardized tests will be honest and try their best on the tests. It assumes the survey questions answered by teachers are answered honestly by all teachers involved in the survey. Great care will be taken to protect the identities of all teachers (excluding the researcher) and keep teacher and school district names anonymous.

### ***Definition of Terms***

Common Assessments = Teacher-created instruments, processes, projects or tests that assess student learning according to the same criteria (DuFour et al., 2010, p. 63).

Differentiated Instruction = Fitting the lesson to the learner (Wormeli, 2001, p. 68). Any instructional changes made after the initial large-group instruction to differentiate the lesson to meet the needs of individual or small groups and improve their learning could be differentiated instruction.

ELO = Essential Learning Outcome.

Consensus among content area teachers about what learning outcomes are essential for students to learn. The inessential content is eliminated from course instruction. With this model, every teacher in every course becomes clear on the answers to the question, “What is it we want students to know and be able to do?” (Eaker, DuFour, & DuFour, 2002).

Formative Assessments = Assessments *for* learning (DuFour et al., 2010) that are part of the teacher’s method of continually monitoring student learning in the classroom. These assessments can be formal written assessments (or quizzes) or informal subjective checks for student understanding. Formative assessments are used to inform both the student and teacher about student progress in order to address any inadequacies in student learning.

Guaranteed and Viable Curriculum = An expectation that all students have access to the same essential learning regardless of who is teaching the class (Marzano, 2003).

Interdisciplinary Teams = A team of teachers who teach a variety of content to the same group of students (for example, a team may consist of four teachers: one math, one science, one language arts, and one social studies teacher who all deliver lessons to the same group of students) and who meet regularly to discuss concerns about students (Jackson & Davis, 2000).

MCA = Minnesota Comprehensive Assessment. The standardized test given by the state of Minnesota to measure student achievement in mathematics and reading. In the spring of 2010, students took the MCA II test, which was aligned with the 2003 MN mathematics standards. In the spring of 2011, students took the MCA III test, which was aligned with the 2007 MN mathematics standards (July 2010, retrieved from Minnesota Department of Education website: [http://education.state.mn.us/MDE/Accountability\\_Programs/Assessment\\_and\\_Testing/Assessments/MCA/index.html](http://education.state.mn.us/MDE/Accountability_Programs/Assessment_and_Testing/Assessments/MCA/index.html)).

Norms = A set of agreed upon guidelines or protocols to determine how PLC conducts meetings. These may include expectations to arrive on time, for everyone to participate, and for all participants to be respectful and honest during team meetings. The protocols are commitments made by the team members to help the team function effectively (Eaker, DuFour, & DuFour, 2002).



PLC = Professional learning community.

For this research, PLC refers to a team of teachers who teach the same content area (for this research, middle-level mathematics) who meet regularly and adhere to a set of norms in order to address student learning. The three questions charged to the PLC are:

1. What is it we expect students to learn?
2. How will we know students are learning?
3. What will we do if students do not learn?

(DuFour & Eaker, 1998).

Realignment = Aligning policies, procedures, programs, goals, tactics, strategies, job designs, and day-to-day practices to reflect the goals of the organization (DuFour, 2003).

Reculturing = A process in which a staff dissolves cultural and structural barriers in order for change to occur (Buffum et al., 2009). Reculturing a school is an intricate process that causes fears and challenges, as well as opportunities, in the field of education (Hughes, 2007; Senge, 1990).

RTI = Response to Intervention. “[a] movement that shifts the responsibility for helping all students become successful from the special education teachers and curriculum to the entire staff, including special education teachers *and* regular education teachers and curriculum. This seismic shift in educational policy culminated in the Individuals with

Disabilities Education Improvement Act (IDEIA), which was signed into law by President George W. Bush in December 2004” (Buffum et al., 2009, p. 2).

Study Island = A web-based program that allows students to practice answering multi-choice standardized questions that are linked to state standards. The program includes options that allow teachers to develop assessments, practice worksheets, and monitor student progress (<http://www.studyisland.com/>).

Summative Assessments = End of unit assessments or tests used to determine if students have met intended standards and school district’s essential learning outcomes (DuFour et al., 2010).

### ***Summary Statement***

This research makes inquiries about the impact of the first year of implementation of a Professional Learning Community on student achievement at the middle school level in the content area of mathematics. Student standardized test scores from 2010 and 2011 will be statistically analyzed and results presented.

Teacher surveys will be analyzed to help describe the professional atmosphere in the school and the teachers’ perspectives on the impact the PLC concept had on classroom and student achievement after first year implementation.

## **Chapter 2: Literature Research Review**

### ***PLC and Reform in Education***

The PLC movement is one of the hot new ideas in educational reform taking the profession by storm; however, it is not new. The idea of collaborating in teams was under experimentation eighty years ago. Using teacher teams to drive reform was one of the successes of the 1930's Eight-Year Study, during which collaboration communities formed and flourished (Bullough, 2007).

Sponsored by the Progressive Education Association (PEA), the Eight-Year Study (which actually continued for twelve years, 1930-1942, 'Eight-year' referred to the amount of time spent in high school and college) (Bullough, 2007) began with roughly thirty schools and two main goals; "[t]o establish a relationship between school and college that would permit and encourage reconstruction in the secondary school" and "[to] find, through exploration and experimentation, how the high school in the United States can serve youth more effectively" (Aikin, 1942). According to Bullough (2007), five lessons can be learned from the Eight Year Study:

1. Teacher education and capacity building is at the root of school reform.
2. Powerful teacher education involves engagement and exploration with others in pressing personal and professional problems and issues.
3. Sustained school reform requires a foundation of trust among those involved.
4. Schools, colleges, and universities must join in a mutual quest for change and improvement in order to be successful.
5. Each generation must learn from the experience of previous generations.

As the study proceeded, the role of the teachers became increasingly more complex, as it does in today's PLC (Fleming & Thompson, 2004). New tasks in the 1930's called for collaboration, developing new skills and setting aside old habits. Today's PLC movement requires the same, calling on educators to set agreed upon norms, and proceed with student learning as a main focus to drive cultural change within the school system.

The *term* professional learning community and corresponding acronym (PLC) on the other hand, are a newer addition to the list of educational reform acronyms. In the business community, a similar concept is referred to as organizational learning or learning organizations and its influence has rippled across both private and public sectors (Senge, 1990). According to Senge in his 1994 paperback introduction to his book, *The Fifth Discipline*, "the learning organization was one of the prominent management fads of the first half of the 1990's" (p. xi). Influenced by the success of this concept in business management, educators such as Richard DuFour and company have brought the term professional learning community to the world of education and have made it famous across the globe in this decade through books, videos, and professional development conferences for educators.

***What is a "Professional Learning Community?"***

There are many interpretations of what constitutes a professional learning community. Generally, most agree that a learning community consists of a group of professionals who "continuously seek and share learning, and act on their learning" (Hord, 1997). Parr and Ward (2006) describe learning communities as a

sustainable vehicle for teacher learning that uses shared norms and values, collaboration, focus on student learning, shared personal practice, and reflective dialogue. DuFour and company (2010) argue that a PLC “is an ongoing process in which educators work collaboratively in recurring cycles of collective inquiry and action research to achieve better results for the students they serve (DuFour et al., 2010, p. 11).

Dialogue is a key feature in learning communities. Senge (1990) contends that “there is a deep hunger to rediscover our capacity to talk with one another” (p. xiii) in response to the boom of dialogue groups that have mushroomed across public and private sectors. As face-to-face dialogue is replaced by interactive technologies, this should not be a surprise. Dialogue drives collaboration, which generates ideas, goals, and vision. Wegner’s (1998) social theory calls for participants to mutually engage in the task at hand, focus on agreed upon goals, and develop shared methods of working together. These values are also found in Diane McGinty Weston’s elements for organizational learning, which include: 1) vision, values, and integrity; 2) dialogue; and 3) systems thinking (Weston, 1993). Similarly, DuFour and Eaker (1998) cite mission, vision, values and goals as the four building blocks of a professional learning community. Social theorists, business gurus, and educational leaders seem to be on the same page; provide stake holders a place at the dialogue table in a community atmosphere to generate sustainable change.

DuFour and Eaker (1998) break down the PLC title word by word. The authors use *professional* to describe a person with expertise who is obligated to stay current in their field of study, *learning* to describe an action and perpetual curiosity, and *community*

to describe a group with common interests (DuFour & Eaker, 1998, p. xi-xii). The choice here to use the word community instead of organization is purposeful. The term community evokes feelings of involvement, growth, family, and welcomeness versus the mechanic, traditional, linear, top-down feelings evoked by the term organization.

### ***Why PLC?***

In the 1930s, Ralph Tyler championed an early form of action research; a generous view of assessment that involved teachers and focused on student attitudes, beliefs, and values as well as academic performance.

“Tyler argued that teachers were fully capable of developing valid assessment instruments and warned against over-reliance on test “technicians” who know little about content and less about the challenges of schooling. Teachers, he thought (and the [Eight-Year Study] proved), could not only effectively gather and use data to support systemic change but also do so with skill and intelligence. Lacking such involvement, Tyler thought, assessment would inevitably go awry-- as many believe it has” (Bullough, 2007).

This generation’s standards movement and development of Common Core State Standards (<http://www.corestandards.org/>) make it more important than ever for teachers to talk about what students need to learn to be successful in the “real world” market, and share innovative and effective practices about how the curriculum is being taught. Rick DuFour (2003) calls this our professional obligation, “...to align the practices of [our] schools and districts with what we know to be the most effective strategies to achieve the

fundamental purpose of our profession -- high levels of learning for all students” (DuFour, 2003, p. 71).

We live in a socially networked world. More than 600,000 tweets were written about this year’s final episode of The Oprah Show in one week of May, 2011 (<http://blog.tweetreach.com/2011/05/>). According to the Times OnLine, Facebook boasts more than 400 million regular users world wide ([http://technology.timesonline.co.uk/tol/news/tech\\_and\\_web/the\\_web/article7064973.ece](http://technology.timesonline.co.uk/tol/news/tech_and_web/the_web/article7064973.ece)). Gone are the days where teachers had the academic freedom to teach what they wanted behind closed doors; the doors no longer close. The development of the world-wide-web has vaporized borders and shrunk our world. Decisions made in other state departments effect ours. News travels fast. Educators need to be part of the conversation.

### ***Themes for developing PLC in Schools***

Trust. Willingness to work hard. Learning. Collaborative culture. Dialogue. Leadership. Results-oriented thinking. These are some of the common terms that appear in literature about PLCs and learning organizations alike and are personnel traits that are necessary for forward movement in this reform (Senge, 1990; DuFour & Eaker, 1998; Jessie, 2007; Hughes, 2006; Rentfro, 2007; Bullough, 2007).

One study involving a number of principals defined eight themes schools should follow for successfully implementing learning communities in their schools. Emphasizing the process of growing into a learning community, building structural supports to enable staff development, and working in an environment of trust were among the eight themes

(Cranston, 2009). Leaders in this environment need to be flexible and encouraging, yet have solid expectations.

As key players in this educational movement or “culture shift,” principals particularly may be called on to act as a referee to keep staff focused and on track (DuFour, 2003, 2004; Cranston, 2009; Williams, Brien, Sprague, & Sullivan, 2008; Gregg, Niska, & Thompson, 2004). In *Turning Points 2000*, Jackson and Davis (2000) state “no single individual is more important to initiating and sustaining improvement in the middle grades school students’ performance than the school principal” (p. 157). Senge (2000) refers to the principal as a “lead teacher and lead learner, and steward of the learning process as a whole” (p. 15). In his article “Building a Professional Learning Community” published in *The School Administrator*, Richard DuFour calls on school officials to embrace “organizational autonomy” with carefully planned parameters to give focus and direction to school staffs and to keep the focus on learning, collaboration, and results (DuFour, 2003). Change can be very uncomfortable and although it happens inevitably, it also takes time.

In *Learning by Doing, A Handbook for Professional Learning Communities at Work*, the authors open the book with this statement: “[w]e learn best by doing” (DuFour et al., 2010, p. 9). The authors encourage school districts to start the PLC journey and contend that by working through the process, educators will learn by doing. Teachers and school leaders should know that the PLC process is more than just a scheduled team meeting. If teachers attend team meetings to address issues then return to classrooms with a business as usual attitude, they are not functioning as a PLC. “While collaborative



teams are an essential part of the PLC process, the sum is greater than the individual parts. Much of the work of a PLC cannot be done by a team but instead requires a school-wide or district-wide effort” (DuFour et al., 2010).

Professional learning communities have also been closely connected to another movement, “response to intervention” or RTI in which interventions are used at increasingly more intense levels as students’ needs demand. The two movements share two fundamental assumptions: educators believe all students are capable of high levels of learning, and educators accept responsibility for making this learning a reality (Buffum et al., 2009). If the teaching staff is not behind these fundamental beliefs, both movements are undermined and face an uphill battle toward success.

Solution Tree ([www.solution-tree.com](http://www.solution-tree.com)), the Society for Organizational Learning (<http://www.solonline.org>) and other professional development companies have volumes of resources including on-line videos, journal and newspaper articles, and research that point toward positive results in student achievement after PLC implementation.

### ***Challenges of PLC***

Even the authors and researchers who make their livings promoting learning organizations or learning communities admit that this movement faces challenges ranging from leadership to sustainability (Senge, 1990). Principals play a key role in nurturing a climate that is supportive of staff collaboration. Even if leadership styles vary, many believe a professional learning community will not be sustained without strong principal support (Williams et al., 2008). Supportive conditions also include the “physical conditions and human capacities that encourage and sustain a collegial atmosphere and

collective learning” (Hord, 2004). The Eight-Year Study was successful in its time with collaboration among teachers, administrators, colleges, and communities, yet it too eventually went away.

Critics of the term PLC, argue about *who* is the professional in the PLC. Laura Servage challenges the use of the word “professional,” and encourages teachers to scrutinize and challenge assumptions about PLCs. She sees PLCs as not only a reform vehicle, but a way for schools and principals to push agendas that may not have anything to do with student learning in the classroom (Servage, 2009). Robert Bullough points to the absence of shared leadership between universities and schools as a shortfall of PLCs. He questions the use of standardized tests as measures of achievements;

“Learning to what ends, for what purposes? Short of a clearly articulated social philosophy, upon what basis are curriculum decisions being made? (Test scores?) How does one know that the most important aims are being made?” (Bullough, 2007, p. 176).

Teachers themselves can be roadblocks in Professional Learning Communities by refusing to participate, fostering ill feelings of jealousy or mistrust, or by clinging tightly to practices or lessons that are outdated or no longer effective. Richard DuFour contends efforts to improve achievement for all students increase the likelihood of sustaining school improvement and increases overall student success (DuFour, 2003). But it takes work, patience, diligence, and commitment to work through the roadblocks. It also takes training. DuFour writes, “there is no question that education has failed to invest

sufficiently in the development of the professionals who, in the final analysis, will determine the quality of any school. It is important that school leaders present an effective and compelling case to provide greater support for staff development” (DuFour, 2003, p. 67).

“You will never “find” time for anything. If you want time, you must make it,” Charles Bruxton (1823-71), English brewer, philanthropist, writer and Member of Parliament (Artis, 2010). Making time within the confines of the school day can be a daunting task. Linda Nathan warns about the danger of schools getting caught up in the logistics of just “doing school.” She contends that teachers and school leaders erroneously spend too much time focusing on what students get wrong on standardized tests instead of asking the more complex questions to answer why students make errors (Nathan, 2008). She writes, “[a] school with a healthy professional learning community will maintain a razor-sharp focus on student achievement; its faculty will feel a common ownership and responsibility for that achievement; and its students will achieve success” (para. 17).

The PLC model offers only a conceptual framework for transforming a school, not a prescribed recipe (Eaker et al., 2002). In the PLC model, teachers and school leaders are called on to initiate change to begin to collectively answer critical questions about teaching and learning (Burnette, 2002; DuFour et al., 2010; DuFour & Eaker, 1998; Eaker et al., 2002; Nathan, 2008).

“There is a natural tendency to wait for someone else to take the initiative to improve our schools. Superintendents wait for more enlightened school boards of education or more favorable state legislation, principals look to the central office, department chairpersons, and so on” (Eaker et al., 2002, p. 7).

While staff development takes time and money, both of which are tapped resources in many school districts, procrastination is perhaps the worst of the challenges for any advancement or change. DuFour and company contend that even a small step in the direction of change is better than no movement forward at all.

What about sustainability over time? As far as “fads” go, this movement has already been moving ahead for more than two decades (which is many times longer than most movements). All indications are that PLCs are sustainable and will only grow stronger, but perhaps the clock on the popularity of this movement is ticking with time running out.

Are PLCs simply vehicles to move administrative agendas? Are they simply a fad or the newest “bandwagon” in educational reform? Committed to advocating for this newest educational reform vehicle, DuFour defends PLC’s against the toughest critics. In his article: “Professional Learning Communities: A Bandwagon, and Idea Worth Considering, or Our Best Hope for High Levels of Learning?” DuFour responds to an article in the *Middle School Journal* that doubts the long term success of PLCs. He argues that school reform efforts have followed a predictable pattern in the United States. School districts, school officials, and teachers need to give PLCs a chance to develop past the stage of confusion, criticism, and complaints to allow teacher collaboration to truly shift

the focus of education away from teaching and toward student learning, understanding, and ultimately success (DuFour, 2003).

### ***Investment in Change***

Throughout the literature about what a PLC is or should be, there is consensus about its focus in the field of education. In education, teachers and school staff should be focused on student learning and all that encompasses (DuFour & Eaker, 1998; Jessie, 2007; Hughes, 2006; Rentfro, 2007; Peskin, Katz, & Lazare, 2009; Hord, 1997). What should students be learning, how do we know if they learned, and what do we do if they did not?

Pioneer Middle School, in Orange County, CA, won the National Blue Ribbon School designation in 2008 for outstanding performance on standardized tests. School officials credit its success to the collaborative culture it built with the implementation of PLCs. Teachers collaborated to monitor student learning, what to do if they were not learning, and how to best meet the needs of students (James, 2008).

South Elementary School in Eldon, Missouri, showed a 24.1 percent gain in advanced and proficient scores for communication arts on the Missouri Assessment Program (MAP) between 2001 and 2005 after implementing PLC training in 2003 (Rentfro, 2007).

### ***Lesson Study***

Japan has been drawing world-wide attention since their success on the Third International Mathematics and Science Study in 1999 (Tolle, 2010), after using lesson study to shift from “teaching as telling” to “teaching for understanding” (Lewis &

Tsuchida, 1998). The spirit of Japanese lesson study is about teachers collaborating to improve student learning (Tolle, 2010).

Lesson study takes collaboration to the next level. Not only do teams of teachers work together to decide on what is important and develop goals and focus areas, they also develop lessons that are observed by other teachers, recorded, and reviewed by the faculty, sometimes including outside educators in a panel-like discussion (Lewis & Tsuchida, 1998).

Japan's development of lesson study has shown how investing in professional development can empower teachers to have a voice in the political tide of educational reform, and more importantly, improve teaching and learning. "Because the policymakers who write the national standards attend public research lessons and see what aspects of the standards need further support or revision, the lessons also allow formative research on policy" (Lewis, 2010). Japanese publishing companies are taking notice too. "That may explain why our recent study of two U.S. and two Japanese elementary textbook series found that the Japanese texts use the same four models to represent fractions, while the U.S. texts use 15 different models" (Lewis, 2010).

How long after implementing collaborative policy changes like PLCs can a district expect to see improvements on standardized test scores, if any? Lesson study has proven that a collaborative approach to educational reform is quite powerful (Lewis & Tsuchida, 1998; Lewis, 2010; Tolle, 2010). Can PLCs have a similar effect in the content area of mathematics? This research paper will look specifically at what happens with student standardized mathematics scores after the first year of PLC implementation.

### Chapter 3: Interpretations

#### *This Too Shall Pass*

“The Eight-Year Study brought together university and school faculty and provided opportunities for *shared leadership*, the first dimension of PLCs” (Bullough, 2007, p. 176). The Great Depression was changing the way Americans viewed education in the 1930’s. It was a time when education needed to change because the United States economy could no longer support the amount of uneducated citizens it had before. Teachers collaborated in curricular areas, across grade levels and across districts to develop student-centered curriculum. “The commitment to democracy as a fundamental aim and focus grew slowly, paralleling the social upheavals of deepening economic depression and rising European fascism and Soviet communism” (Bullough, 2007, p. 170). It was popular during this era for citizens to conclude the future success of the nation depended on the education of American children.

We are now in a time that has been compared to the Great Depression in terms of the financial strain families are experiencing. Pressure on student success is rising. Parallels with today’s PLC movement and the 1930’s Eight-Year Study prove that we have a long way to go in learning from our own history in terms of reforming education. Now, as then, with less financial resources teachers are expected to do more with less. What better way for school districts to make gains than to make better use of the resources they already have employed? Their most valuable human resources: their teachers.

At the heart of both reforms (Eight-Year Study and the PLC movement) is the belief that teachers can make a difference in student learning when given the chance to collaborate and learn from each other. Dialogue with colleagues about what works and what does not work with students in classrooms can lead to effective changes in instruction. Powerful change can happen when teachers accept they can learn from each other.

Japan attributes its success in education to the investment in the professional development of teachers through lesson study. While observing a research lesson in Japan, Lewis and Tsuchida were reminded how powerful an “aha” moment can be in terms of student learning (Lewis & Tsuchida, 1998, p. 51). Catherine Lewis contends the lesson study model would benefit the United States as a proving ground for standards-based instruction (Lewis, 2010). Another researcher, Penelope Tolle, discovered the most important part of Japanese lesson study was the reflection that happens in the post-lesson discussion. She writes, “[t]he post-lesson forum provides the opportunity for rich discussion by a large group of stakeholders, but it is also the area most neglected and least written about in America” (Tolle, 2010, p. 183).

Unfortunately, cultural change within a school necessary for success with any movement (including PLCs, RTI, and Lesson Studies) take time. “We are wise to believe it is difficult to change, to recognize that character has a forward propulsion which tends to carry it unaltered into the future, but we need not believe it is impossible to change...We create ourselves. The sequence is suffering, insight, will, action, change” (Wheelis, 1973, p. 101-102).



Perhaps the biggest reason experienced teachers reserve themselves from high expectations for reform is the inevitability they will have to adapt to a different reform before the first had time to become fully established. Education is a field with many acronyms and reforms that come and go. In chapter one of *Learning by Doing, A Handbook for Professional Learning Communities at Work*, the authors mention a school faculty that felt wore out by the constant program changes implemented at their school. In three years, team meetings had three different names: PLC the first year, Understanding by Design the next, and then Differentiated Instruction. “They converted the names of the various programs into verbs, and the joke on the faculty was that they had been UBDeD, PLCed, and DIed” (DuFour et al., 2010). Teachers, like anyone else, are guilty of resisting change. Based on their own experiences, some may believe successful or not, inevitably, this too shall pass.

### ***Building Community***

In the first year of implementation, each teacher in this district had his or her own ideas and expectations of this new concept; this PLC thing. The teachers knew one thing: this wasn't going to go away. At least not for a while. Some teachers jumped in with both feet and others reluctantly followed. All teachers grappled with this new concept as they started their PLC journey in their curriculum departments. Each building and each PLC within each building followed the district's plan, each at its own pace.

In order to focus on student learning, the first step was to build a solid foundation of trust and shared values (as advised by DuFour (1998, 2002, 2010) and company). The

district closely adhered to what Parr and Ward (2006) described as a “sustainable vehicle” for success and followed this blueprint:

1. Set agreed upon norms. The departmental PLC agreed on rules and protocols to follow during meetings in order to be productive and on task. These included being on time, staying on task, attending to the agenda given to our PLC on meeting days, listening respectfully to all ideas in discussions, participating in discussions, and celebrating successes in and out of the classroom. “Celebration is a particularly powerful tool for communicating what is valued and for building community” (DuFour et al., 2010, p. 37).
2. Establish essential learning outcomes (ELOs). The middle school mathematics department examined the 2007 Minnesota mathematics standards and prioritized the standards at each grade level to determine what parts of the curriculum were essential. The district goal was to provide students a guaranteed curriculum. Every student, no matter the teacher, would all be taught the essential learning outcomes. PLC groups then compared proposed ELOs across grade-levels to ensure all major concepts were taught. ELOs needed to be rephrased so that students and parents can easily understand the goals of each course taught.

The following are the district’s direction for PLC teams in year two:

3. Begin writing common summative assessments. Formative and summative assessments are becoming common terms used by educators. Each assessment has a

purpose: either to inform learning and check for student understanding or to assess the learning of a major concept at the end of a unit. The shift toward common assessments means teachers have to discuss their plans to teach concepts, plan activities to promote student learning, and write formative assessments to be used for checking for understanding. Teachers working together to write ELOs, align curriculum, and write common assessments is leading to discussions about the district's grading policies and whether the district's current policies are reflective of the district's philosophy or not.

4. Administer common assessments and begin dialogue about successes and failures, teaching methods, and what can be done to improve student learning.

### ***The Power of Collaboration***

Currently, this district tests students with two types of formal, standardized tests. The NWEA MAP (Northwest Evaluation Association's Measures of Academic Progress) test is administered three times (fall, winter, spring) to assess whether a student is showing growth in the areas of reading and mathematics. The MAP test is a national assessment that dynamically responds to a student's responses as they take the test, adjusting up or down in difficulty (<http://www.nwea.org/>). The MCA (Minnesota Comprehensive Assessment) III is a state-wide standardized test administered to determine if a student is proficient with the state standards.

Up until the introduction of the PLC, one reason for all of the testing was that the subject areas did not have common assessments. Each teacher developed his or her own tests as the content taught in the classroom largely was left up to each individual teacher. The shift toward collaboration and common assessment leads nicely toward teachers

using real classroom data to inform decisions, much like Ralph Taylor's 1930's early form of action research. Teachers, given the opportunity and time, have the skill and intelligence to gather and use data to support systemic changes. As Rich DuFour stated, it is our professional obligation to align with standards (2003). Teachers can certainly use classroom data to show growth throughout the year.

### ***Support and Trust***

Although teachers bear much of the responsibility in the success or failure of a PLC, the principal also has a large role to play. Senge refers to principals as the "lead teacher and lead learner" (2000, p. 15). As the lead teacher, the principal's responsibilities are great. Jackson and Davis (2000) contend that the principal is the most important player in initiating and sustaining student performance.

The principal is responsible for building a schedule that allows time for teachers to collaborate; providing guidance, parameters, and expectations for PLC teams to follow; and perhaps the ability to step in as referee to ensure PLC teams keep the focus on student learning. In order to be successful with these responsibilities, the principal needs the trust, respect, and the support of the staff as much as the teaching staff needs the principals' support and trust. Teachers need to know collaborative time will not be spent on district agendas rather than student learning (Servage, 2009). Threats, punishments, and government-handed-down mandates do not acknowledge what inspires teachers to extraordinary levels of performance. "Reforms driven by distrust cannot endure, nor can they produce sustainable quality programs" (Bullough, 2007, p. 179).

The successful PLC journey is one that is paved with professionalism and leadership by all parties involved. If the PLC journey is to take a path similar to lesson study, teachers and administrators need each other's support. Penelope Tolle writes about lesson study in Japan, "At no time, not even when the presentation is extremely weak--or students lose interest or the lesson falls apart--is the teacher's job in jeopardy" (Tolle, 2010). Collaboration also means that responsibility for student success is shared; "collaborative planning of research lessons means that criticism is generally shared with several colleagues" (Lewis & Tsuchida, 1998). With teacher tenure laws being challenged and state legislatures preparing to step in and regulate the process of teacher evaluation, the focus and intent of PLCs need to remain honest and intact; to improve teaching and learning.

## **Chapter 4: Research**

### ***Statement of Intent***

The focus of this research is to determine if there is a positive impact on student standardized test scores as measured by the Minnesota Comprehensive Assessments in the area of mathematics after just one year of implementing the PLC in the middle school mathematics department. This research will analyze grade-level averages (mean and median of grade-level scores) and spread (standard deviations), simple two tailed t-test analysis and value-added comparisons (comparing individual student score gain/loss from last year to this year) of student MCA test scores from 2010 and 2011 to determine whether an impact was made. Using t-test analysis, results of  $p < 0.05$  would indicate a significant difference in scores. If the p-value is  $< 0.01$ , a highly significant difference was made.

A five-point Likert-scale survey will be administered to teachers in the middle school mathematics department before the 2011 test results are released. Teacher responses will be analyzed to see if teachers believe PLCs had a positive impact on student learning. Teacher perception of the effectiveness of the PLC will be compared with the actual student data to see if teacher perception and actual student data are aligned. The teacher survey will also be given in the school year following the 2011 MCA III test to determine if any changes in perception occurred. Survey results and comments will be compared and noted in the next chapter of this paper.

Permission to include the teacher survey was applied for, and obtained, before the survey was administered from both Bemidji State University and the school district

included in the study. Great care has been taken to protect the identity of the community, school district, the teachers, and students involved in the study (excluding the researcher).

### *Time for PLCs*

Making time for PLC collaboration means something else in the schedule has to be sacrificed. Where can time be made? Principals only have control over the time that is allocated for the school day. Before and after school time is not an option when attempting to build successful PLC due to teacher time already spent on supervising duties, teaching electives, coaching extra-curricular activities, or involvement with other district committees.

In this middle school, departmental PLC meeting time has been carved out of Prime Time, or student advisory time. Each Prime Time has a partner class with a teacher from a different curriculum. Two days a week all students from both groups go to one teacher's classroom for Prime Time. For the mathematics department, our Prime Time students go to a science teacher's room on Thursdays. Then on Fridays, the science teachers students join our class. This frees up teachers to meet with their departments one day a week.

The agenda of these department-wide meetings vary depending on the guidance of the district. One meeting might address district concerns with standardized testing schedules or include a review and analysis of standardized test results reported by the building principal or the district test administrator. Another meeting will focus on curriculum or teaching methodology. PLC meeting time on in-service days has been devoted to solidifying departmental essential learning outcomes (ELOs) and preparing

final drafts to be reviewed by the district's curriculum committee. In the second year of implementing PLC teams, teachers are using the approved ELOs to write common assessments. Most of the common assessments are created outside of the departmental PLC meeting time.

***Learning Atmosphere, Expectations, and Teacher Survey Results***

A five-point Likert survey was distributed to the six mathematics teachers who are part of the school's mathematics PLC in the spring of 2011 before the MCA III test results were released. Four teachers responded to the survey. The survey was administered again in the winter of 2012, part-way through the second year of PLC development in the school with five teachers responding to the survey.

Comments about PLCs were all positive. One teacher commented, "I have enjoyed the opportunity to meet with my department to discuss things as they arise. It is a good feeling to not be an island in this ocean of education." Another teacher exclaimed "Every building & district should do this!"

Regarding the research question: does the PLC implementation contribute to an overall improvement on the professional atmosphere in the school, teachers who responded to the survey generally agreed (table 1).



Table 1

*Teacher Responses to Mathematics PLC Survey*

<b>Question</b>	<b>Strongly Agree</b>	<b>Agree</b>	<b>Neither Agree nor Disagree</b>	<b>Disagree</b>	<b>Strongly Disagree</b>
PLC set a firm foundation with agreed upon norms and goals					
Spring 2011		4			
Winter 2012		3	1	1	
PLCs have contributed to an overall improvement in the professional atmosphere					
Spring 2011	1	3			
Winter 2012	1	3		1	
PLC is focused on student learning					
Spring 2011	1	2	1		
Winter 2012	1	3		1	
PLC can help address students not learning					
Spring 2011		3	1		
Winter 2012	2	2		1	
Teachers have more opportunities to communicate about student learning					
Spring 2011	1	3			
Winter 2012	2	1	1		1
PLCs have helped raise student success (as measured by less students failing)					
Spring 2011		2	1	1	
Winter 2012			5		
PLCs are a waste of time					
Spring 2011				2	2
Winter 2012			2	1	2
Culture for learning will lead to student improvement					
Spring 2011		4			
Winter 2012	1	4			
PLCs have make a positive impact on how I teach					

Question	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
Spring 2011			3	1	
Winter 2012		2	3		
PLCs have contributed to my professional growth					
Spring 2011		1	3		
Winter 2012	1	3		1	

*Note.* Four out of six teachers responded to the survey in the spring of 2011. Five out of six teachers responded to the survey in the winter of 2012. One teacher in 2011 was a long-term substitute teacher. One teacher in 2012 was a newly hired teacher.

Perceived student achievement was gauged with the question: is this reflected in classroom expectations and student achievement? During the first year of PLC implementation, the amount of students failing classes in the middle school was decreased to almost no students failing more than one class in the building. PLCs have been given a lion’s share of the credit for a dramatic shift in teaching philosophy in the building. Almost all teachers in the middle school offer re-tests and re-teaching time for students to understand concepts. The mathematics teachers, based on teacher responses to the survey, are neutral on this question. Regardless of the change in philosophy in the building and the emphasis on developing PLCs, they neither agree nor disagree that PLCs are to be given the credit for less students failing classes in the middle school (table 1).

All mathematics teachers that responded to the survey believe the culture change in the school will lead to improved student learning. One teacher who strongly agreed commented, “We have valuable time to communicate about what is going on in our classrooms.”

However, in response to the survey question asking teachers if implementing professional learning communities has played a part in raising student achievement in the area of mathematics as measured by classroom grades, all teachers who responded to the winter survey were neutral, neither agreeing or disagreeing.

After focusing group energy on developing the PLC, do teachers feel like the PLC is focused on improving student learning? In the spring following the first year of PLC work, only one teacher was neutral about whether the focus of the PLC was on improving student learning. The rest of the teachers either agreed or strongly agreed. The winter survey showed one teacher disagreed while the rest agreed that the mathematics department PLC is focused on improving student learning. One teacher commented, “With any new idea, it takes time to realize the effects. I believe that in time, our PLC will be more effective.”

Has the PLC helped to support the classroom teacher in developing better teaching strategies to address concerns when students aren't achieving? One of the main goals of PLCs is to answer the question, what do we do when students are not learning. Most of the mathematics teachers either agreed or strongly agreed that the department PLC has the potential to support them in developing better teaching strategies to address what to do when their students are not achieving.

Are teachers communicating and meeting with each other on a regular basis? When the district began structuring professional learning communities, forty minutes twice a month was allocated for teachers to collaborate. Within a couple of months, it was obvious to administrators that in order for teachers to complete the tasks the district

wanted (including agreeing on essential learning outcomes and setting a scope and sequence across grade levels), teachers needed to meet weekly. Since December of 2010, teachers have met weekly with their PLC groups. In the spring of 2011, all teachers who responded to the teacher survey disagreed or strongly disagreed that PLCs have been a waste of valuable staff time. One teacher commented “I like the professional learning community concept.”

***Student Achievement Data and Growth (2010, 2011)***

Table 2

*Student Scale Scores from 2010 and 2011*

	Sixth Grade			Seventh Grade			Eighth Grade		
	2010	2011	+/-	2010	2011	+/-	2010	2011	+/-
N	183	167		204	161		174	184	
Mean (SD)	649.9 (10.5)	648.1 (14.4)	-1.8 (3.9)	754 (12.1)	747.6 (10.3)	-6.4 (-1.8)	847.5 (12.9)	851.1 (13)	3.6 (0.1)
Min	601	611	10	701	718	17	801	813	12
Median	650	648	-2	755	748	-7	850	852	2
Max	672	688	16	788	766	-22	880	879	-1

*Note.* N = number of students; +/- = the amount of increase or decrease from 2010 to 2011; SD = standard deviation from the mean; Min = minimum, lowest student score; Max = maximum, highest student score.

Table 3

*2010 6th grade scale scores compared to their 2011 7th grade sale scores*

	Class of 2015			Class of 2016		
	2010	2011		2010	2011	
N	183	161		204	184	
Grade	7	8	+/-	6	7	+/-
Mean (SD)	49.9 (10.6)	47.6 (10.4)	-2.3 (6.7)	54 (12.1)	51.2 (13)	-2.8 (0.9)
Min	1	18	17	1	13	12
Median	50	48	-2	55	52	-3
Max	72	66	-8.3	88	79	-9
% Proficient	68.7	56	-12.7	50.8	46.4	-4.4

*Note.* The calculations on this table adjust the scores by removing the hundreds digit (which indicates student grade level). +/- indicate the change from the adjusted 2010 score from the adjusted 2011 scale score. The last two digits must be 50 or higher for a student to earn a proficient score on the MCA tests.

***Student Achievement Results and Calculations***

Regarding this study’s main question: are there improvements in student achievement (as measured by the MCA III test scores) after the first year of PLC implementation, the results are mixed and complex.

The 2011 MCA III test was based on the 2007 Minnesota Mathematics Standards, which emphasizes algebra in the eighth grade. The 2010 MCA II test was based on the 2003 Minnesota Mathematics Standards. As a middle school, there was emphasis on the eighth graders’ performance in 2011 in reaction to the new standards being tested. As a result, the curriculum was shifted down one grade level from previous years.

Table 5

*MCA II & III Mathematics Achievement Levels and Proficiency*

Grade	Year	Does Not Meet	Partially Meets	Meets	Exceeds	Proficient
Local Percentages						
6	2011	23.90	5.50	27.90	12.70	40.60
	2010	15.07	34.17	44.22	6.53	50.75
7	2011	22.20	31.40	34.00	12.40	46.40
	2010	13.27	18.00	48.81	19.90	68.70
8	2011	20.80	23.10	35.20	20.80	56.00
	2010	23.93	27.12	42.02	6.91	48.93
Statewide Percentages						
6	2011	23.00	26.70	32.50	17.80	50.30
	2010	12.02	19.00	44.83	24.13	68.96
7	2011	18.90	29.30	33.40	18.30	51.70
	2010	13.84	21.79	40.45	23.90	64.35
8	2011	21.00	25.70	31.80	21.40	53.20
	2010	19.11	22.32	38.31	20.24	58.55

*Note.* The researcher taught seventh and eighth grade students in 2010 and 2011.

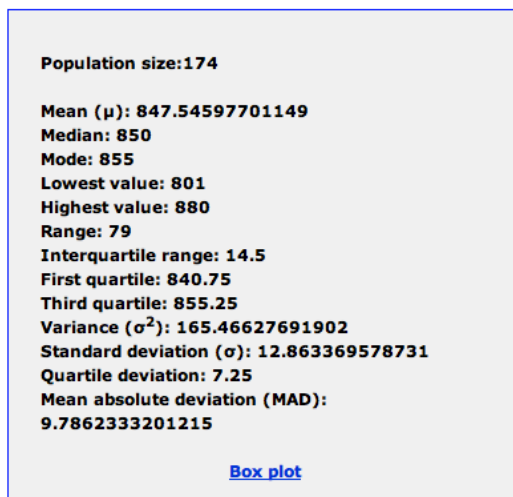
With the emphasis on the algebra in eighth grade it is not surprising that the eighth grade test scores outperformed the seventh and sixth grade test scores. In 2011, 56% of the eighth graders were deemed proficient (with a test scale score of 850 or higher), which was above the state eighth grade proficiency of 53.2%. From 2010 to 2011, the eighth grade mean, median, and minimum scores all increased (the mean from 847.5 to 851.1, the median from 850 to 852 and the minimum from 801 to 813). A two-sample *t* test with unequal population variances resulted in a two-tailed P value of 0.0086, which

by conventional criteria is considered to be statistically significant. (A two-sample  $t$  test was used because the student data could not be paired. The eighth graders in 2010 were not the same students as 2011). By these accounts, the eighth grade test scores showed improvement after the first year of PLC implementation.

Figure 1

*8th Grade Dispersion Calculations*

2010



2011

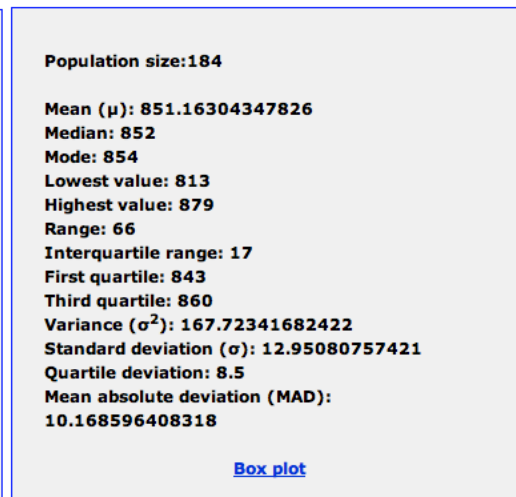
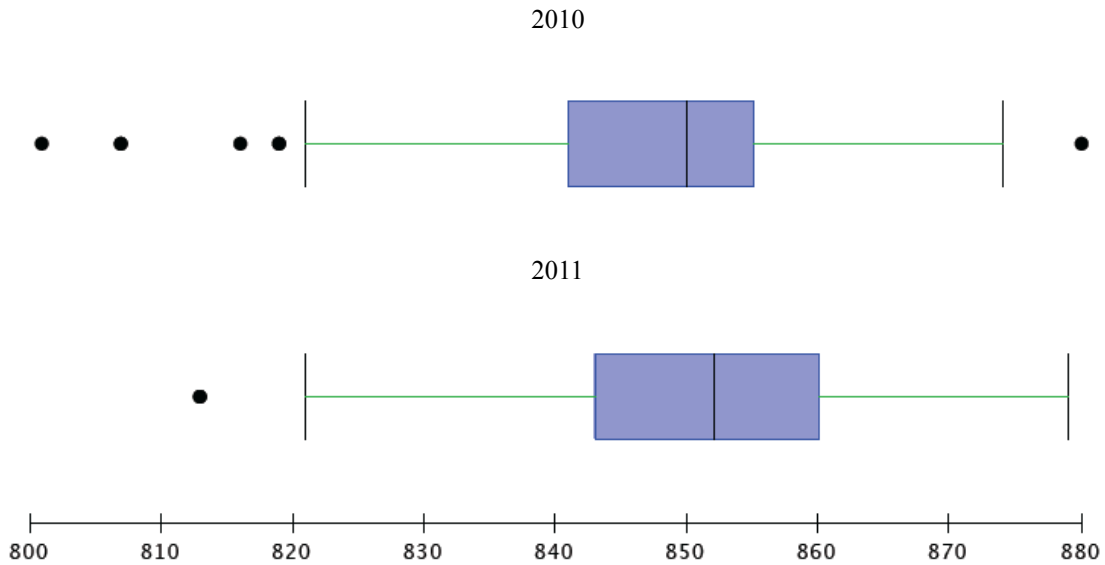


Figure 2

*Box Plots of 8th Grade MCA Test Results*



*Note.* In the box plots in figure 2, the median is the line in the middle of the boxes. Quartile 1 is the lower end of the box and quartile 3 is the upper end of the box. Half of the data points (or 50%) are contained between quartile 1 and 3. This range is referred to as the *Inner Quartile Range*, or IQR. The whiskers (the lines extending from the box) include the data within the inner fences. The data points above and below the inner fences indicate outliers, which means the data points were one-and-a-half times the IQR beyond the end quartiles.

$$IQR = Q_3 - Q_1$$

$$Lower\ Inner\ Fence = Q_1 - 1.5(Q_3 - Q_1)$$

$$Upper\ Inner\ Fence = Q_3 + 1.5(Q_3 - Q_1)$$

On a positive note, the lowest seventh grade score raised from a 701 in 2010 to 718 in 2011. The rest of the seventh grade test data seems to imply that the PLC impacted students negatively. Both the mean and the median test scores lowered from 2010 to 2011 (the mean fell 6.4 points from 753.96 to 747.6 and the median score seven points from 755 to 748). In 2011, 46.4% of the class was deemed proficient (with a test scale score of 750 or higher), which was lower than the state average of 51.7%. A two-sample *t* test



with unequal population variances resulted in a two-tailed P value of 0.0001, which by conventional criteria is considered to be statistically significant. Here, the low P value implies that the drop in scores is unlikely to have happened by chance (the eighth grade P value was also low but implied the *raise* in scores was not likely to have happened by chance).

Figure 3

*7th Grade Dispersion Calculations*

2010

2011

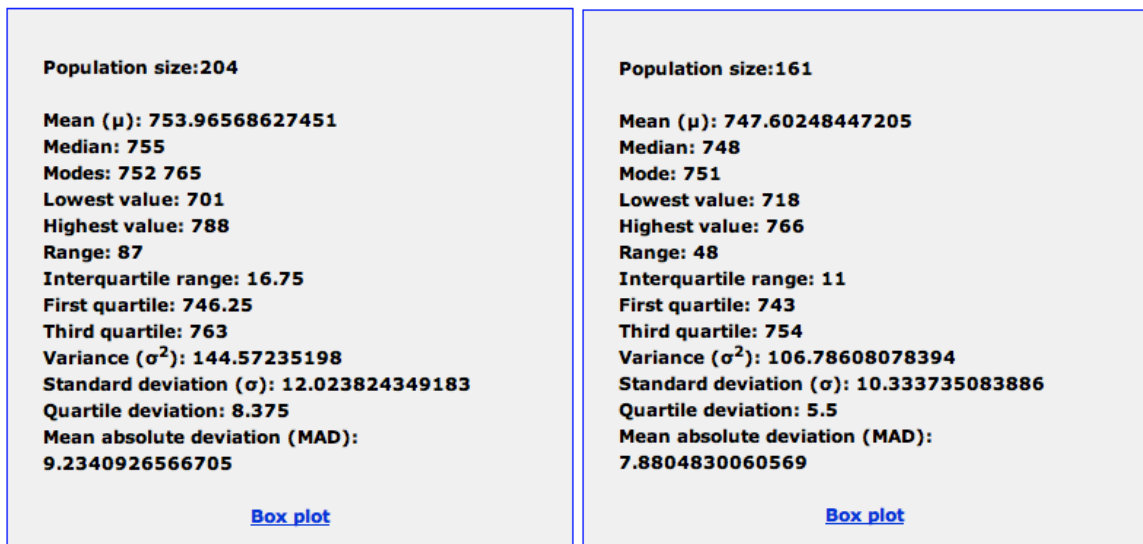
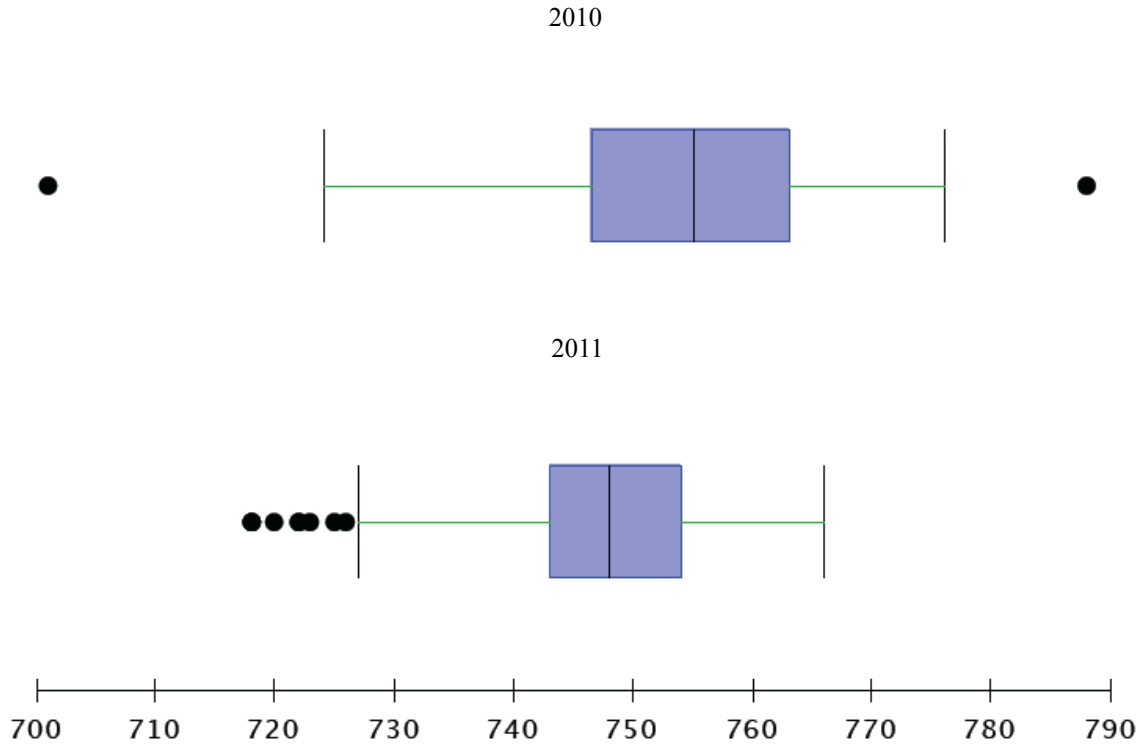


Figure 4

*Box Plots of 7th Grade MCA Test Results*



*Note.* In the box plots in figure 4, the median is the line in the middle of the boxes. Quartile 1 is the lower end of the box and quartile 3 is the upper end of the box. Half of the data points (or 50%) are contained between quartile 1 and 3. This range is referred to as the *Inner Quartile Range*, or IQR. The whiskers (the lines extending from the box) include the data within the inner fences. The data points above and below the inner fences indicate outliers, which means the data points were one-and-a-half times the IQR beyond the end quartiles.

$$IQR = Q_3 - Q_1$$

$$Lower\ Inner\ Fence = Q_1 - 1.5(Q_3 - Q_1)$$

$$Upper\ Inner\ Fence = Q_3 + 1.5(Q_3 - Q_1)$$

Sixth grade was hit the hardest by the changes in a few ways. The 2007 Minnesota Mathematics Standards moved quite a few concepts into the sixth grade to make room for all of the algebra topics in the eighth grade. The change was felt across the state. In 2010,

68.96% of the state’s sixth graders were proficient in math. In 2011, that statewide percentage fell to 50.3%. This district’s sixth graders fell from 50.75% proficient in 40.6% proficient in 2011. The spread of the data also increased (refer to the box plots in figure 6). However, the percent of sixth grade students in this district who exceeded proficiency raised from 6.53% in 2010 to 12.7% in 2011. The minimum and maximum scores both raised from 2010 to 2011 (the minimum raised from 601 to 611 and the maximum raised from 672 to 688). In 2010, two student’s scores were above the upper fence (1.5 times the inner quartile range above quartile 3). In 2011, there were eight students data points above the upper fence. A two-sample *t* test with unequal population variances resulted in a two-tailed P value of 0.1867, which by conventional criteria is not considered statistically significant.

Figure 5

*6th Grade Dispersion Calculations*

2010

2011

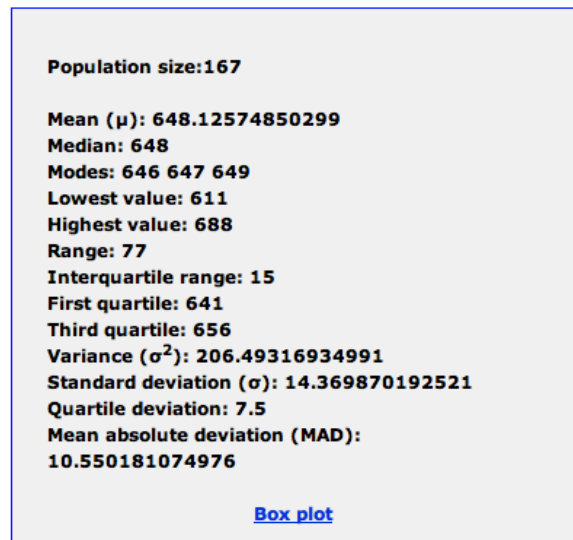
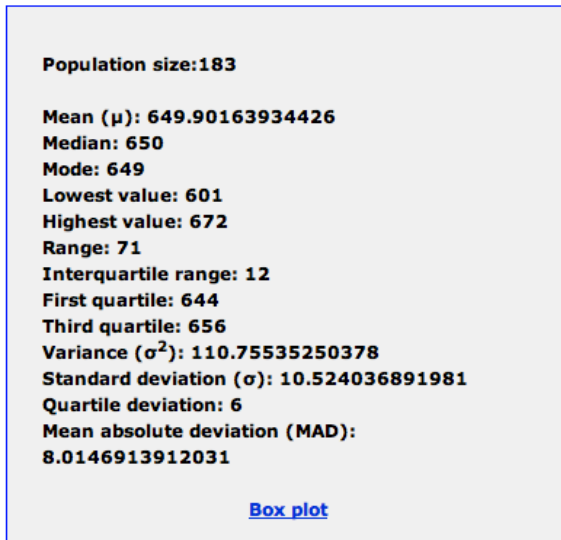
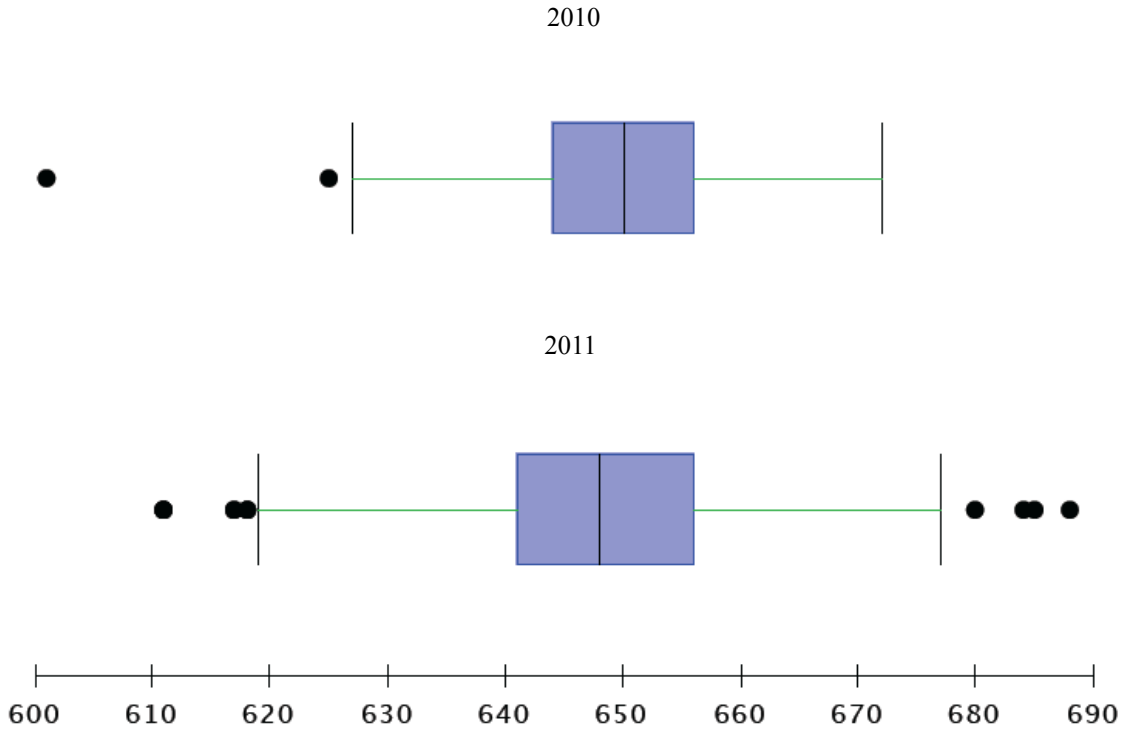


Figure 6

*Box Plots of 6th Grade MCA Test Results*



*Note.* In the box plots in figure 6, the median is the line in the middle of the boxes. Quartile 1 is the lower end of the box and quartile 3 is the upper end of the box. Half of the data points (or 50%) are contained between quartile 1 and 3. This range is referred to as the *Inner Quartile Range*, or IQR. The whiskers (the lines extending from the box) include the data within the inner fences. The data points above and below the inner fences indicate outliers, which means the data points were one-and-a-half times the IQR beyond the end quartiles.

$$IQR = Q_3 - Q_1$$

$$Lower\ Inner\ Fence = Q_1 - 1.5(Q_3 - Q_1)$$

$$Upper\ Inner\ Fence = Q_3 + 1.5(Q_3 - Q_1)$$

The 2011 eighth grade mathematics MCA test scores showed improvements on state standardized test scores, but seventh and sixth grade did not. The change in the standards the test assessed (2003 Minnesota State Mathematics Standards for the 2010 MCA II test and 2007 Minnesota State Mathematics Standards for the 2011 MCA III test) may have contributed to changes in the student test scores. Staffing changes, changes to scope and sequence, and the shift in curriculum material may also have contributed to low test scores.

According to the teacher survey administered to the mathematics teachers, the teachers were very positive about their experiences and agreed that involvement in a PLC contributed to personal professional growth. Part way through year two of working in PLCs, mathematics teachers continue to believe the culture change will lead to improved student learning (four teachers agree and one teacher strongly agrees that the culture change will lead to improved student learning).

## **Chapter 5: Conclusions**

### ***Discussion***

Mathematics teachers across the state of Minnesota have been put under the microscope of public scrutiny by the political tide of attaching student test scores to teacher performance. Currently the MCA III test measures student proficiency in mathematics, reading, and in a few grades, science. The PLC concept provides mathematics teachers the opportunity to collaborate to address issues with student learning and share the responsibility of school-wide student achievement in the content area.

Low MCA test scores in mathematics motivated the building principal to initiate changes for the 2011-2012 school year including adjustments to the sixth grade schedule to provide more time for mathematics and asking teachers for creative suggestions to solve this complex problem of low test scores. The sixth grade mathematics teachers started to use the twenty-three minutes at the beginning of the day originally designated for student advisory for guided mathematics groups, asking all sixth grade teachers to tutor students in small groups using materials provided by the mathematics teachers. All sixth grade teachers are now partially invested in the student proficiency rates.

### ***Teachers Investing in Themselves***

Throughout literature, there is consensus that in education, teachers need to focus on student learning (Buffum, 2009; Cranston, 2009; DuFour, 1998; DuFour et al., 2002; Lewis & Tsuchida, 1998; Nathan, 2008; Tolle, 2010; Wormeli, 2001). Meeting in PLC teams one time a week is a start, but not enough time to truly be effective. How much

time does it take to be an effective PLC? How does that impact the teachers' work day and contract time? Are there union issues? Within the mathematics department, grade-level teachers have found time to prepare units together and collaborate on assessments during common prep times. Teachers have just started to have common data to compare (from students taking common assessments). The next phase will be to re-examine the assessments, compare student classroom assessment results and discuss teaching strategies that improve student success in our classrooms.

Collaboration takes time. Time is money, so the district's commitment to supporting teacher collaboration is a large investment (Nathan, 2008). On the teacher's part, the investment is personal as much as it is professional; requiring the courage to acknowledge, take criticism, and improve on areas of vulnerability and weakness to reach the ultimate goal of improving student achievement, however it is measured (Dufour, 2003).

### ***What Next?***

In the first year, the mathematics PLC focused on developing norms and essential learning outcomes (ELOs). In the second year, the mathematics department began working on common assessments and used many PLC meetings to discuss MCA III delivery, student preparation, and new implications of test results. The 2012 MCA III mathematics portion of the test will be administered on-line and students will have the opportunity to take the test three times; the highest score achieved is recorded for the school district (<http://www.education.state.mn.us>).

The February 9, 2012 Minneapolis Star Tribune Newspaper reported that the Minnesota State Department of Education was granted a waiver by the federal government that eliminates some of the punitive structures administered to low achieving school districts under the No Child Left Behind Act (McGuire, 2012). In order to receive the waiver, the state included plans to reduce the achievement gap in Minnesota in the application. The state will now require students to show growth (as determined by MCA test scores) in addition to meeting proficiency. In the past, the MCA tests were designed to show proficiency in content area, not growth. It will be interesting how the state decides to use the assessment differently in coming years.

The improvement in the eighth grade test scores from 2010 to 2011 indicate that PLCs may have potential to make positive impacts on student test scores, even after one year of implementation. Research has shown that investing in teacher collaboration and professional development will, in time, result in improved student learning (Lewis & Tsuchida, 1998; Lewis, 2010; Tolle, 2010; DuFour & Eaker, 1998; Jessie, 2007; Hughes, 2006; Rentfro, 2007; Peskin et al., 2009; Hord, 1997). Whether through PLCs or lesson studies, teacher collaboration and professional development regarding student learning and student achievement measured by standardized tests is not going away anytime soon.

The school district examined in this study will continue to analyze future MCA test results. In the interest of all involved it is recommended that the district continue to monitor the test results of grade-level groups and consider researching the validity of the Minnesota Comprehensive Assessments in relation to the future success of students. Pressure has been added to administrators and teachers alike to raise student scores but is



there research validating the test? Students are also under pressure to perform. They are more aware now of the implications of their test scores than ever before. Are there psychological implications for our students? Does a proficient score on a standardized test mean that the student has learned the concepts taught in the classroom? There is little research about whether the students' assigned classroom grades (as impacted by the PLC's emphasis on student learning) correlate to standardized test proficiencies and whether the learning indicated by the grade-level standardized test is long-term or not. If a student scores a 450 in fourth grade, should that student be expected to earn a 550 or higher in fifth grade? Then 650 or higher in sixth grade? This correlation, founded or not, is what is being discussed state-wide by parents, teachers, legislatures, and the general public.

As the district continues to examine test scores, it is recommended that the scope and sequence of the mathematics curriculum continue to be revisited. It was found in this study that the lower MCA scores of the 2011 seventh graders (class of 2016) compared to the MCA scores of the seventh graders from 2010 was statistically significant. This particular class has experienced around 10% drops in proficiency every year since the first time they took the MCA tests in 2007. What is happening with these students that they are not able to retain the mathematics they need to achieve on the state tests?

Teachers who teach curriculum that is tested are under the microscope to perform. Research should be done to study the effects of this pressure on the teaching staff. Is the emphasis on teaching to the test causing teachers to leave their jobs?

It is recommended that the district consider surveying the entire staff about their PLC experience and consider revisiting the scheduling of PLC time, perhaps scheduling grade-level colleagues the same prep time (outside of the department PLC meeting time) to allow those teachers to plan together and analyze student data throughout the year. It is also recommended that more research be done on the impact of PLCs across grade bands and in specific content areas.

It seems that the PLC bandwagon is not losing momentum. With researchers supporting the culture shift toward student learning (Buffum, et al., 2009; Bullough, 2007; Cranston, 2009; Eaker, et al., 2002; Hughes, 2007; James, 2008; Jessie, 2007; Lewis, 2010; Marzano, 2003; Nathan, 2008; Parr & Wood, 2006; Rentfro, 2007; Senge, 1994; Servage, 2008; Tolle, 2010; Weston, 1993) teachers and administrators will continue to hear about PLCs. It will be up to teachers and administrators to make the PLC journey worthwhile.

## References

- Aikin, W.M. 1942. *The story of the eight-year study*. New York: Harper & Brothers.
- Artis, S. (2010). *Moving from ordinary to extraordinary*. Bloomington, IN: iUniverse Star.
- Buffum, A., Mattos, M., & Weber, C. (2009). Pyramid response to intervention: RTI, professional learning communities, and how to respond when kids don't learn. *Laying the foundation: a professional learning community*. 47-57. Bloomington, IN: Solution Tree Press.
- Bullough, R. (2007). Professional learning communities and the eight-year study. *Educational Horizons (Spring)*. 168-180.
- Burnette, B. (2002). How we formed our community; lights and cameras are optional, but action is essential. *National Staff Development*. 51-54.
- Buxton, C. (n.d.). BrainyQuote.com. Retrieved January 22, 2012, from BrainyQuote.com  
Web site: <http://www.brainyquote.com/quotes/quotes/c/charlesbux392410.html>
- Clanon, J. (1999). Organizational transformation from the inside out: Reinventing the MIT center for organizational learning. *The Learning Organization* 6(4).  
Retrieved from <http://www.solonline.org/> on March 4, 2012.
- Cranston, J. (2009). Holding the reigns of the professional learning community: Eight themes from research on principal's perceptions of professional learning communities. *Canadian Journal of Educational Administration and Policy* (90).
- DuFour, R. (2003). Ask for more, but focus on doing better with what's at hand. *National Staff Development Council* 24(3).

- DuFour, R. (2003). Building a professional learning community. *The School Administrator*. Retrieved from <http://www.aasa.org> on October 31, 2010.
- DuFour, R. (2003). If we are to call ourselves professionals, we are obligated to use the best practices. Anything less is unacceptable. *National Staff Development Council* 24(2).
- DuFour, R. (2003). Procrastination can sink even the best school improvement plan. A few simple strategies can help get those projects moving forward. *National Staff Development Council* 24(1).
- DuFour, R. (2007). Professional learning communities: a bandwagon, an idea worth considering, or our best hope for high levels of learning? *Middle School Journal* 39(1). 4-8.
- DuFour, R. DuFour R. Eaker, R. Many, T. (2010). *Learning by doing: a handbook for professional learning communities at work, second edition*. Bloomington, IN: Solution Tree Press.
- Dufour, R. Eaker, R. (1998). *Professional learning communities at work; best practices for enhancing student achievement*. Bloomington, Indiana: Solution Tree.
- Eaker, R. DuFour, R. DuFour, R. (2002). *Getting started; reculturing schools to become professional learning communities*. Bloomington, Indiana: National Education Service.
- Fleming, G.L. Thompson, T. L. (2004). "The Role of Thrust Building and Its Relation to Collective Responsibility." In *Learning Together, Leading Together*, ed. S. M. Hord, 31-44. New York: Teachers College Press.

- Gregg, L. Niska, J. Thompson, S. (2004). Professional learning communities, leadership, and student learning. *RMLE Online* 28(1).
- Hord, S. (1997). *Professional learning communities: communities of continuous inquiry and improvement*. Austin, Tex.: Southwest Educational Development Laboratory.
- Hughes, T. (2007). Professional learning communities and the positive effects on student achievement: a national agenda for school improvement. *The Lamar University Electronic Journal of Student Research*.
- Jackson, A., & Davis, G. (2000). *Turing points 2000: educating adolescents in the 21st century*. New York & Westerville, OH: Teachers College Press & National Middle School Association.
- James, E. (September 25, 2008). Pioneer middle school sets the bar high. *The Orange County Register*. Retrieved October 31, 2010 from <http://www.ocregister.com>.
- Jessie, L. (Winter, 2007). The elements of a professional learning community. *Leadership Compass*, 5(2). Retrieved on October 31, 2010 from <http://www.naesp.org>.
- Lewis, C., Tsuchida, I. (1998). A lesson is like a swiftly flowing river: how research lessons improve japanese education. *American Educator*. Winter, 14-17 & 50-52. Retrieved from [www.lessonresearch.net](http://www.lessonresearch.net) on Feb. 12, 2012.
- Lewis, C. (2010). A public proving ground for standards-based practice: why we need it, what it might look like. *Education Week* 30(03). 28-30. Retrieved from [www.edweek.org](http://www.edweek.org) on Feb. 12, 2012.
- Marzano, R. (2003). *What works in schools: Translating research into action*. Alexandria, VA: Association for Supervision and Curriculum Development.

McGuire, K. (2012, February 9). Minnesota freed from 'No Child Left Behind' sanctions.

*Minneapolis StarTribune*. Retrieved from <http://www.startribune.com>

Nathan, L. (2008, Spring). Teachers talking together: The power of professional community. *Horace* 24(1).

Parr, J. & Ward, L. (2006). Building on foundations: Creating an online community.

*Journal of Technology and Teacher Education*, 14(4), 775-793.

Peskin, J. Katz, S., Lazare, (2009). Curriculum, coherence, and collaboration: building a professional learning community among instructors in initial teacher education.

*Teaching Educational Psychology* 5(2).

Rentfro, E. (2007, Winter). Professional learning communities impact student success.

*Leadership Compass* 5(2). Retrieved on October 31, 2010 from <http://www.naesp.org>.

Senge, P. (1990). *The fifth discipline*. New York: Currency Doubleday.

Senge, P. (1994). Introduction to the paperback and some tips for first-time readers. In *The fifth discipline*. New York: Currency Doubleday.

Senge, P. Cambron-McCabe, N. Lucas, T., Smith, B., Dutton, J., & Kleiner, A. (2000).

*Schools that learn*. New York: Doubleday.

Servage, L. (2008). Critical and transformative practices in professional learning communities. *Teacher Education Quarterly* (winter). 63-77.

Servage, L. (2009). Who is the "professional" in a professional learning community? An exploration of teacher professionalism in collaborative professional development settings. *Canadian Journal of Education* 32(1).

Tolle, P. (2010). Lesson study: still a work in progress in america. *Mathematics Teacher*

104(4). 181-185. Retrieved from [www.nctm.org](http://www.nctm.org) on February 12, 2012.

Wheelis, A. (1973). *How people change*. New York: Harper Torchbooks.

Wenger, E. (1998). *Communities of practice: Learning, meaning and identity*. Cambridge, UK: Cambridge University Press.

Weston, D. (1993). *Organizational learning as strategy*. Menlo Park, Ca.: SRI International.

Williams, R. Brien, K., Sprague, C. Sullivan, G., (2008). Professional learning communities: developing a school-level readiness instrument. *Canadian Journal of Educational Administration and Policy*. 74.

Wormeli, R. (2001). *Meet me in the middle*. Portland, ME: Stenhouse Publishers.

***Annotated Bibliography***

Brien, K., Sprague, C. Sullivan, G., Williams, R. (2008). Professional learning communities: developing a school-level readiness instrument. *Canadian Journal of Educational Administration and Policy*. 74.

Implementation and sustainability of education reform depends on the organization, leadership, and operations of the bureaucratic support systems in schools. The authors of this two-year study used a mixed-method action approach, with meetings and a 5-point Likert scale survey to gather information from participants to trace the process that may prevent schools from becoming PLCs. The authors developed a school-level instrument (survey) to help identify barriers and to measure school readiness for becoming and growing as a PLC, that includes themes of culture, leadership, teaching and professional growth. Although these surveyed items are repeated in many articles about PLCs, the authors do not describe how the survey data is used to overcome the barriers for reform in the schools. Further research and results are pending.



Brunvand, S., Duran, M. Fossum, P. (2009). Preparing science teachers to teach with technology: exploring a K-16 networked learning community approach. *The Turkish Online Journal of Educational Technology* 8(4). 21-42.

This article describes the results from a three-year project with five cohort groups of teachers participated in a K-16 networked learning approach to prepare to teach science with technology. Data for this study was collected and analyzed both with quantitative and qualitative design. Teachers were surveyed through a technology survey, administered in a pre-post test fashion. Their responses were analyzed with a paired t-test. Journal entries, participant observations, and electronic portfolios were also used for anecdotal descriptions of the experiences. Findings indicate that teachers can learn and grow through collaboration and further identifies professional learning communities as a vehicle for improved technology integration in science education. Although this article focused on the science curriculum, the experiences of the teachers can be extended to teachers of other curricular areas, not only with technology, but in the development of any classroom activity that could lead to more effective outcomes in education.

Buffum, A., Mattos, M. Weber, C. (2009). Pyramid response to intervention: RTI, professional learning communities, and how to respond when kids don't learn.

*Laying the foundation: a professional learning community.* 47-57. Bloomington, IN: Solution Tree Press.

In chapter four of their book, the authors lay out a foundation for reculturing a school. They write that PLC and RTI (response to intervention) are complementary processes that work together, not separately. In order to build a culture of shared community and collaboration, the authors believe there are two fundamental assumptions: educators believe all students are capable of high levels of learning, and educators accept responsibility for making this a reality. They also see the process of implementing a PLC as a precursor to successful implementation of RTI. This seems contradictory to DuFour's article about the necessity to make the first step toward change and not allow excuses to prohibit movement toward change. In the movement toward RTI, are learning communities an obstacle?

Bullough, R. (2007). Professional learning communities and the eight-year study. *Educational Horizons (Spring)*. 168-180.

Bullough's research points out that the idea of the Professional Learning Community is not new (although the coined PLC terminology is). He concludes there are five lessons that can be learned from studying

literature from the Eight-Year Study, an experiment that actually ran for twelve years (from 1930-1942) in Denver schools, sponsored by the Progressive Education Association (PEA). The five lessons are:

1. Teacher education and capacity building is at the root of school reform.
2. Powerful teacher education involves engagement and exploration with others in pressing personal and professional problems and issues.
3. Sustained school reform requires a foundation of trust among those involved.
4. Schools, colleges, and universities must join in a mutual quest for change and improvement in order to be successful.
5. Each generation must learn from the experience of previous generations.

The most interesting thing about this article is how our current professional climate in schools is paralleling the study he researched.

When the economy of the time sloughed in the 1930's, efforts by educators increase dramatically to meet the needs of students in the education system, despite fewer resources. The same can be said for today's educators.

Cranston, J. (2009). Holding the reigns of the professional learning community: eight themes from research on principal's perceptions of professional learning communities. *Canadian Journal of Educational Administration and Policy* (90).

This study uses interviews of school principals to examine the principal's perspectives and visions for learning communities. Eight themes were developed out of the principals' interview responses and group discussions about learning communities and are suggested as a framework for the development of PLCs within the school setting. The author found that the principals demonstrated exclusive interest in the development of the PLCs rather than the outcome and future potential of developing a collaborative climate in their schools. This implies that the principals may be enforcing a managerial-style approach to leading their schools rather than developing a culture of trust, community, and risk-taking among school staff.

DuFour, R. (2003). Ask for more, but focus on doing better with what's at hand.

*National Staff Development Council* 24(3).

DuFour blames education as a professional field for not investing sufficiently in the development of teachers as professionals and undermines the over-used excuse that there are not enough resources for reform by making two points: first, effective professional development

stems from the belief that with our own efforts we can make change, and second, existing resources can be used more efficiently if some traditional practices are stopped and re-aligned with current best practices. DuFour advocates for more time for teachers to work together and for school districts to make improvements with follow-up trainings. DuFour's article echoes the frustrations and complaints of many teachers involved in reform, that there is often not enough time for collaboration, and no efforts by districts to follow-up on professional development opportunities before jumping onto the next band-wagon. It is no wonder that teacher buy-in is low with new reform ideas, despite evidence of success within our field.

DuFour, R. (2003). Building a professional learning community. *The School*

*Administrator*. Retrieved from <http://www.aasa.org> on October 31, 2010.

This article by Richard DuFour highlights what “system leaders” (principals and superintendents) can do to encourage their schools to buy into the building of professional learning communities. DuFour recognizes the huge demands that are made on school officials to meet the needs of the many students, teachers, parents, and citizens within a school district. He encourages school officials to embrace “organizational autonomy” with carefully planned parameters to give focus and directions to school staffs. Interestingly, these parameters are the guidelines for

Professional Learning Communities (defining what we want students to learn, how we are going to tell if they learned, and what to do if they don't learn). DuFour calls on superintendents to be firm on the following concepts: focus on learning, collaborate in teams, and teacher teams focus on results.

DuFour, R. (2004). Culture shift doesn't occur overnight-or without conflict.

*National Staff Development Council 25(4).*

Change can be uncomfortable. As humans, we resist change impulsively, although doing so can cause conflict. This article addresses the question, "what do we do when a student doesn't learn?" DuFour advocates for professional learning communities to act as a support system for teachers to address student needs and grow as a professional. He touts high levels of learning for all students and recommends teachers become comfortable with data collection and synthesis to improve the use of interventions with students. DuFour encourages leaders in schools to make culture changes in the school that build values in learning and shape the norms of behavior in the school. He points to the necessary role of the principal as policeman if conflict within a team arises and states that team issues be remedied effectively.

DuFour, R. (2003). If we are to call ourselves professionals, we are obligated to use the best practices. Anything less is unacceptable. *National Staff Development Council* 24(2).

In this article, DuFour denounces the teacher's excuse for academic freedom in the classroom. With his last statement that "either we are a profession, or we are not" he makes a strong, black-and-white stance against the excuse. He believes teachers must buy-in to researched best practices and educational reform that has been proven to improve the effectiveness of schools. He sees educational change in the classroom as a teacher's responsibility and states that efforts to improve achievement for all students increases the likelihood of sustaining school improvement and increases overall student success.

DuFour, R. (2003). Procrastination can sink even the best school improvement plan. A few simple strategies can help get those projects moving forward. *National Staff Development Council* 24(1).

DuFour recognizes three excuses (he calls prerequisites) for non-action stated by school officials regarding the move toward educational reform and specifically, the development of learning communities: the need for greater buy-in, more training, and stronger relationships. In this article,

DuFour points out that procrastination is the single-most prohibitor of change. He breaks down each excuse and argues that the first step toward change, although often small in nature, is an action step and that even a small change is better than no change at all. If school districts wait for the three prerequisites to be fulfilled, any efforts toward change will end, as it will take too much time. He encourages school leaders to be pilots of change and put staff in positions to be effective as teams. The Chinese proverb that a journey of a thousand miles begins with a single step is the analogy that concludes DuFour's article and leaves the reader hopeful that successful change can happen with the first action step. Readers might also be careful here to acknowledge that the excuses listed above are legitimate school official concerns and will need to be worked on as the reform is implemented within the district.

DuFour, R. (2007). Professional learning communities: a bandwagon, an idea worth considering, or our best hope for high levels of learning? *Middle School Journal* 39(1). 4-8.

In this article, DuFour writes a response to an article titled "Learning Communities in 6-8 Middle Schools: Natural Complements or Another Bandwagon in the Parade" (Patterson, 2006). DuFour is clearly insulted that the Professional Learning Community approach to educational reform



be considered a “bandwagon” and argues that Patterson had the wrong focus, as the original article studied schools that were not necessarily confirmed as PLC schools. DuFour contends that the article was printed in poor timing, when many schools are implementing change and experiencing some amount of confusion as new practices are implemented and grown. The bottom line with school improvement plans and strategies is that the staff must focus on student learning, work collaboratively, and be accountable for the results.

Gregg, L., Niska, J. Thompson, S. (2004). Professional learning communities, leadership, and student learning. *RMLE Online* 28(1).

This study uses interviews and surveys of principals and teachers of middle schools that identify and follow with the recommendations of *Turning Points 2000* (Jackson & Davis, 2000) to determine the success of newly implemented learning communities. Survey questions were written in the spirit of Senge’s 1990 book, *The Fifth Discipline*, which outlines qualities necessary for a successful learning community. All of the schools surveyed (teachers and principals) believe their school is a learning organization, and are reported to have success in PLC implementation. No student data is collected or examined which begs the question, what was

the purpose of the learning communities? In many other sources, the focus in educational PLCs is student learning.

Hughes, T. (2007). Professional learning communities and the positive effects on student achievement: a national agenda for school improvement. *The Lamar University Electronic Journal of Student Research*.

This study exclusively examines Texas Assessment of Knowledge and Skills (TAKS) test results from 64 Texas high schools that were in different stages of PLC implementation with a goal of determining whether student achievement was impacted as a result of professional learning communities. The authors concluded that almost all schools functioning as Professional Learning Communities improved in both Mathematics and Reading/English Language Arts test scores. Schools in the research averaged 2.5 years with experience with PLCs, yet this study did not differentiate or group results from schools with varying years of PLC implementation.

Nathan, L. (2008). Teachers talking together: the power of professional community. *Horace* 24(1).

Linda Nathan is the founding headmaster of the Boston Arts Academy (BAA) in Boston, MA. The structure of her school culture included teacher collaboration and teamwork from inception. All teachers co-teach writing seminars that all students are involved with at the same time of day. Time is given to teachers to develop lessons and common assessments as well as analyze student achievement and react accordingly. Poor readers are given opportunities for remediation while high-achieving students are given opportunities for enrichment. Because teacher consensus is not always easy, BAA has developed a team “tuning protocol” in which teachers ask big questions of each other and essentially lay out their curriculum for their peers to discuss and critique. Nathan’s approach and leadership seems to be very rigorous and shows she is dedicated to holding teachers accountable for what they are teaching. As tough as she seems, the end result is student learning, the goal of learning communities. Being this is a private school, there may be more freedom on the part of the administrator to implement such measures as the school’s mission was built up around this high ideal standard instead of restructuring an existing staff culture and work environment.

Servage, L. (2009). Who is the “professional” in a professional learning community? An exploration of teacher professionalism in collaborative professional development settings. *Canadian Journal of Education* 32(1).

This author challenges the use of the word “professional” in PLCs with two questions: first, who is defining “professional” and second, whose interests are being served in the learning community? Servage encourages professionals (teachers) to scrutinize and challenge assumptions about learning communities, opening the doors to broader possibilities for professional development. She argues that PLCs when handled in a managerial approach is disempowering to teachers because agendas are handed out with focus on the means rather than the ends. Interestingly, despite the author’s negative narrative, she concludes that there are exciting possibilities that become available with the PLC trend, including the powerful idea that teachers’ collaborative learning rest in the hands of the teachers themselves.

**Appendix**

*NIH Certificate*



*IRB Approval*



---

COLLEGE OF HEALTH SCIENCES AND HUMAN ECOLOGY  
SCHOOL OF GRADUATE STUDIES

Date: June 9, 2011

To: Jessica M. Stuewe  
31177 Eagle Lake Road  
Frazee, MN 56544

From: Patricia L. Rogers, Ph. D, Dean & Human Subjects Convener

*PLR/as*

Subj: Human Subjects Request

Project Title: Professional Learning community Impacts on Student Achievement in Middle School Mathematics

The Human Subjects Committee has approved your request for your study. A copy of the approval form is enclosed. We have a copy of your proposal on file in the School of Graduate Studies office along with the original approval.

Thank you for submitting your request in a timely manner. Should you have questions, please do not hesitate to contact me.

jm

cc: Dr. Todd Frauenholtz

**APPROVAL FORM AND ALL ATTACHMENTS MUST BE TYPED! Section A**

Bemidji State University  
Human Subjects Committee  
Human Research Approval Form

Title of Study: PROFESSIONAL LEARNING COMMUNITY IMPACTS ON STUDENT ACHIEVEMENT  
IN MIDDLE SCHOOL MATHEMATICS

Date Submitted: Spring 2011      Project starting date: Summer, 2011      Project ending date: Autumn, 2011

Principal Investigator(s): Jessica M. Stuewe

Street Address: 31177 Eagle Lake Road      Telephone (cell phone): 952-200-2919

City, State, & Zip:      Frazee, MN 56544

E-mail Address:      [jstuewe@detskies.k12.mn.us](mailto:jstuewe@detskies.k12.mn.us), [jessicakohl@hotmail.com](mailto:jessicakohl@hotmail.com)

Co-Investigators:

Faculty Advisor/Sponsor: Dr. Todd Frauenholtz

Request:      Expedited Review (include reasons below)

Investigator is not collecting any names on the surveys that will be administered. Data collected is not sensitive in nature and will not name any participants in the study.

RECEIVED

JUN 07 2011

PROFESSIONAL/  
GRADUATE STUDIES

Is the submitted document in draft form yet to be pre-tested?      Yes  
(If Yes, a final copy of the survey instrument must be re-submitted upon completion.)

Can the title of this study be made public before the completion date:      Yes

The student's faculty advisor must first approve all student research. Signature denotes the advisor's approval of the project and must be obtained prior to forwarding to the HSC.

Todd Frauenholtz      6 June 2011  
Signature of Advisor/Sponsor      Date

HUMAN SUBJECTS

COMMITTEE RECOMMENDATION:

<input type="checkbox"/> Exempt Review	<input type="checkbox"/> Approved	<input type="checkbox"/> Revise and resubmit	<input type="checkbox"/> Not approved
<input checked="" type="checkbox"/> Expedited Review	<input checked="" type="checkbox"/> Approved	<input type="checkbox"/> Revise and resubmit	<input type="checkbox"/> Not approved
<input type="checkbox"/> Full Review	<input type="checkbox"/> Approved	<input type="checkbox"/> Revise and resubmit	<input type="checkbox"/> Not approved

[Signature]      6-9-2011  
HSC Chair's Signature      Date

*Debriefing Statement*

**Debriefing Statement**

The purpose of this study is to determine the impact of departmental PLC's on student achievement, as measured by standardized test scores in a middle school setting. 2010 test results will be compared to 2011 test results and differences will be noted in the study.

Teacher surveys are included as part of the study to create a "snapshot" of the professional climate in the school setting in the first year of PLC implementation.

The results of this study will be shared with the investigator's teaching team at a team meeting as well as at a PLC meeting with department peers following completion of the study.

If you desire more information or if you have any further questions, you can contact Jessica Stuewe at: [jstuewe@detlakes.k12.mn.us](mailto:jstuewe@detlakes.k12.mn.us) or 218-844-9228 ext. 0207.

It is not expected that you experience any adverse effects from this study. If any unintended consequences should occur, please contact me.

Thank you for participating in this study.

Jessica M. Stuewe



*Informed Consent*

**INFORMED CONSENT FORM**

You are invited to participate in a study titled *PROFESSIONAL LEARNING COMMUNITY IMPACTS ON STUDENT ACHIEVEMENT IN MIDDLE SCHOOL MATHEMATICS*, investigated by Jessica Stuewe of the Department of Mathematics and Computer Science at Bemidji State University under the supervision of Dr. Todd Frauenholtz. You will be asked to complete a 5-point Likert-scale survey, constructing a “snapshot” of the current climate and/or progress of the Professional Learning Community program that is newly instituted in our school district.

The information obtained through this study will be used to determine whether the first year of PLC implementation positively affected student standardized test scores. The benefits you may expect to receive from participating in this study include potential validation of new teaching practices that have been instituted and supported in your work environment.

All data obtained will remain confidential. Your name will not appear on any of the test materials or be associated with individual data.

You are free to decline to participate or to withdraw your consent and discontinue participate at any time.

If you have any questions about this study, you may ask them before, during, or after participation.

\_\_\_\_\_  
Name (please print)

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature

### *Teacher Survey*

The teacher survey was made available to teachers through google docs. The following is the published form of the survey:

#### **Departmental PLC Survey**

Thank you for participating in this survey about your experience with our professional learning community (PLC) in our school. Your answers will be completely confidential and your personal identity will not be part of the study. If you have any further questions about the study, please contact Jessica Stuewe at [jstuewe@detlakes.k12.mn.us](mailto:jstuewe@detlakes.k12.mn.us).

The following questions are to be answered by choosing the statement that most closely aligns with your experiences or beliefs from the pulldown menu. Answer as follows: 1) Strongly disagree 2) Disagree 3) Neither agree nor disagree 4) Agree 5) Strongly agree.

\* Required

**In this first year of implementation, my professional learning community set a firm foundation with agreed upon norms and goals. \***

1-Strongly disagree 2-Disagree 3-Neither agree nor disagree 4-Agree 5-Strongly agree

**Implementing professional learning communities this year has contributed to an overall improvement to the professional atmosphere in our school this year. \***

1-Strongly disagree 2-Disagree 3-Neither agree nor disagree 4-Agree 5-Strongly agree

**My department professional learning community is focused on improving student learning. \***

1-Strongly disagree 2-Disagree 3-Neither agree nor disagree 4-Agree 5-Strongly agree

**My department professional learning community has the potential to support me in developing better teaching strategies to address what to do when my students aren't achieving. \***

1-Strongly disagree 2-Disagree 3-Neither agree nor disagree 4-Agree 5-Strongly agree

**Because of professional learning communities, teachers have more opportunities to communicate about student achievement. \***

1-Strongly disagree 2-Disagree 3-Neither agree nor disagree 4-Agree 5-Strongly agree

**Implementing professional learning communities has played a part in raising student achievement in the area of mathematics (as measured by classroom grades; less students failing this year at term grade than last year). \***

1-Strongly disagree 2-Disagree 3-Neither agree nor disagree 4-Agree 5-Strongly agree

**Professional learning communities have been a waste of valuable staff time. \***

1-Strongly disagree 2-Disagree 3-Neither agree nor disagree 4-Agree 5-Strongly agree

**I believe the culture change in our school (including the implementation of the professional learning communities) will lead to improved student learning. \***

1-Strongly disagree 2-Disagree 3-Neither agree nor disagree 4-Agree 5-Strongly agree

**Involvement in a professional learning community has made a positive impact on how I teach mathematics. \***

1-Strongly disagree 2-Disagree 3-Neither agree nor disagree 4-Agree 5-Strongly agree

**Involvement in a professional learning community has contributed to my personal professional growth this year. \***

1-Strongly disagree 2-Disagree 3-Neither agree nor disagree 4-Agree 5-Strongly agree

**Include any comments you might have about your experience with the first year of professional learning community implementation at our school.**

Table 6

*Teacher Survey Responses, Spring 2011*

		Survey Questions									
		1	2	3	4	5	6	7	8	9	10
<b>Teacher Responses:</b>	<b>Response A</b>	4	5	4	4	5	2	1	4	2	3
	<b>Response B</b>	4	4	4	4	4	4	2	4	3	3
	<b>Response C</b>	4	4	5	3	4	4	1	4	3	4
	<b>Response D</b>	4	4	3	4	4	3	2	4	3	3
<b>Averages:</b>	<b>Mean</b>	4	4.25	4	3.75	4.25	3.25	1.5	4	2.75	3.25
	<b>Median</b>	4	4	4	4	4	3.5	1.5	4	3	3
	<b>Mode</b>	4	4	4	4	4	4	1	4	3	3

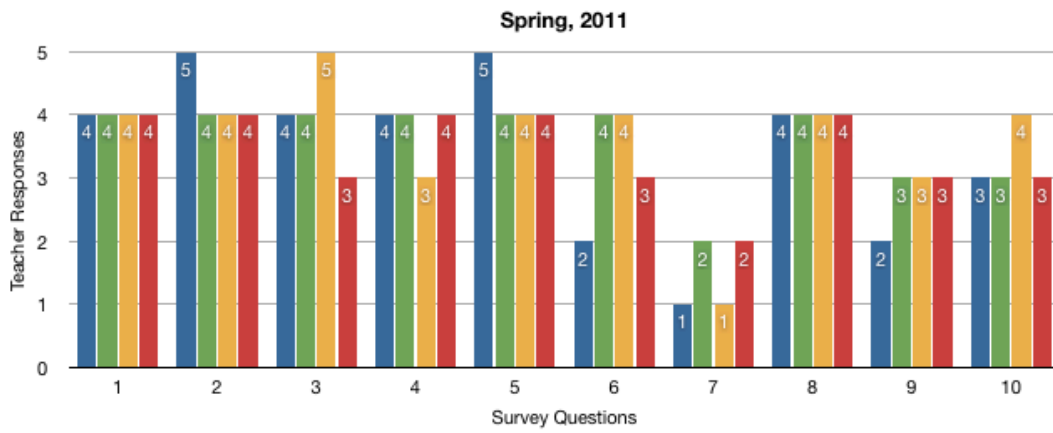


Table 7

Teacher Survey Responses, Winter 2012

		Survey Questions									
		1	2	3	4	5	6	7	8	9	10
Teacher Responses:	Response E	2	4	4	2	1	3	3	4	3	2
	Response F	3	4	2	4	3	3	3	4	3	4
	Response G	4	5	4	5	4	3	1	5	3	4
	Response H	4	4	5	4	5	3	2	4	4	5
	Response I	4	2	4	5	5	3	1	4	4	4
Averages:	Mean	3.4	3.8	3.8	4	3.6	3	2	4.2	3.4	3.8
	Median	4	4	4	4	4	3	2	4	3	4
	Mode	4	4	4	4	5	3	3	4	3	4

