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COLLABORATIVE TEACHER ACTION RESEARCH: IMPROVEMENT
SCIENCE AS PROFESSIONAL DEVELOPMENT?

CAROL MUNSON

108 Pages

There is growing consensus in the education world about the need to change the dominant practices in P-12 teacher professional development, which do not respect teacher knowledge and are unconnected to teachers' daily work, to be more consistent with new and ambitious visions for school reform. This study employed collaborative action research, using improvement science, in which a small cadre of teachers worked through problems of practice to examine the effect on their practice and student learning. In this research project, I implemented a systematic evidence-based process developed by Anthony Bryk, president of the Carnegie Foundation for the Advancement of Teaching. The focus was on improving the actual day-to-day work in the classroom and embracing an approach that utilizes multiple quick tests of change and iterative refinement of the interventions. Findings of the study showed improvement of professional practice through the use of collaborative action research. The teachers found that student learning was increased as a result of the collaborative action research process. Teacher perceptions documented the belief that the use of improvement science did positively inform professional development. The data showed teachers perceived that collaboration, shared goals and responsibility, trust, and process all contributed to a high level of quality professional development. This study was unable to sufficiently provide conclusive evidence that teacher action research can close the gap among professional development, evaluation, student learning, and school improvement. However, some consistent connections were noted.

KEYWORDS: Action Research, Improvement Science, Professional Development

COLLABORATIVE TEACHER ACTION RESEARCH: IMPROVEMENT
SCIENCE AS PROFESSIONAL DEVELOPMENT?

CAROL MUNSON

A Dissertation Submitted in Partial
Fulfillment of the Requirements
for the Degree of

DOCTOR OF EDUCATION

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SCIENCE AS PROFESSIONAL DEVELOPMENT?

CAROL MUNSON

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CONTENTS

	Page
CONTENTS	i
TABLES	v
FIGURES	vi
CHAPTER I: INTRODUCTION	1
Overview	1
Statement of the Problem	3
Research Purpose	7
Research Questions	8
Kind of Study	8
Definitions and Technical Terminology	10
Conceptual Framework	11
Research Paradigm	13
Summary	14
CHAPTER II: REVIEW OF RELATED LITERATURE	15
Enhanced Standards and Evaluation	24
Professional Development	26
Action Research	28
Improvement Science	30
Summary	32
CHAPTER III: METHODOLOGY OF THE STUDY	36

Research Questions	36
Research Design	37
Research Setting and Participant Selection	40
District Profile	40
School Profile	41
Participant Selection	41
Participant Profiles	42
Participant #1 – Mrs. East	42
Participant #2 – Mrs. West	43
Participant #3 – Mrs. North	43
Participant #4 – Mrs. South	44
Problem of Practice Overview and Cycle Timeline	44
Ethical Considerations	47
Data Collection Procedures	48
Research Positionality	50
Data Analysis	53
Trustworthiness and Credibility	54
Summary	55
CHAPTER IV: FINDINGS	56
Research Issue	57
Findings from Thematic Analysis	58

Research Question #1	58
Benefit to Using the PDSA Technique for Improvements	58
Open Communication	60
Reflection	60
Data Driven	61
Context Specific	61
Improvement to Practice	62
Research Question #2	64
Student Achievement and Skills.	65
Student Confidence and Competence	66
Research Question #3	67
Collaboration	67
Shared goals/responsibility	68
Trust	70
Process	73
Research Question #4	75
Strong Connection	76
Connection	77
Strong Connection	78
Possible Connection	78
Summary	79

CHAPTER V: CONCLUSIONS, IMPLICATIONS, AND	
RECOMMENDATIONS	81
Overview of the Study	81
Discussion of Findings	82
Research Question #1	82
Research Question #2	83
Research Question #3	83
Research Question #4	84
Summary	85
Implications	86
Effective Form of Professional Development	86
Informing Professional Practice	88
Increases Student Achievement	89
Limitations	90
Recommendations for Future Research	91
REFERENCES	93
APPENDIX A: INTERVIEW QUESTIONS	106
APPENDIX B: STAFF RECRUITMENT EMAIL	107
APPENDIX C: CHARLOTTE DANIELSON'S FRAMEWORK FOR	
TEACHING	108

TABLES

Table	Page
1. PDSA Cycle Activities	45
2. Perceptions of Teachers: Improvement of Practice	59
3. Student Achievement Results by Teacher as a Result of Implementation of PDSA Cycle	65
4. Perceptions of Teachers: Shared Goals/Responsibility	70
5. Teacher Action Research Connections	76

FIGURES

Figure	Page
1. Plan-Do-Study-Act Cycle (Deming, 2021)	39

CHAPTER I: INTRODUCTION

Overview

In the new century, school improvement in Illinois is a primary focal point for educational leadership and educational policy makers. Higher student test scores, engaging classrooms that meet the needs of all learners, and more meaningful environments for teachers and students are now required. Effective and meaningful professional development has come to the forefront of attention in educational arenas and research efforts. The majority of school reform initiatives are tying together teacher evaluation, professional development, and core standards to student outcomes. School improvement, professional development, and evaluations systems should all be uniformly tied together in a formative system that can be sustained. This most often proves to be elusive for schools and districts. No one has been able to identify the 'magic formula'. A great deal of research supports the notion that there are large differences among teachers in their ability to help students learn at high levels (Goe, 2012). The key then is to link the needs of teachers to meaningful professional development that will, in turn, lead to student growth. An avenue of identifying the needs of teachers is teacher evaluation. Identified teacher needs will in turn inform professional development. Teacher action research could be this vital link. Sappington, Baker, Gardner, & Pacha (2010) found support of participatory action research in preparing principals for practice. Action research (AR) has been defined as a signature pedagogy (Shulman, 2005). The key idea is how the principal candidates reinforced their own learning through reflective inquiry about self-identified challenges in their own local schools. The concept of reflective inquiry is not new. Donald Shon (1983) speaks to reflective practice and contemplative science, pushing professionals to confront dilemmas in their work

and test new ways of obtaining knowledge and engaging practice. Widely adopted in Illinois is the model of professional learning communities (PLCs) as a means for professional learning. PLCs have the capacity to provide strong support to action research as professional development. Additional support of action research as a coherent and embedded form of professional development in combination with a community of learners (Shulman & Shulman, 2004) can be realized by teachers to create and sustain teacher learning.

In response to the continuing failure of many research-based programs and interventions to push broad scale instructional improvements, a number of researchers have turned their attention to the goal of enhancing organizational capacity (Bryk, Gomez, Grunow, & Lemahieu, 2015). To achieve this end, researchers and practitioners in education have increasingly embraced the discipline of improvement science (Hinnant-Crawford, 2020; Lewis, 2015; Mintrop, 2020) which relies on “rapid tests of change to guide the development, revision and continued fine-tuning of new tools, processes, work roles and relationships” (Carnegie Foundation for the Advancement of Teaching, n.d., paragraph 1). Drawing on the promise of this research, I propose a pedagogy of professional development. Teachers possess a great deal of professional knowledge, and are highly capable of learning for themselves and generating new knowledge (Ferguson, 2011). New knowledge can very effectively be generated through dialogue with other teachers who are equally interested in the process of learning and improvement. This would be accomplished by forming a school-based collaboration to inquire about the question, ‘How do I improve my work?’ Support for this idea can be found in the article by Gardner, et al. (2005) in their example of Model C which is a complex group situation. Essentially they examined structural arrangements of training and implementing the processes of local development by looking at four constructed types with Type C being the most complex due

to it involving a school network of teachers and others in which the training is ongoing, embedded, and interactive. It is worthy of mention as it found many hallmark ideas for action research and represents a significant stepping stone to improvement science and cycles of action research that are becoming the norm.

The process of teacher evaluation and professional development should conceptually work in a cyclic, ongoing fashion. One should inform the other in an effort to enable continuous school improvement. The reality is that professional development is often designed separate from the formative feedback shared between school administrators and teachers. In a new paradigm of professional development, the process is shared and public, emphasizes school related issues, relies on internal knowledge, expects teachers to be active participants, and articulates a theoretical research base (Hawley & Valli, 1999). There is a disconnect between theory and practice that calls for an investigation of a professional development system that can be tailored to the needs of teachers in response to feedback derived from the evaluation process. Action research would allow cadres of teachers to work collaboratively on identified problems of practice which encourages construction of meaning, development of a community of learners/practitioners, and critical reflection on current practice (Baird & Davis, 1999; Bryk, 2015; Gilles et al., 2010). The process of teacher action research has the potential to be transformative to teaching and student learning.

Statement of the Problem

Even though a developing consensus of in-service teachers about the need to change the dominant practices in P-12 teacher professional development to be more consistent with new and ambitious visions for school reform. A training model, unconnected to teachers' daily work and disrespectful of teachers' knowledge, continues to persist as a common form of professional

development for teachers in the USA (Zeichner, 2006). This continues to be the case despite the fact that teachers don't generally like these types of programs and also don't tend to use them to improve instructional skill and classroom practices. Much of the traditional professional development experiences for teachers in the United States are one day 'sit and get' experiences (Darling-Hammond & McLaughlin, 1995; Darling-Hammond, et al., 2009; Guskey, 2002; Hawley & Valli, 2000). I include this information as it is still effectual in the school and district in which I serve. These dominant types of professional development activities lack follow-up critique and information or any customization to a teacher's situation. Gardner, Baker, Vogt, & Hodel (2005) examined how professional development is carried out in schools through looking at opportunities for learning and implementation. They found that the group network model in which teachers work collaboratively on problem solving that is sustained over time and includes the utilization of evidence produces more successful results. Much has been learned from this prior research and led to transitions to new professional development models. Improving professional learning for teachers is critical in the attempt to transform schools and improve academic achievement (Wei et al., 2009). The advent of PLCs, Multi-Tiered Systems of Support (MTSS), and grade level teaming are among the many collaborative practices put into place since the early 2000's to address the lack of collaborative supports noted above. Even with the advent of these models and other factors, including teacher leadership, there continues to be a shift in professional development practice. However, the shift still does not reflect action research principles. PLCs were developed with the idea of improving schools through collaboration. Teacher collaboration in PLCs can lead to increased levels of student learning (Lomos, Hoffman, & Bosker, 2011) and high-quality professional learning (Kools & Stoll, 2016). The difficulty has become the ubiquitous way the term has been used to describe all

possible combinations of individuals with an educational interest (DuFour, 2004). PLCs are difficult to make work. Shortfalls have been in the superficial understanding of the process. Goal displacement often takes precedence over advancing the learning of students. The use of PLCs has faced the fate of many other reform efforts that have come before. Implementation problems have derailed the sustainment of the original reform effort (DuFour, DuFour, & Eaker, 2008). We, in education, now seem to be in an intermediate phase or gap. There is an ongoing effort to transition from -sit and get- professional development to true PLC work. Professional development needs to be tied to school-based collaborations that are improvement oriented. The predominant lack of professional development that is collaborative and research-based, tied to daily practice for teachers is the problem I am targeting. I believe that action research, using improvement science, could have a significant impact on teachers' professional learning contexts. This would be a more enlightened form of professional learning that works with the assumption that teachers already have a good deal of professional knowledge, and are highly capable of learning for themselves and generating new knowledge (Castro Garces & Granada, 2016; Ferguson, 2011; Hine & Lavery, 2014). New knowledge can most effectively be generated through dialogue with other teachers who are equally interested in the process of learning and improvement. They would form a school-based collaboration to inquire about the question, 'How do I improve my work?' Again, support is found in the article by Gardner, et al. (2005) and the example of their Model C which is a complex group situation. To put this in perspective it is useful to understand the Gardner, et al structural arrangements of training and implementing the processes of local development by looking at the four constructed types. Type A is a simple, one level approach involving an individual only and an individual workshop. Type B is classified as complex because it involves teachers and others in a school workshop situation. No or minimal

networks are developed. Type C, referenced above, is the most complex because it involves a school network of teachers and others in which training is ongoing, embedded, and interactive. Type D is simple in that it involves the individual only but participates in collaborative opportunities with a network or consulting with peers. What has been learned about professional development from this research provides a bridge to current methods involving improvement science design models.

The processes of teacher evaluation and professional development should conceptually work in a cyclic, ongoing fashion. One should inform the other in an effort to enable continuous school improvement. The reality is that professional development is often designed separate from the formative feedback shared between school administrators and teachers. In a new paradigm of professional development, the process is shared and public, emphasizes school related issues, relies on internal knowledge, expects teacher to be active participants, and articulates a theoretical research base (Hawley & Valli, 1999; Ravitch, 2014; Youngs, 2013). There is a disconnect between theory and practice that calls for an investigation of a professional development system that can be tailored to teachers' situations in response to feedback derived from the evaluation process. My defined problem has two levels. The first level addresses the problem of the building principal in search of better teacher professional development that is tied to evaluation. The second level of the problem is that of teachers exploring the idea of creating quality professional development by identifying problems of practice to address through the use of IS and the iterative cycles of refinement associated with the method. Action research would allow the practitioner researcher (teacher) to create plans for professional development which encourage construction of meaning, development of a community of learners/practitioners, and critical reflection on his/her practice (Baird & Davis, 1999; Castro, 2016; Hine, 2014). The

process of teacher action research, specifically employing improvement science, has the potential to be transformative to teaching and student learning.

Research Purpose

In this study I employ collaborative action research, using improvement science, with teachers working through persistent problems of practice to examine the effect on their practice and student learning. In addition, I explore the teacher perceptions of the use of this methodology. The study reveals how targeted professional growth opportunities can be developed for teachers using improvement science (IS). Improvement science is a methodological framework that is undergirded by foundational principles guiding scholar-practitioners to define problems, identify changes to rectify the problems, test the efficacy of the changes, and spread the changes if they are improvements (Hinnant-Crawford, 2020). According to Bryk (2015), although individual teachers likely develop considerable knowledge through their daily work, no mechanisms exist to test, refine, and transform this practitioner expertise into a professional knowledge base (p.x). Thus, the importance of the new emphasis on collaborative action among teachers.

In this research project, I implement a systematic evidence-based process developed by Bryk, to explore how this process could help identify improvement in practice and student learning. In this study I focus on improving the actual day-to-day work in the classroom, as well as, embrace an approach that utilizes multiple quick tests of change and iterative refinement of the interventions. Additionally, the knowledge production of this research reveals implications for other practitioners, administrators, and teacher educators.

Research Questions

The following three research questions guide this study:

1. As the teachers worked through the collaborative action research process using improvement science as a tool for professional development, what improvements did they note in their practice?
2. As the teachers worked through the collaborative action research process using improvement science as a tool for professional development, what improvements did they note in students learning?
3. What are the perceptions of the teachers regarding the use of improvement science to inform professional development?
4. How can teacher action research, using improvement science, be used to close the gap among professional development, evaluation, student learning, and school improvement?

Kind of Study

In this action research study, I worked collaboratively with a small cadre of teachers using improvement science, a process developed by the Carnegie Foundation for the Advancement of Teaching, as a professional development tool to identify and work on persistent problems of practice (PPOP) that affect their daily practice and student learning in their school/district. The PPOP employed by these teachers stemmed from the authentic classroom experience and/or school-based contexts. The practitioners in this study specifically targeted the problem of students not proficiently mastering their math facts. Their research employed the use

of teacher identified and selected interventions, then testing the interventions for improvements in student achievement. In addition, the PPOP was in tandem with the information used in the Danielson Framework for teacher evaluation and for the process of identifying professional learning needs. Glensne (2011) reports that in this type of action research, the researcher works with others as agents of change to improve practice. This process is collaborative and inclusive of practitioners with the researcher acting as a facilitator who deepens the research cycles moving.

John Elliot conducted groundbreaking research in the United Kingdom that put teacher research on the map as being a viable option for professional development for teachers in many parts of the world (Zeichner, 2006). A common claim is that teachers will become more skilled at what they do by conducting research, and that the quality of student learning will also be increased and improvement-oriented collaborations will be created and developed. This is the heart of professional learning and the development of teacher leadership, key components of current professional learning systems (Darling-Hammond, 2017; Hargreaves & Fullan, 2012; Marzano, 2003). Additionally, action research by teachers has been declared to stimulate positive changes in culture and productivity of schools and raise the status quo of the profession. In a study of the Cooperative Research and Extension Services for Schools (CRESS) Teacher Research Program at the University of California Davis School of Education, teacher research was demonstrated to be an important base for reflective practice, development of greater professionalism, providing valuable knowledge, and a context for the transformation of practice (Brookmyer, 2007; Croft et al., 2010; Ravitch, 2014). The evidence produced by this earlier research lays a foundation for my research that utilizes current methodology of improvement science to capture the collaboration and problem-centered approach to professional learning at an accelerated pace (Crow, Hinnant-Crawford, & Spaulding, 2019).

Definitions and Technical Terminology

Improvement Science (IS) – Improvement science is explicitly designed to accelerate learning-by-doing. It's a more user-centered and problem-centered approach to improving teaching and learning. This is accomplished by using rapid tests to guide the development, revision, and continued fine-tuning of tools, processes, and work roles and relationships (Carnegie Foundation for the Advancement of Teaching, n.d.; Bryk et. al, 2015; Crow et. al, 2019).

Action Research in Education – Research undertaken by practitioners in order that they may improve their practices. The people who actually teach children or supervise teachers or administer school systems attempt to solve their practical problems by using the methods of science. They accumulate evidence to define their problems more sharply. They draw upon all of the experience available to them as a source for action hypotheses that give promise of enabling them to work. They test out these promising procedures on the job, and again accumulate the best evidence they can of their effectiveness (Corey, 1954; Lewin, 1946).

Persistent Problems of Practice (PPOP) – Problems identified by practitioners for improvement in which to engage together in disciplined inquiry (Bryk, et al., 2015; Mintrop, 2020).

Plan-Do-Study-Act – A model for improvement that provides a framework for developing, testing and implementing changes leading to improvement. It is based in scientific method and enables you to test out changes on a small scale, building on the learning from these test cycles in a structured way before wholesale implementation. It is a powerful tool for learning from ideas that do and don't work. (Cleary, 1995).

Conceptual Framework

At present, education policy is in the midst of a major shift as we transition from the former federal mandates of No Child Left Behind (NCLB) to the new reauthorization of the Elementary and Secondary Education Act (ESEA) called the Every Student Succeeds Act (ESSA). This transition to ESSA now places more responsibility and decision making back in the hands of states and local districts. Under the new laws, districts are responsible for improving the quality and effectiveness of teaching and administrative leadership, and for increasing student academic achievement as mandated by ESSA. This is a broad mandate that can be manifested in many ways due to the openness of interpretation.

From my personal experience, principals and teachers alike have not been provided adequate professional development and support they need to be true instructional leaders. Also, teacher evaluation systems have stood in isolation of other school improvement goals. As previously stated, school improvement, professional development, and evaluation systems should all be uniformly tied together in a formative system that can be sustained. This is not the system experienced in most schools.

ESSA opens the door to allow states and districts more autonomy in exploring and deciding what types of evaluation and professional development activities best meet the needs of their situation. It is my feeling that embracing Hargreaves & Fullan's (2012) concept professional capital as the driver of the change effort in leading learning in schools. Professional capital is a function of the interaction of three components: human capital, social capital, and decisional capital (Fullan, 2016). In reference to the school principal, human capital refers to the quality of teachers in the school (i.e. their teaching talents). Social capital concerns the level of quality of interaction and relationships among the people in the school. Decisional capital refers

to the combination of knowledge and expertise in making decisions. This three-part conception of professional capital will be used as a way leading learning for this study. It is my role as a school leader to build the professional capital of my teachers in my efforts of school improvement.

The use of professional capital has the power to transform teaching every day. It highlights the importance of the need for professional work, professional capacity, and professional effectiveness (Hargreaves & Fullan, 2012). Much attention has been drawn to teacher leadership in relation to professional learning (Frost, 2011; Lieberman, Campbell, & Yashkina, 2017; York-Barr & Duke, 2004). Professional capital embraces the notion of teacher leading their own development. Professional capital is not simply developing and sharing knowledge and practices, however, it is establishing and cultivating opportunities for informed professional judgement, decisions, and actions (Osmond-Johnson, 2017). Hargreaves and Fullan (2013) position professional capital in the teaching profession as a critical component of “improving as an individual, raising the performance of the team, and increasing quality across the whole profession” (p. 23). Using this view of teachers being the drivers of the improvement, they use collective expertise to make important decisions about teaching and learning. Consequently, teacher leadership presents a critical opportunity for developing professional capital. Using professional capital and teacher leadership as a conceptual framework for my research project makes for a natural fit with the driving principles of my chosen method of improvement science to explore professional development.

Research Paradigm

Pragmatism will be the primary lens applied to this study involving teacher action research in their undertaking to create relevant professional development in response to defining a persistent problem of practice. John Dewey is a primary figure associated with the philosophy of pragmatism (Dewey, 1904). He defined quite precisely the criterion of validity common to the pragmatic school of thought when he stated the proper interpretation of “pragmatic,” namely the function of consequences as necessary tests of the validity of propositions, provided these consequences are operationally instituted and are such as to resolve the specific problem evoking the operations, the text that follows is thoroughly pragmatic (Dewey, 1938). Although brief, Dewey’s definition of pragmatic inquiry is also decidedly useful for practitioners who desire to do their own research to improve their practice. Pragmatists focus on the reality of experience. In pragmatic philosophy, reality is constantly changing and we learn best by applying our experiences and thoughts to problems. The world is always changing, therefore, truth is ever evolving. Principles of pragmatism emphasize action over ideas, yet will bridge the gap between educational theories and practice. A pragmatic approach is regarded as an intervention approach that is likely to guide what should be done to produce successful educational research outcomes and as a framework that would guide the types of questions that should be asked to assess how successful the educational interventions have been or are likely to be (Kalolo, 2015). Research utilizing this perspective in attempting to link theory to practice, describe and solve educational challenges in their contextual setting can bring relevance to the educational setting and other interested stakeholders.

Pragmatism relates very well to the educative process because activity is the center of the whole educative process with problem solving being the axis. Education will be useful if it

brings about the growth and development of the individual, as well as, the society in which it lives (Educational System, 2013). A pragmatic paradigm views education as a continuous restructuring of experience and a process of development in which knowledge is created through the process. The process of reconstruction of experience leads to adjustment and the development of improved processes. There are no quick fixes for creating quality teaching. It is the mission, status, conditions, and rewards of the job, as well as the quality and timing of training, that matter most (Hargreaves & Shirley, 2009).

Summary

In-service educators need a method of professional development to transition from the knowledge that collaborative teacher action can improve teacher practice and student learning outcomes. Teacher action research, implementing improvement science, may provide the link for the use of job-embedded professional development tied to evaluation. Improvement science will allow principals and teachers to work through identified problems of practice to generate quality professional development that is professionally meaningful and increase student achievement using multiple quick tests of change and iterative refinement of interventions.

CHAPTER II: REVIEW OF RELATED LITERATURE

In light of less than successful past educational reform efforts (Elmore, 2006; Hargreaves & Fullan, 2012; Hawley & Valli, 1999), how can professional development systems focused on student learning and school improvement be developed that test whether our initiatives are in fact improvements? In an essay considering this possibility, Bryk and Gomez (2007) questioned how our nation could improve our schools with a transformation in the ways it develops and supports school professionals and the materials, ideas, and evidence with which they work. How can professional learning collaborative systems work in tandem with teacher evaluation and school improvement policies in Illinois and elsewhere? Past reform and improvement efforts faltered in part because teacher evaluation systems failed to meaningfully assess instruction or promote teacher knowledge acquisition (Youngs, 2013). Couple the aforementioned with the fact that for more than a century teachers have worked in isolation due to the structure and mission of American public schools. This is a primary structural impediment to improving instruction and increasing student learning (Lortie, 1975). He reveals that since at least the early 1900's teachers have worked behind closed doors, rarely collaborating with peers. They were expected to be self-sufficient and hone their craft in the privacy of their classrooms. However, this is changing. The advent of PLCs, teacher teaming, teacher leadership, MTSS, and other collaborative efforts in education have contributed to teachers being more receptive to opening their doors and sharing their practice.

The state of affairs in education is a system of reform efforts that has introduced enhanced teaching standards for educators and learning standards for students all hinged on accountability measures that are unprecedented. The standards and accountability-based rollout began in 2001 with the passage of No Child Left Behind (NCLB) that was a reauthorization of

the Elementary and Secondary School Act (1965). The main event in this reauthorization is the central role of standards. The purpose of this initiative was to provide a consistent, clear understanding of what students are expected to learn. They state, "The standards are designed to be robust and relevant to the real world, reflecting the knowledge and skills that our young people need for success in college and careers," which should place American students in a position in which they can compete in a global economy (Core Standards, 2016). The elevated element of standards driving instruction called for a change in teacher practice, therefore, a change in professional development. To successfully implement standards that were aligned to the actual expectations of colleges and employers, an investment and redesign of professional development was needed to meet a bar that was substantially raised. Professional development was and continues to be needed that truly helps teachers be more effective. It is now widely accepted that new approaches to professional learning are ones that support continuous improvement, collaboration, and in context of the culture.

The NCLB mandates were followed up by an additional mandate in the state of Illinois called the Performance Evaluation Reform Act (PERA) in January of 2010. PERA legislation was brought about by the highly competitive bid for federal reform dollars under the Race to the Top grant introduced in Chapter One. PERA requires every school district in Illinois to adopt a new teacher evaluation system that targets teacher performance and student growth. In tandem with all of the enhanced standards for what students need to learn, the State of Illinois also initiated enhanced Professional Teaching Standards in 2013 (ISBE, 2010). These consist of nine standards and each standard is comprised of knowledge indicators and performance indicators for a competent teacher. The standards address teaching diverse students, pedagogical knowledge, differentiated instruction, learning environment, instructional delivery, all modes of

communication, assessment, collaboration, and professionalism. The Professional Teaching Standards were designed to align with the learning goals and academic standards which are established for Illinois students. Finally, a new standardized assessment system was implemented by Illinois, and a majority of other states, in 2015 to evaluate each student's progress toward the CCSS. This new assessment in Illinois is called the Partnership for Assessment of Readiness for College and Careers (PARCC). The past decade in education has presented tremendous challenges with the ever-mounting mandates placed on students and educators. This all comes at a time when schools are receiving fewer resources, and as a result, professional development is being decreased or cut altogether; curriculum is becoming more standardized; testing has increased; teachers spend more time in the classroom and less time with peers; morale is sinking; and teacher input is often not sought (Nichols & Berliner, 2010; Ravitch, 2014). Some would say all hope is lost at salvaging public education in the United States.

But with great challenges come great opportunities. The Every Student Succeeds Act (ESSA) that governs U.S. public education policy was passed in December of 2015 by Congress. This law replaced NCLB and was the latest reauthorization of the 1965 Elementary and Secondary Education Act. ESSA retained many of the federal mandates and accountability of NCLB but shifts the law's federal accountability provisions to states. One key area of opportunity is that ESSA helps support and grow local innovations developed by local leaders and educators. I feel this time to be the perfect point of insertion for teacher research to be explored as a transformative tool for education. The kind of professional development targeted in this study does not require paying expensive "experts" or "consultants". It is the task of the school or district to learn how to do it, commit to it, and find the time for it to be job-embedded. Teacher research will employ a set of methodological processes that generate local,

contextualized data upon which more informed decisions can be made and shared. The documented value of practitioner research is to generate local, practice-based knowledge; triangulate the approach of theory-research-practice connections; and generate collaborative projects that challenge traditional expert-learner dichotomies (Ravitch, 2014). Practitioner research speaks to what is useful, relevant, and meaningful for teachers (Kassner, 2014).

There is, in fact, reason to be optimistic about such collaborative efforts. This optimism is illuminated by Richard DuFour, one of the foremost authorities on Professional Learning Communities (PLCs). In his book *Revisiting Professional Learning Communities at Work* (2008), he and his co-authors provide a multitude of research that supports the collaborative practice and collective inquiry into best practice and current reality in classrooms. Educators build shared knowledge which allows them to make more informed decisions. Peer interactions also encourage reconsideration of personal views and reconnection to alternative perspectives and approaches and allow for reframing of thoughts and actions (Vogel, 2010). Brain research has routinely proven that learning is social. Therefore, the institutionalization of collaborative networks in the educational system, where teachers are supported in reflecting together over student achievement, would unquestionably be a primary foundation for pedagogical growth. Engaging in reflective dialogue is also considered a core element of successful professional learning communities (Matthews & Crow, 2010). The employment of PLC's is also inherently action oriented. Members learn by doing and understand that it is the most powerful form of learning. In a PLC culture there is a commitment to continuous learning. Systematic processes engage each member of the group in an ongoing cycle of gathering evidence of current levels of student learning, developing strategies to build on strengths and address weaknesses, implement strategies, analyze the impact, and apply new knowledge in the next cycle. DuFour's PLC model

provides for me overwhelming support of my chosen action research project. So also does Marzano's (2003) factors of collegiality and professionalism and Blankstein's (2008, 2012) principle of collaborative teaming. Bryk and his associates draw on some of the best ideas emerging in education in the form of communities of practice, teacher action research, lesson study, and the scholarship of teaching and learning (Bryk et al., 2015). My group of teachers was not a formal PLC, however, it was definitely a collaborative group of teachers with common goals for improving teaching and learning. They did not rely solely on the research of others but instead conducted their own research based upon a problem of practice they identified as meaningful to their teaching and their students' learning. They realized a cultural shift in their work from what they commonly thought of within the traditional model of schools and classrooms. There was a shift from relative isolation to true collaboration, from individual teachers attempting to discover ways to improve to a collaborative team helping each other to improve, from privatization of practice to open sharing, from decisions being made based on individual preferences to decisions made collectively by building a shared knowledge of best practice (DuFour, DuFour, & Eaker, 2008).

It is pertinent at this point to elaborate on the predominant practice of teacher isolation and how this practice impedes the teacher collaboration that research tells us is the most powerful tool for school improvement. Lortie (1975) discusses, in depth, the issues of teacher practice. He specifically endorses "reflective practice" to guide their work and the social validity of increased effectiveness when engaged in interaction amongst peers. In the vast majority of American schools teachers work alone, at least for the most part (Darling-Hammond, 2010). They have little time to interact. They arrive at school shortly before students arrive and leave shortly after students depart. The time during the work day while teachers are at school is spent

teaching. According to Elmore (2006) the design of work in schools is fundamentally incompatible with the practice of improvement. Teachers spend most of their time working alone in their classrooms. This is problematic in that it provides little opportunity for teachers to engage in continuous and sustained learning about their practice in the setting in which they actually work. This disconnect between the requirements of learning to teach well and the structure of teachers' work life is fatal to any sustained process of instructional improvement. The common practice of teaching in America does not include learning to teach while actually teaching. Yet other professions require their members to become more skilled over time (Fullan, Hill, & Crevola, 2006; Ramani, McMahon, & Armstrong, 2019).

A wealth of information can be gained from John Dewey's educational theories. In his works, Dewey repeatedly argues that education and learning are social and interactive processes (1902, 1916). He applies this thought to both students and teachers. Specifically, in regards to teachers, Dewey believed a successful classroom teacher would possess a passion for knowledge in the materials and methods in which they teach. The teacher must be possessed by realization of their responsibility for constant study of the classroom, the children, their methods and the proper adaptations of such to meet the needs of the pupils. To accompany this passion for intellectual growth in their craft should also be a natural desire to share their knowledge with others. For Dewey, this desire for the lifelong learning is inherent in other professional fields such as architecture, medicine, and law but is particularly important for teaching (1904).

In the current suppressed financial climate there is a dire need to utilize what we have. What we have is an incredibly rich resource that is vastly underutilized and underappreciated. This resource will cost us very little in money but will require a commitment of time. This resource has the power to be transformative to education in classrooms, schools, districts, states,

and nationally. We have teachers! We have teachers who are ready to stand and deliver. Andy Hargreaves and Michael Fullan (2012) call this professional capital. Professional capital is comprised of three essential elements: human capital-talent, social capital-collaboration, and decisional capital-professional judgments. The idea is that when the majority of teachers come to demonstrate the power of professional capital they become a talented, committed, collegial, expert-driven group that is always in pursuit of learning how to improve themselves and generate increased student achievement. This directly targets the information I gained from my small-scale study that utilized improvement science with a group of teachers in my school. My study addressed many of the educational challenges with professional development that is teacher driven, job-embedded, tied to evaluation, and research-based. This was done collaboratively among the teacher cadre. There is considerable evidence that teacher collaboration on instruction improves the quality and equity of student learning (Blankstein, 2012; Hinnant-Crawford & Spaulding, 2019; Marzano, 2003; McLaughlin & Talbert, 2006).

The state evaluation model for evaluation was created by Charlotte Danielson in 2011 and is based on her original framework for teaching (Danielson, 2011). It is designed to help districts promote a common definition and understanding of excellence in teaching shared by teachers, administrators, and the larger community. However, the current Danielson framework that is widely used does not give sufficient guidance in context to really improve and criteria on which to judge if you have improved. Teachers themselves must do this in tandem with building professional learning and teacher leadership capacity (Wenner & Campbell, 2017; Pineda-Baez, Bauman & Andrews, 2020). Most teacher evaluations of the past focused on a very narrow concept of teaching practices during limited classroom observations with virtually all teachers receiving a satisfactory or excellent summative rating. To combat these shortcomings, several

new approaches to teacher evaluation that are much more in tune with professional practice and student growth have been developed and proposed (Marzano & Toth, 2013; Darling-Hammond, 2013; Danielson & McGreal, 2000). Here too is the opportunity to get professional development for teachers right. This is the opportunity for teachers to take the reins of their learning and place it in context of their current professional situations. If we are to place teachers in the central role of improving instruction, then they must be provided an environment in which they can do the improvement work (Stigler & Hiebert, 1999). Teachers can and should be engaged in improvement because they are the only ones who can ensure that students' learning improves. They are the gatekeepers of the classrooms in which teaching and learning takes place. Teachers desire to have more say in their professional development. This presents a chance for teachers to create more meaningful experiences. Teachers can help put an end to the fragmented and isolated professional development workshops that traditionally dominate American educational culture presently. Done well, collaborative teacher problem solving holds the power of collective knowledge and expertise as well as a shared understanding of good practice (Hawley & Valli, 1999). The world of education has known what to do for quite some time. The challenge is to put that knowledge to use when past practice did not emphasize teachers learning on their own or in teams. It is also not easy to break down the privacy of practice that many teachers love. Evaluating and solving problems of practice in order to improve a teacher's practice, which is at the heart of job-embedded professional development, is usually best accomplished through sustained collaboration (Croft, 2010). Teachers can lead the charge to implement development that is teacher-lead and utilizes small groups that study and share their practices to maximize student learning and hone their craft. This will make professional development more personal and increase professional meaning. Teachers are the key ingredient to the solution of improving

teaching. Action research and improvement science can address this shortcoming because it requires little money and teachers and principals together will make the time if research like mine can demonstrate to them the value of this approach over buying professional development in the form of consultant workshops and the like.

In considering professional development and teacher evaluation as tools for school improvement, you must not think of them in isolation. The research of Hargreaves & Fullan (2012) supports that professional development should be integrated with a comprehensive change process that is systemic. A new teacher evaluation tool, like the Danielson framework alone, will not bring about a transformation in improving teacher quality. An effective evaluation tool needs to be paired with solid professional development approaches that target individual teacher need and builds expertise in teaching and learning. What is required is a comprehensive system of supports for continuous improvement that includes material and expert resources, recognizing that local expertise is in place and can be further developed. Teacher action research, specifically improvement science, as a professional development method targets genuine teacher problems in context of their teaching situations to improve their craft and realize increased student achievement. This study seeks to validate teacher research as a viable, effective, and authentic form of professional development that will help sustain school improvement efforts while being tailored to the individual needs of teachers.

Danielson & McGreal (2000) convey that teachers are neither probationary nor marginal. Therefore, a professional development track should become the dominant strand within the evaluation system. In the past two decades, researchers have gained a great deal of new knowledge about staff development in regard to teachers. A set of guiding principles has emerged that is offering strong support for teacher evaluation programs that are directly linked to

professional development. The most effective professional development programs include support of site-based initiatives (Barth et. al, 2005); are grounded in knowledge about teaching (Blankstein, 2013); offer intellectual, social, and emotional engagement with colleagues (Garces & Martinez, 2016); respect teachers as professionals (Darling-Hammond, 2017); and provide sufficient time for integration into practice (Bradley, 2014). Action research is a viable method of professional development for teachers that links the aforementioned principles of professional development to effective evaluation utilizing local teacher expertise. This brings us back to Hargreaves and Fullan's notion of professional capital. Professional capital is about communities of teachers using best and next practices together (2012). The concept of using professional capital to carry out AR is a logical pairing to meet the need of constantly and collectively building a knowledge base and corresponding expertise, where practices and their impact are tested, developed, circulated, and adapted.

Enhanced Standards and Evaluation

There is a great deal of discourse these days about standards. Much of the discussion, especially with policy makers, is in reference to how high or low standards are, and the need to raise them. Standards represent far more than high expectations. Standards contain the goals that we most value. Therefore, it is essential that we are very clear about what we want students to learn and what the necessary skills of teachers are. Support for the need of implementing enhanced standards can be found in a 2008 report titled "Accelerating the Agenda: Actions to Improve America's High Schools." This report was a joint publication of the National Governors Association Center for Best Practices, National Conference of State Legislatures, National Association of State Boards of Education, and Council of Chief State School Officers; all major educational stakeholders within each state. In the agenda laid out in the article the authors relay

that America's position as the world leader in innovation, new products and services is compromised by the performance of 15-year-olds in the United States who in 2006 ranked 25th in math achievement and 21st in science achievement, compared with their peers in other nations according to the U.S. performance on the Programme for International Student Assessment examination. With the adoption of the Common Core State Standards, we in the United States are realizing enhanced learning standards for students and the need for greater emphasis on critical thinking skills are necessary components.

Teacher evaluation has undergone major reform efforts since the passing of the Performance Evaluation Reform Act (PERA) in 2010. The increased attention given to teacher evaluation has, in turn, raised questions about the link between evaluation and student outcomes. Teacher evaluation is a tool to measure teacher effectiveness for accountability purposes in most districts. However, evaluation as a stand-alone process is unlikely to have much effect as a significant and meaningful vehicle for improvement of teacher performance (Smylie, 2014). Evaluation may also be a tool to help teachers improve by using results to guide teachers toward professional growth. According to Howard and Gullickson (2013), one of the primary "threats" to the potential of teacher evaluation to improve teaching is the lack of connection to professional development. A good evaluation system should not only measure a teacher's effectiveness but also help improve the teacher's ability to be effective (von Frank, 2013). Similarly, Darling-Hammond (2012) finds that evaluations should trigger targeted goal-setting for teachers, specific professional development supports, and opportunities to share expertise with colleagues. She further states that such opportunities may include school-based action research projects.

Professional Development

Our nation is in the midst of many comprehensive educational reform agendas. This is causing teachers to rethink their own practice. There is a need for new classroom roles and expectations to generate increased student outcomes. This means they need to teach in ways they have never taught before – and probably never experienced as a student (Darling-Hammond & McLaughlin, 1995). Much rests on the success of teachers' learning the skills to achieve the new visions of instructional practice. Traditional models of professional development that are top-down are not be sufficient. Teachers need more than sit-and-get sessions and limited support. Isolated workshops are disconnected from practice and do not allow teachers the time they need for study of their issues, viewing models in practice, receiving coaching, or trying out new ideas in their classrooms and reflecting on the results (Hawley & Valli, 1999, 2000). Modern professional development should include critical teacher reflection on practice, in context, and generate new knowledge and beliefs about content, pedagogy, and learners (Prawat, 1992 as cited in Darling-Hammond & McLaughlin, 1995). These findings coincide with what teachers believe about the value of sustained professional development programs. According to national surveys, teachers rate professional development as most useful to them when they are engaged with it over an extended period (Wei, 2010).

Effective professional development has several established characteristics. It must engage teachers in concrete tasks of teaching, assessment, observation, and reflection that illuminate the process of learning and development (Wilson & Berne, 1999). Effective professional development must also include experimentations that is participant driven (Ravitch, 2014) and be collaborative, involving a sharing of knowledge among educators and a focus on teachers' communities of practice (Blankstein, 2013). As an extension of the previous, effective

professional development must also be derived from teachers' work with their students (Darling-Hammond, Wei, Andree, Richardson, & Orphanos, 2009) as well as; sustained, ongoing, supported, and intensive (Darling-Hammond & McLaughlin, 1995).

In general, American teachers do not routinely have the opportunity to collaborate on planning lessons, analyzing instruction, designing assessments, or building curriculum due to the design of schools and the structure of the day in the United States even though the Illinois State Board of Education mandated PLCs. It is time to move forward from less effective past practice and make movement to improve professional development to align with exemplary practices. Research shows when schools are intentional in creating and maintaining teachers' working relationships the benefits often include increased consistency of instruction, more sharing of practices, trying new ways of teaching, and greater success in solving problems of practice (Joyce & Calhoun, 1996; McLaughlin & Talbert, 2001).

Ann Lieberman (1995) provides support of authentic professional development opportunities to learn from and with colleagues inside a school. Goe, Biggers, and Croft (2012) report that job-embedded professional development holds considerable promise for improving instruction and student outcomes. Job-embedded professional development can also play an important role in providing structure and continuity for teachers. This expanded view of professional learning is both individual and collective, and both inquiry-based and technical. The idea is that even though no specific set of instructions exists on how to directly achieve our goal of authentic professional development situated in context, we do have methods to utilize that have proven to be effective in other school situations. This is my justification for having used teacher action research and specifically, improvement science, as methodology.

Action Research

As can be evidenced in the discourse above regarding professional development and evaluation, action research promises to be a viable option for targeted professional development and can be extrapolated from the new evaluation instruments. In recent years, action research has been utilized to study a wide variety of classroom and school issues. The exact origins of action research are unclear in literature. However, American psychologist, Kurt Lewin, is widely credited with founding action research as a method of inquiry in a social science context which includes practitioners from the real world. Lewin (1946) describes action research as a spiral of steps that proceeds from planning to action to observation and then reflection. Although Lewin originally formulated this type of research for social problems, educationalists have adopted much of it for their own professional research endeavors. The teacher-researcher movement originated in the United Kingdom with the work of Professor Lawrence Stenhouse (1971, 1975) and the Humanities Curriculum Project. He did much to popularize the idea of the teacher as a researcher, the classroom as a laboratory, and teachers as part of a scientific community. Stenhouse felt that all teaching should be based upon research.

Within the ever-increasing layers of top-down policy, mandates, and standardization of public education, many conceptualize and situate practitioner research as a powerful stance and tool of social, communal, and educational transformation (Ravitch, 2014). She further reinforces other literature on action research that finds the methodological processes of the research generate a local, contextualized, practitioner-driven data set upon which practitioners create and extend professional knowledge, skills, ideas and practices that support this kind of inquiry stance on professional development.

Mohr & MacLean (1987) found that teachers who engaged in teacher research wrote more honestly about classroom problems, became more self-assured, began to see teaching more as a learning process, found their research plans became their lesson plans in response to discoveries they were making in their classrooms, and changes their focus from teaching to finding out what their students knew and then helping their students to learn. Teachers who engage in action research seek to improve their practice and, perhaps that of their colleagues. Such systematic examination is designed to increase awareness of the contexts that shape professional actions, decisions, and judgments, enabling teachers to see their practices anew, to recognize and articulate the complexities of their work, and the values and choices at the core of professional practice (Ravitch, 2014). Action research fills the need of research that is practice-based and speaks to what is useful, relevant, and meaningful in specific school and/or classroom contexts and with specific populations that other professional development workshops simply can't provide.

In a study of the CRESS Teacher Research Program, Brookmyer (2007) found that among a sample of 114 teachers who had conducted action research studies from 1985 to 2005, almost 90% indicated that teacher research is an important information base for reflective practice, and that 85% indicated that teacher research is an important foundation on which to develop greater professionalism. Also in the same study, over 80% of the teachers who participated responded that teacher research provides valuable knowledge for classroom practice. While another overwhelming majority believed that teacher research provides a context for the transformation of practice.

Similarly, Gilles, Wilson, and Elias (2010) find that action research encourages school personnel to systematically develop a question, gather data, and then analyze that data to

improve their practice. Collaborating on action research opens communication among teachers and school faculty; it increases awareness and reflection of issues that affect learning and professionalism (Darling-Hammond & McLaughlin, 1995).

Although all action research approaches encourage disciplined inquiry, reflection, and the improvement of practice they do vary in purpose and approach. In discussing action research for school improvement, Calhoun (2002), advises educators who wish to use action research for professional development to select a structured process to use in the school. For this reason, I have chosen the work of Anthony Bryk and his employment of improvement science for my action research project.

Improvement Science

The work on improvement science of Anthony Bryk, Chairman of the Carnegie Foundation for the Advancement of Teaching, is the primary basis for this proposed project, thus considerable attention and work cited is devoted in this literature review. Bryk, Gomez, Grunow, & LeMahieu (2015) in their book *Learning to Improve: How America's Schools Can Get Better at Getting Better* gives a very detailed account of the chronic failure of promising reform ideas. Bryk, et al (2015) points out that in each instance of an attempted reform effort there was a real problem to solve that often had the seed of a good idea. This easily includes attempts to improve professional development for teachers. However, educators often did not know how to properly execute the ideas and districts lacked the expertise and organizational capacity to support the changes on a large enough scale to make a difference (p.5). To date, nothing has changed. Educators and policy makers continue down this path of disrupting the educational system by cycling through interventions, initiatives, and programs. The result of pushing good ideas into large-scale operation rarely delivers the intended outcome. Rather large-scale disappointment

ensues. The heart of this problem is what Bryk calls *going fast and learning slow*. There is a consistent lack of appreciation of what is necessary to make a promising idea work in practice. We educators maintain high hopes and when dramatic results aren't realized in a short period of time we give up and move on to the next new reform idea. This strategy has continually failed. Therefore, Bryk, et al. (2015) draws upon improvement science and advocates for the concept of *learning fast to implement well* utilizing a different organizational arrangement to accomplish this. Teacher action research through use of improvement science allows educators to employ well established tool sets and personal practical experiences. In *The Improvement Guide* (Langley, Moen, Nolan, Nolan, Norman, & Provost, 2009) provide one major collection of improvement science tools and processes, and identifies as the core framework of improvement science the Plan-Do-Study-Act (PDSA) cycle, a process for rapid cycles of learning from practice, coupled with the three fundamental questions that drive improvement work.

Further support of improvement science in education has been found by Lewis (2015). According to her, improvement science theorizes that two different types of knowledge are needed: basic knowledge from the discipline of education and a system of 'profound knowledge' needed to enact basic disciplinary knowledge within organizations. From her research profound knowledge might include content specific knowledge, knowledge of organizational routines, and knowledge of motivation. The system of profound knowledge includes both generalizable knowledge and organization-specific knowledge. This need to recognize and appreciate the required profound knowledge as an integral part of educational research for the improvement of teaching and learning is where improvement science provides elements that positivist and post-positivist research cannot. This is because positivism assumes the possibility of drawing causal conclusions by minimizing variation in both treatment and setting. However, we all know that

variation is the primary issue that needs to be understood in educational improvement (Bryk, Gomez, & Grunow, 2010). So, if you apply this concept to implementing a new program in a school, the post-positivist approach of testing implementation assumes that the needed knowledge is “in” the intervention and ignores the role of profound knowledge in producing success or failure. In contrast, improvement science treats variation in implementation and setting as important sources of information and provides tools to grasp and learn from variation in order to redesign both the intervention and the system without needing to make causal claims or predict outcomes for other settings (Lewis, 2015). Organizational and system factors crucially shape program implementation (Spillane, Parise, & Sherer, 2011). Thus, improvement science capitalizes on the authenticity of each situation.

Summary

Characteristically, action research studies an identified problem or situation in an ongoing systematic and cyclical way to take action to change a situation or address a persistent problem of practice. It is a process of concurrently inquiring about problems and taking action to solve them. It is a sustained, intentional, recursive, and dynamic process of inquiry in which the teacher takes an action- purposefully and ethically in a specific classroom context- to improve teaching/learning (Pine, 2009). Therefore, action research dovetails with improvement science employed by Bryk. Both are spiraling cyclical processes in which research issues change and actions are improved, discarded, or become more focused. Action research recognizes that teachers are the agents of educational reform and not the objects of reform. It provides empowerment of teachers allowing them to own their professional knowledge. Teachers conceptualize and create knowledge, interact around knowledge, transform knowledge, and apply knowledge; enabling teachers to reflect on practice, become more autonomous in

professional judgement, develop a more dynamic environment for teaching and learning, build their craft, and recognize and appreciate their own expertise (Pine, 2009). This calls for a more balanced approach to educational change; one rooted in teacher leadership in which teacher professional learning increasingly becomes the purview of the profession itself (Osmond-Johnson, 2017). Professional capital embodies informed professional judgment, decisions, and actions. Hargreaves and Fullan (2013) position professional capital in the teaching profession as a critical component of “improving as an individual, raising the performance of the team, and increasing quality across the whole profession” (p. 23).

To combat the many documented shortcomings, several new approaches to teacher evaluation are much more in tune with professional practice and student growth. The implementation of new teacher evaluation systems across the United States has created both challenges and opportunities for the improvement of quality of teaching. In her article “From ‘Gotcha’ to Grow,” Janice Bradley (2014) explores what we are learning about teacher evaluation at the school level. She specifically looked at how principals promoted professional growth using teacher evaluation. This is a very formative approach as opposed to the traditional summative method. Bradley found that principals who truly supported teacher growth recognized that if teachers were to become effective as defined by their state’s teacher evaluation rubric, they needed to create structures for job-embedded professional learning as part of the process (p.11). Principals deliberately restructured their schools to align job embedded professional learning with the teacher evaluation domains and empowered teachers to select learning designs connected to the classroom where they could develop a deeper understanding of effective practices in a collaborative setting with peer and coach feedback.

Professional development opportunities, when properly designed and implemented, have the potential to enhance classroom practices and ultimately improve student learning outcomes (Guskey, 2002). The key is providing professional development that is timely, relevant, and effectively delivered. Professional development that is provided in an effective way can have a measurable impact on school improvement and student achievement (Callahan & Sadeghi, 2015). However, arguably, it is difficult to establish this causal connection, but what is known about effective professional development is that it causes teachers to learn and change their practice, often incrementally. Past practice finds that professional development programs are created with little input from teachers. When professional development programs are mandated and there is a pre-determined political agenda for change and teachers' perspectives are not considered during the process, little professional learning actually happens (Callahan & Sadeghi, 2015). However, when teachers can provide input to inform the professional development training, positive learning outcomes are realized and the learning is more effective (Edmond & Hayler, 2013).

In an effort to better utilize evaluation results to inform personalized professional development for teachers, this study sought to employ the innovative practice of teacher action research as a mechanism of transformative change in this realm. The principles that we know constitute effective professional development align well to evaluation systems appropriately implemented such as the formative nature of the Danielson Framework for Evaluation adopted by the State of Illinois. The Danielson evaluation system is fundamentally developmental and collaborative, improvement-oriented professional development is intended to function. In Chapter 3 you will find the explanation of methods used for this action research study. This project engaged a small cadre of teachers to specifically apply improvement science as teacher

researchers to tackle self-generated problems of practice. The overriding goal was to identify a problem of practice stemming from a component of the district evaluation tool to target improvement, thus creating authentic professional development in the process.

CHAPTER III: METHODOLOGY OF THE STUDY

The purpose of this research study was to employ collaborative action research using improvement science with teachers working through problems of practice to examine the effects on their practice and student learning. Additionally, I explored teacher perceptions of the use of these methodologies. To achieve this, I implemented a systematic evidence-based process developed by Bryk, et al. (2015) to identify a problem in professional practice and student learning. Next, determine an intervention to employ using IS to study the impacts of that intervention. The focus was on improving authentic daily work in the classroom and embracing an approach that utilizes multiple quick tests of change and iterative refinement of interventions in line with the design engineering practices offered (Bryk et al, 2015; Mintrop, 2020).

This is in response to the current state of most predominant professional development practices for P-12 educators which has proven largely ineffective to meet the needs of the ambitious goals of school reform called upon by policy makers today. This predominant lack of meaningful professional development is the identified function of my proposed project. It is my hope that action research will allow teachers to generate meaningful professional development through persistent problems of practice that are personally chosen and conducted on-site.

Research Questions

The research questions for this study were designed to examine targeted professional development for teachers using IS, within the boundaries of a teacher evaluation system that is aligned to the Danielson Framework for Evaluation. The focus was on improving teacher practice while embracing the IS approach of multiple quick tests of change and iterative

refinement of the interventions. The questions further explored the perceptions of teachers regarding the process during the study. The research questions guiding the study were as follows:

1. As the teachers worked through the collaborative action research process using improvement science as a tool for professional development, what improvements did they note in their practice?
2. As the teachers worked through the collaborative action research process using improvement science as a tool for professional development, what improvements did they note in student learning?
3. What are the perceptions of the teachers regarding the use of improvement science to inform professional development?
4. How can teacher action research, using improvement science, be used to close the gap among professional development, evaluation, student learning, and school improvement?

Research Design

The type of study I conducted is a very specific form of collaborative action research using ideas borrowed from Improvement Science (IS). This paradigm for research has been developed by Anthony Bryk and his associates at the Carnegie Foundation for the Advancement of Teaching. A detailed method of disciplined inquiry is used to drive improvement. An important premise of Bryk and his associates is to make the work of improving education problem-specific and user-centered. Chapter 5 of his book, *Learning to Improve*, details the method I followed in my research. As the chapter informs, all activity in improvement science is disciplined by three simple questions:

1. What specifically are we trying to accomplish?
2. What change might we introduce and why?
3. How will we know that a change is actually an improvement?

These questions got to the heart of actual improvement. They scaffolded a learning dynamic that involved making hypotheses about change, testing the hypotheses against evidence, revisiting one's change ideas based on what was learned, and testing again. The improvement research process will typically cycle through this process multiple times. My research project underwent 5 cycles over a ten-week period. At the conclusion of each cycle the teacher participants examined the three questions above to decide what actions to take in the new cycle.

This type of study, drawing from Bryk's work, employed small, rapid tests of change in iterative cycles to refine the interventions and examine student achievement. The *Plan-Do-Study-Act (PDSA) cycle* is a basic method of inquiry in improvement research and was utilized for this project. It guided the rapid learning and followed the logic of systematic experimentation that is common in most scientific pursuits yet is now applied to everyday practices. Below (Figure 1) illustrates the cycle and the four-step process carried out repeatedly to answer new questions as the parameters of inquiry expand during the process.



Figure 1 *Plan-Do-Study-Act Cycle* (Deming, 2021)

Utilizing the PDSA cycle, this research project will also incorporate the use of a small cadre of teachers to loosely simulate networked improvement communities (NIC's). The use of NIC's is discussed in Bryk (2015), chapter 6 titled *Accelerate Learning Through Networked Communities*. The NIC's are at the center of the study by bringing together ideas about accelerating social learning with the methods of improvement science. They are purposefully designed social organizations in which participants have distinct roles and responsibilities. My study did not use a NIK; however, I observed how the small teacher cadre employed the principles of a NIC in their action research. The principles spelled out by Bryk included a focus on a common aim, which is guided by a shared understanding of the problem, and employing disciplined methods of improvement research. The named NIC characteristics framed the teacher cadre as a scientific learning community. The action research teacher cadre recognized and drew upon the importance of social capital in the effort to effect meaningful change. As Bryk has found, when members come to respect and trust one another, they are more likely to adopt the innovations of their colleagues and test and refine the innovations in their own contexts. Teachers are able to compare results and learn from one another. The common data collected by

the teacher cadre in this study provided opportunities for the teachers to examine comparative outcomes and inform continuous improvement within a safe collaborative environment. DuFour and Mattos (2013) concur that the most powerful strategy for improving both teaching and learning is not by micromanaging instruction but by creating a collaborative culture and collective responsibility of a professional learning community (i.e. the teacher cadre). Research shows correlations between student learning increases when teachers participate in learning collaboration.

Research Setting and Participant Selection

District Profile

The middle school involved in the study is part of a PK-12-unit district in east central Illinois. The district is small and rural with a student population totaling 1,000. According to the 2019 school report card the district maintained a student attendance rate of 96 percent, an 86 percent graduation rate, and a teacher retention rate of 83 percent. The district realized a student mobility rate of eight percent. Fifteen percent of the student population qualified for special education. The average class size across the district was nineteen students. Approximately 54 percent of the teachers employed hold a master's degree or higher. Financially, the district is classified as a Tier 2 school in which it is at 70 percent capacity for meeting student needs and expends \$9,300 per pupil. The district administration consists of a superintendent and three principals. All schools within the district have achieved a rating of 'commendable' from the state. The largest achievement gap is realized with the low-income population. Approximately 40 percent of students in the district are classified as low-income.

School Profile

The middle school in which the research study took place shall be referred to as Direction Middle School. Direction Middle School has an enrollment of just over 300 students serving grades 5-8. There are approximately 30 certified teachers, and five aides. Three of the instructional aides are special education classroom assistants, one is an intervention specialist, and the fifth is a library assistant. Of the 30 certified teachers, approximately three-fourths of them would be categorized as mid to late career. There is one principal and no assistant principals or deans that serve this building. Three days of the week a school social worker provides student services.

Participant Selection

The teacher participants were selected from the school in which I was principal. The teachers were informed of the research study at a staff meeting in which the study was described in brief. During this meeting I informed the teachers that I would be asking for volunteers and those who might be interested in participating in the study to contact me privately via email, phone call, or in person. Following this a meeting date was set for all interested teachers to attend and receive more detailed information on the collaborative action research project. I did sent out a follow-up email (Appendix B) after the informational meeting requesting teachers interested in participating to send me a confirmation email. From the candidates that responded I chose four teachers. The selection was based upon their, already established, high level of collaboration as a grade level team.

Participant Profiles

The participants of the study were general education teachers within the building of the administrator conducting the research study. To ensure the confidentiality of each of the participants, pseudonyms have been utilized. The teachers will only be referred to as Mrs. East, Mrs. West, Mrs. North, and Mrs. South. All the participants are licensed educators in Illinois. All of the participants followed a traditional path of becoming a teacher. Three of the four teachers enrolled in college to pursue a teaching degree right out of high school. The fourth participant came to teaching after working in another profession for fifteen years. These teachers are all fifth-grade teachers in self-contained classrooms. Therefore, they are responsible for teaching all subject areas. Collectively they have been teaching an average of 9 years.

The participants were chosen because of the high level of collaboration they already displayed. They had an established culture of teamwork and met weekly to plan curriculum, share ideas, problem solve, and reflect on instruction. This level of collaboration and support fit nicely with Bryk's concept of networked improvement communities (Bryk et al, 2015).

Prior to securing agreement from these four teacher participants, the study was presented to all staff at a faculty meeting and three to four volunteers were requested. A follow-up email invitation was sent out again extending the invitation to participate (see Appendix B). Ultimately, participant agreement was secured from the four participating teachers.

Participant #1 – Mrs. East

Mrs. East is a veteran teacher. She holds a bachelor's degree in Education. She has been teaching for twenty years. She unofficially functions as the lead teacher at her grade level. She is also an instructional coach for the building. Mrs. East has frequently volunteered for staff

committees and openly supports embracing change to increase her professional practice and student achievement. Mrs. East has a very natural aptitude for teaching and leading. Her route to teaching was very traditional. After high school she entered college as an education major and has been teaching since the year she graduated with her degree and teacher certification. Mrs. East taught third grade for six years in her hometown. The following 14 years she has been teaching fifth grade at Direction Middle School. Mrs. East has always indicated a very strong interest in continual improvement of her instruction and delivery.

Participant #2 – Mrs. West

Mrs. West holds a bachelor's degree in Education and is in her seventh year of teaching. Prior to Direction Middle School, Mrs. West taught sixth grade for six years in a neighboring school district. Also, before entering the education field, she worked for fifteen years in another profession unrelated to education. Although Mrs. West has been teaching for several years, this is the first year that she has taught at Direction Middle School and is new to the grade level team. She has readily assumed a participatory and collegial position with her teaching peers. She brings an abundance of life experience to the team, as well as, a genuine love for kids. Her work ethic is beyond reproach and that carries over to the teamwork that is common with this particular group of teaching peers.

Participant #3 – Mrs. North

Mrs. North is in her fifth year of teaching, all of which have been with Direction Middle School. Mrs. East was originally her mentor teacher during her first two years. Mrs. North is currently working on her master's degree in Curriculum & Instruction. Mrs. North is realizing how much she enjoys teaching fifth grade. Before accepting this teaching position, she was

convinced that she would be more effective in teaching the primary grades. Mrs. North now feels very differently and can't imagine teaching students that young. She is eager to try new things and often brings ideas from her master's work to the team for discussion. She is very cognizant of the bridge between theory and practice. The employment of Mrs. North proved to be catalyst for the grade-level team creation and work ethic they now enjoy.

Participant #4 – Mrs. South

Mrs. South is completing her second year of teaching and is her second year of being mentored by both Mrs. East and Mrs. North. Mrs. South adjusted well to this district since she attended another school in central Illinois of similar size and student make-up. Additionally, she holds a master's degree in Curriculum & Instruction. Mrs. South has brought novel excitement and enthusiasm to the team along with new, fresh ideas and a willingness to try multiple things. Anyone who did not know would not be able to identify Mrs. South as a second-year teacher because of her advanced skills in teaching methods and relationship building with her students. Mrs. South strives for excellence and is very open, and even seeks, constructive criticism.

Problem of Practice Overview and Cycle Timeline

In September of 2019, the teacher participants, created the following problem of practice and an aim statement to keep their focus clear throughout the duration of the study.

Problem of Practice: Our students are entering 5th grade with the majority not knowing their math facts. This lack of fact fluency makes it difficult for student to learn higher level math standards subsequently required.

Aim Statement: *Our instructional practices for teaching math fact fluency actively engage students in strategies that are based on math learning science. We know we are improving when the majority of students in each class are scoring better on their timed fact tests each cycle.*

The teacher action research team’s stated goals were to use the PDSA cycle to carry out improvement science; develop commonly agreed upon interventions; gather meaningful evidence; and engage in inquiry, dialogue, and reflection during the research process.

The table below catalogs the dates and descriptions relevant to the PDSA cycles.

Table 1

PDSA Cycle Activities

Date	Description
Sept 4	Team Meeting
	Problem of practice /Aim statement created
Sept 6	Baseline timed test administered
Sept 9 – Sept 19	Cycle 1
Sept 18	Team Meeting
Sept 20	Timed test administered
Sept 23	Team Meeting
Sept 23 – Oct 3	Cycle 2
Oct 4	Timed test administered
Oct 7	Team Meeting
Oct 7 – Oct 17	Cycle 3

Table Continues

Date	Description
Oct 18	Timed test administered
Oct 21	Team Meeting
Oct 21 – Oct 31	Cycle 4
Oct 30	Team Meeting
Oct 31	Timed test administered
Nov 4 – Nov 14	Cycle 5
Nov 12	Team Meeting
Nov 15	Timed test administered
Nov 21	Final Team Meeting

The PDSA cycles formed the core of the improvement science activities. The action research team collectively chose their interventions for each of the five cycles. Each teacher tested the interventions in their own classrooms following the cycle timelines above. The cycle interventions were chosen to improve student math fact fluency as opposed to solely promoting rote memorization. The teachers' goal was for students to have facts meaningfully memorized so as to develop number sense while learning their facts.

Cycle 1 Interventions: Flashcards, Skip Counting, Patterns - For the first cycle the teacher participants chose begin with the foundation facts of 0's, 1's, 2's, 5's, and 10's. The teachers taught the strategies of skip counting and patterns on a hundred chart to foster student learning. They did have students intersperse the use of flashcards to reinforce these foundational facts.

Cycle 2 Interventions: Halving & Doubling, Square Products - To begin the second cycle the teachers introduced the strategies of halving and doubling of even factors. They also taught the students the strategy of finding a square that is near the fact they are trying to solve and then adding or subtracting the extra. Flashcards were once again used to practice these particular strategies.

Cycle 3 Interventions: Fact Songs, Math Games - High interest student activities were chosen for the third cycle. Two fact songs were learned by the students for learning their 7's and 9's. The teachers also incorporated math games that provided meaningful practice that involved many calculations that encouraged efficiency.

Cycle 4 Interventions: Fact Songs, Grouping/Arrays - The fourth cycle incorporated teaching the strategies of grouping and arrays to find unknown facts. The teachers also taught two new fact songs to reinforce what had previously been taught. Student also practiced flashcards individually or with a partner.

Cycle 5 Interventions: Review of Strategies, Math Reasoning Games – For the final cycle of the study the teachers employed a mix of all of the previous strategies and introduced new math reasoning games.

Ethical Considerations

My research participants were teachers who worked under my supervision. This situation could have definitely produce some ethical issues. I recognized that I was in a position in which I could have exploited these teachers with this research project. There were some explicit agreements with the participants that outlined shared expectations regarding all aspects of the project. I obtained informed consent that was fully voluntary. There was no perceived coercion

of any kind; that there were no repercussions from me if a teacher chose not to participate. Institutional Review Board (IRB) approval was sought and granted to conduct my study.

Data Collection Procedures

My data collection included participant observation, interviews, teacher journals, field notes, and student data as document analysis. Participant observation is a method in which a researcher takes part in the daily activities, rituals, interactions, and events of a group of people as one of the means of learning the explicit and tacit aspect of their life routines and their culture (DeWalt & DeWalt, 2011). According to Vogt, Gardner, and Haeffele (2012) participant observation is an effective design choice when you want to see what a phenomenon looks like from the inside and you want to study something over a period of time unfold as perceptions emerge, and meanings are ascribed. My role was to observe the process with the teacher participants having full knowledge of being studied. It also allowed for engaging the participants in conversations and sharing experiences in the natural way of principal and teacher relations. My position was essentially as a learner and facilitator of teacher learning in the research setting; not in a position of evaluation. The focus was on the research participants and perspectives and behaviors (Glesne, 2011).

Also included during the participant observation was the use of field notes, informal interviews, direct observation, participation in the life of the group, collective discussions and journaling to capture data. The research design to be utilized is participant observation. This method of field research is being used as a means of documenting relevant contextual information (Phillippi & Lauderdale, 2018). They are aimed at understanding, observing, and interacting with people in their natural settings (DeWalt & DeWalt, 2011). This paradigm of

participant observation allows the researcher to be in the real world and involved in the everyday lives of the people who are participating with them in the study. Most notably, in the planning stages of this research and through my extensive study of similar types of research, the field notes were a key component. I was particularly aware of the fact that I was a participant observer as a native of this educational environment. That made it more difficult to attend to the level of detail necessary to gain new insight. With that in mind I took detailed jot notes and expanded upon those later. I also had the teachers doing the action research for this project to keep their own journals detailing what was pertinent to them and the process of their research. Employing these methods, I was able see common or regular events of a principal working with her teachers with “new” eyes (DeWalt & DeWalt, 2011).

As I was a participating member in the life of the group, informal interviews were a part of the research process more like focus groups. The informal interviews were more spontaneous in nature. They were not preplanned, and they happened as the discussion evolved during team meetings in which I would pose questions to get teacher insight and information. There were regularly scheduled team meetings during the research phase to discuss the plan, what action would be taken, reflect upon what was instituted, and plan again in a PDSA cycle. During much of this time I was engaged in active listening (DeWalt & DeWalt, 2011). That is listening carefully to the conversation, using casual facilitation techniques, making mental or sometimes written notes about the conversation(s), and sometimes prompting when the conversation touched on some aspect of the research that was of particular importance to me and what I was looking to accomplish. As well as the conversation itself I also was cognizant of the importance of the nonverbal communication that took place such as facial expressions and gestures. It all counted in the data collected. At the end of the study I conducted semi-structured interviews with

each of the teachers individually. When gathering truly qualitative data, interviews are probably best conducted following semi-structured or open-ended formats (Mertler, 2017). I used a set of base questions that allowed for follow-up if I chose. This method proved to be a very productive source of rich data.

Throughout the study I also conducted observations. Most of the observations occurred during the scheduled team meetings in which I carefully watched and recorded what I saw and heard from the teachers. The meetings were scheduled for the end of each cycle, every two weeks, for a ten-week period total. There were five regular team meetings during the actual data collection stage. All four teacher participants and I were in attendance at these meetings. In addition to the regularly scheduled team meetings I also conducted one classroom observation per teacher. Observations were logged in my field notes (Glesne, 2011). My field notes contained both what I actually saw and heard, as well as, my thoughts and interpretations. In addition to my field notes the teacher participants also kept journals. The teacher journals were primarily data journals recording student progress. However, there were instances in the teacher journals where their thoughts were recorded. The number of entries varied by teacher. Each teacher made a minimum of one entry per cycle for a minimum total of 5 journal entries at the least.

Research Positionality

I began my career in education as a teacher in a large urban district in central Illinois and remained there for two years. I next taught in a small rural school district in central Illinois that happened to be my hometown. I remained teaching in this district for six years. Although the two teaching experiences were vastly different, the evaluation process and professional development

delivery system were very much the same. My experience of evaluation, as a teacher, was one in which the principal came in for a formal and informal observation once per semester as a non-tenured teacher. The observations were then followed by the principal writing his/her assessment utilizing a bargained evaluation instrument and setting a meeting date to review the evaluation and each party sign their acknowledgement. The meetings were generally brief and very little discussion and guidance were given during the meeting. Almost no formative feedback was provided. My experience as a tenured teacher was no different except there was only one formal and one informal observation conducted every other school year. The meetings and instruments were fundamentally the same in both districts. All the evaluation was summative in nature. Formative assessment was sorely lacking. Very troubling for new and veteran teachers alike. It is also pertinent to note that there was little instructional interaction with the principal outside of the evaluation process at either district. That was a little disconcerting. It felt like the evaluation process was very judgmental and structured solely to make retention decisions. It really didn't feel like a process to further instructional skills and promote professional growth. Essentially, it was an unfulfilling procedure that was required and truly benefitted no one.

In a similar fashion, my professional development experiences as a teacher were sorely lacking in providing guidance and support in the context of my own teaching situation. The majority of professional development consisted of applying to attend conferences off site that were of interest to the teacher but may or may not be furthering their growth in instruction and most often not linked to common goals of school improvement.

After eight years of teaching I accepted a principal position in yet another small, rural district in central Illinois. One of the parts of the job that produced the most anxiety for me as a new administrator was evaluating staff. Once hired, I was sent to the Regional Office of

Education to take the two-day evaluation course required by the State of Illinois. In the required evaluation course much of the time was spent discussing the evaluation process and how to conduct a summary conference. I was taught that the role evaluation should provide a basis for formative guidance even though summative rating must be given at the end of the evaluation cycle. I had never experienced this and was left wondering why I hadn't. So I went back to my building determined to make the process meaningful. I spent much time visiting classrooms, having informal discussions with teachers about what they were doing and why, talking to students about their thoughts and perceptions on instruction, seeking advice from my mentor principal and other administrative colleagues. I learned a great deal in my first years and every subsequent year as an administrator. I very much feel I made the evaluation process more effective for teacher growth and student learning namely by helping teachers to use reflection and peer review to evaluate their instructional effectiveness. I am now in my eleventh year as a building principal and have served other schools in that capacity and feel very comfortable with teacher evaluation. But the fact remains that it is still not what it should be. It is not a comprehensive system that incorporates teacher performance that is also linked to effective professional development and student growth. It is my belief that many factors should comprise a total evaluation system. I have yet to experience that in any district I have worked for or have knowledge of.

Now with the advent of teacher evaluation reform, I am determined to try and ascertain if the new evaluation instrument, namely the Danielson Framework, will foster the intended change at the district and school level which includes formative feedback that will provide professional development guidance for all teachers. Ultimately, teacher professional development is of the

greatest interest to me and intensely personal because I work in the trenches with teachers on a daily basis and would like to explore how to help them create their own personalized PD.

My district at the time was currently in the third year of implementing the Danielson model of teacher evaluation. As principal of a middle school, I was in the most authentic position to work with my teachers on this action research study. I had access to the field of study daily. I had established trust with the teachers in my building through eight years of working collaboratively on teaching and learning. More importantly, I had teachers who desired to improve professionally and who I believed would readily volunteer to participate in this proposed project because they desired personal and professional growth and development.

I would like for myself, and all principals, to be able to work with teachers to effect increased student learning and quality teaching using highly effective PD that is targeted and job-embedded. Therein lies my interest in incorporating action research.

Data Analysis

The ultimate outcome of data analysis is to enable participants to clearly understand the nature of events that are the focus of the research process (Stringer, 2008). The intent was to understand how people experience and respond to the ongoing reality of a situation. By design, action researchers are proposing to document what is essentially a moving target. Researchers are charged with capturing the process as well as narrating the end game. Ongoing data analysis is imperative to the process in action research. So, in proposing an approach to data analysis, there is also involved a commitment to documenting the data that results from the iterative cycles of research. Key in my analysis was careful attention to the ongoing documentation process and putting methods into place to capture it (Herr & Anderson, 2015).

Data collected involved observations, interviews, journals, and artifacts such as student data records. The student data records included teacher observations and student math fact tests. Due to the type of data I collected, I used coding and thematic analysis. Miles, Huberman, and Saldana (2014) assert that then the researcher will gradually elaborate a small set of assertions, propositions, and generalizations that cover the consistencies discerned in the database. This was accomplished using a thematic process employing guiding principles informed by Miles and Huberman (1994) that are data reduction, data display, and finally the drawing of conclusions for the validation of the themes extracted.

Trustworthiness and Credibility

Although there is growing acceptance and encouragement of action research within schools of education and in school districts, little attention has been paid to what counts as tests of validity for teacher-research (Feldman, 1994). The validity of research has a significant impact on the methodology of how research is conducted. I would term my research project as collaborative action research. It consisted of me working together with of a group of teachers to examine how they took actions within their teaching situations in order to improve their practice.

The problem with validity of this research project is that it involves the highly complex system of teaching and learning in which there are an innumerable number of variables that nullify the traditional controlled experiment. This process utilized the methods of monitoring, reflecting, and adjusting during the course of the research. Techniques I used to validate my action research will be to first collect data which can be used to evaluate the implementation of actions. Second, I collected data that provided evidence for the existence or non-existence of unintended effects. Lastly, I worked with the group of teachers to triangulate the data to gain

different perspectives on the given situation. Thematic analysis provided a comprehensive process for me to identify many cross-references among evolving data (Hayes, 1997). I was able to compare the concepts and opinions of the teacher participants with the data gathered.

Summary

The methodology I employed for this study utilized improvement science as modeled by Bryk and his associates in which disciplined inquiry was used to drive improvement. A small cadre of same-grade teachers conducted collaborative teacher action research. They specifically incorporated the PDSA cycle to study a chosen problem of practice that was job embedded in their daily practice. The supervising principal was involved as a participant observer in the process. The study lasted for 10 weeks and was divided into 5 cycle of interventions during which data was collected in the form of teacher journals, observations, field notes, and semi-structured interviews.

CHAPTER IV: FINDINGS

This chapter presents the findings and analysis of the data collected through the facilitation of a teacher action research study using improvement science. The purpose of this study was to examine the possibility of teacher action research closing the gap among professional development, evaluation, student learning, and school improvement. Participants of this study were a small cadre of four teachers who routinely collaborated prior to the study. The teachers in this study worked in unity as a component of the process of implementing improvement science. Qualitative research techniques were used, including semi-structured interviews with the four teacher participants. Other data collection strategies included classroom observations, and participation in team meetings where student data documents were reviewed, as well as, evaluation of teacher participant journals. In this chapter I report the themes generated from the data. The themes are organized around the four research questions for the study. What I found was improvement of practice happened as a result of employing IS through open communication, reflection, decision making driven by data, and the problem being context-specific. This study also resulted in significant improvement of student math fact fluency and a greater sense of confidence of the students in their abilities. Finally, collaboration, a shared sense of responsibility, and a deeper level of trust were evidenced as informing professional development through the process of IS. The findings are detailed by research question delineation. The chapter will close with a summary of the significant findings from the research data.

Research Issue

This research project was primarily designed to examine the viability of teacher action research, using improvement science, providing effective professional development for teachers in the context of their schools and classrooms. As well as professional development, it also focused on whether the teacher action research could bridge the gap among other key educational issues of evaluation, student learning, and school improvement. The study was designed to be carried out in iterative cycles using the plan-do-study-act process. The completed study contained five cycles in a ten-week time period. Two weeks were dedicated to each cycle. The short cycle is in keeping with the theory of improvement science, in which learning fast, or failing fast, is a key component. The research questions were as follows:

1. As the teachers worked through the collaborative action research process using improvement science as a tool for professional development, what improvements did they note in their practice?
2. As the teachers worked through the collaborative action research process using improvement science as a tool for professional development, what improvements did they note in students learning?
3. What are the perceptions of the teachers regarding the use of improvement science to inform professional development?
4. How can teacher action research, using improvement science, be used to close the gap among professional development, evaluation, student learning, and school improvement?

The participants in the study were teachers who volunteered from the school in which I was principal. They had a history of working collaboratively already in their particular grade

level and had a desire to examine and improve their professional practice. The teacher research participants were new to the concept of IS and cycles of inquiry. They had no exposure to action research or improvement science prior to engaging in this study.

Findings from Thematic Analysis

For the purpose of this study, I gathered data from observations, interviews, and documents in the form of field notes and teacher journals. I used coding and thematic analysis as suggested by Miles et. al (2014) to analyze the data. The results from the data analysis are organized around the four research questions for the study.

Research Question #1:

As the teachers worked through the collaborative action research process using improvement science as a tool for professional development, what improvements did they note in their practice?

Benefit to Using the PDSA Technique for Improvements. When asked about their perceptions of improvements they saw in their practice as a result of participating in the collaborative action research process using improvement science, the teachers spoke of the benefits of using the PDSA technique. PDSA was the technique applied for the planning, executing, studying, and implementing of the interventions chosen by the teacher participants in this study. This technique provided an avenue of implementing small changes and evaluating the impact of those changes within the method framework of improvement science. This cycle for learning and improvement was readily embraced by the teachers involved in this project. All four of the teacher participants stated that they liked the simplicity of the technique and would

continue to use the PDSA method together and individually in the future to improve their practice in regard to student growth and achievement.

In line with the theme *Benefits to Using the PDSA Technique for Improvements*, I identified four specific categories. In Table 2 below, I present the categories as they were generated based on data gathered from each teacher.

Table 2

Perceptions of Teachers: Improvement of Practice

Teacher	Open Communication	Reflection	Data Driven	Context Specific
Mrs. North	X	X	X	X
Mrs. South	X	X		X
Mrs. East	X	X	X	X
Mrs. West	X	X	X	X

As can be seen in the table above, four main categories emerged as primary benefits to using the PDSA cycle during the study. The four categories that emerged were open communication among the participants, reflection on the intervention implemented and the effect

on teaching and learning, the use of data to drive decisions, and the process being context specific and user centered.

Open Communication. Open communication is one of the categories documented as a benefit to using the PDSA technique to conduct teacher action research. Each teacher participant indicated that she highly valued the quality, sincerity, and honesty of the group interactions during the study. Due to the high level of commitment of the research group to regular meetings for the purpose of continuous assessment and review of student learning, as well as, their own instruction they felt they collectively removed barriers to student learning much more effectively than working privately and independently. Together they pooled their knowledge and experience to seek the best strategies. This exemplifies a quote regarding decisional capital taken from Hargreaves & Fullan (2012, p. 142) that states, "...collective responsibility is not just a commitment; it is the exercise of capabilities on a deep and wide scale. It encompasses positive competition: challenging the limits of what is humanly and professionally possible."

Reflection. The open communication cited flows to the second category of reflection. A central part of the PDSA cycle was the act of reflecting on the intervention implemented, the instruction provided, and the student outcomes. In short, the teacher participants embraced this component as it helped each other to improve. The teachers opened themselves to new ways of thinking and also rethinking their current approaches to instruction due to group consideration of the effects of what they implemented. In the concluding interview Mrs. West stated, "I learned so much from our meetings due to the timeliness of reflecting on our interventions." Similarly, Mrs. North said, "I felt a little like a student myself. I always came away from our group meetings knowing more than I did before." The teachers studied as adults to improve student learning. It was apparent to me, the researcher, through team meeting participation and concluding

interviews, that the act of reflection collectively was valued as a means of advancing their professional capacity as teachers.

Data Driven. The use of data was a driving force in the PDSA cycle. All of the communication, reflection, and interventions centered on student achievement data and other data that was observed or collected that informed the process. The data provided them proof of learning and effective instruction and/or interventions. It answered the improvement science question of ‘How will you know that a change is actually an improvement?’ The student achievement data in the form of timed fact test assessments was the primary measure of improvement. Though the teacher participants also used other evidence of informal data such as observations of students’ confidence and statements made by students to inform their decisions on student success as well.

Each of the participants indicated that they liked the quick manner in which they obtained data. They were able to realize early measurable successes in student fact skills as was evidenced by the timed math fact test scores recorded in the teacher journals. This was a catalyst for increased enthusiasm on their part. It increased their desire to continue probing and trying new interventions to further the positive results they were seeing. In my field notes I referenced on more than one occasion the excitement generated when the teachers discussed the student data during the regularly scheduled study meetings. Even when discussing a few students who either weren’t progressing as expected or possibly showed a regression, there was a noticeable feeling of keen interest in finding an instructional strategy that will bring about positive results for those students.

Context Specific. Finally, the perceptions of the teachers regarding the use of the PDSA cycle revealed their gratification of the chosen problem of practice being context specific to

them, their students and their needs. Right from the beginning there was total investment in the problem from the participants. This was due to the tie to the effect of their instructional practice. The motivation to learn was immense. All four participants declared verbally at some point in the study their positive thoughts on the personalized pedagogical experience. Mrs. East stated in a team meeting early in the process, “This project is allowing us to work on the problem of practice we want to address so that it benefits us (the teachers) and the students we are responsible for.” In the same vein, Mrs. South made a similar statement regarding the personal context of the action research was, “This is how it should always be. The teachers choosing a problem that we feel is important and relevant to student success and working collectively to choose interventions and focus instruction.”

Working in the particular context of the classrooms, with the students of the teacher participants stimulated deeper thinking, an increased drive to problem solve, and generated greater teacher knowledge as a result. That is how the PDSA cycle was credited for inciting meaningful, job-embedded professional development. The teacher participants felt it was a very beneficial use of their time and furthered their professional practice by engaging in this type of action research using the PDSA cycle.

Improvement to Practice. There was evidence of improvement to their professional practice cited by the teacher participants. The first improvement of note was the use of evidence, in the form of assessment data, to inform instructional decisions in the moment. They included evidence in both formative and summative forms. This conclusion I drew from the teacher interviews and my observations of team meetings. Mrs. North stated, “I have always known that I should use data to inform my teaching, however, it was often done at the end of a chapter or unit. Then I would make notes to change or tweak a particular approach for the next year. This

improvement science process has made it clear that improvement of instruction can, and should, happen midstream based on the evidence.” Similarly, Mrs. West shared, “I liked having the chance to make alterations that my students needed to directly affect their learning outcome.” Mrs. South was particularly aware of the evidence she gained from the student conferences she conducted during the cycles. She noted, “Student thoughts and responses gave me a valuable look at how they actually think about the math I was asking them to do. Knowing how their minds worked to solve problems also helped me to implement other strategies to create the fact fluency identified as our PPOP.” An example she provided was one student didn’t accurately understand the concept of the doubling and halving strategy. This fact was revealed after conferencing with the student. She was able to reteach the concept to the student and later observed the student using the strategy correctly.

Teachers also made many statements in their interviews referencing sustained engagement with their peers providing improvement to their practice. Notations in my field notes from team meeting observations also supported the concept of peer engagement leading to better classroom practices for both teacher instruction and student learning. Adopting new interventions in team meetings gave cause for the teachers to try new things-improve pedagogy. Then they had the opportunity to conduct follow-up discussions in the next team meeting where deconstruction of the implementation happened thus leading to effective change. My field notes contained jottings documenting statements of the participants such as, “I would never have chosen to do this on my own,” and “This intervention is a little out of my comfort zone.” The improvement to practice was correlated with the sharing of information about what each teacher was doing in their classroom and analyzing the student data collected.

A third area drawn from the research study correlated to improved professional practice was clearly identifying a problem of practice and then developing an aim statement. The teachers all referenced having objectives when planning for instruction. However, through the process of improvement science they indicated that their focus was more sharply maintained on the goal. Most of my data for this component was drawn from team discussion. At the beginning of each meeting the participants would start with a review of the problem statement and the aim statement. From that they would transition into discussion about the intervention implemented in the given cycle. During my participation in the team meetings I observed all four teachers at some time directing the team back to the aim statement. I specifically noted Mrs. East saying, “The aim statement we developed really helps keep us focused. When we begin to sidetrack on a peripheral thought it circles us back to where we need to concentrate.” Three of the four participants also referenced the problem of practice and the aim statement in their interviews.

Research Question #2:

As the teachers worked through the collaborative action research process using improvement science as a tool for professional development, what improvements did they note in student learning?

The data I gathered from the teachers indicated that they noticed improvement in student learning in two primary areas – *Student Achievement and Skills*, and *Student Confidence and Competence*. These two themes evolved as teachers determined if an intervention or instructional shift in this study using improvement science was actually an improvement. I identified these themes through observing the teacher team during the team meetings, observations in the classrooms, interview responses, and reviewing the teacher journals.

Student Achievement and Skills. The primary way that the teacher participants in this study determined if the intervention was an improvement was from the student achievement data obtained in their classroom. Table 3 provides a summary of the data collected by the teachers in regard to student achievement. The table shows the number of students by teacher in each of the given categories. Mastery criteria was set by the teacher team after baseline scores were established. Significant Achievement was designated if students scored ninety percent or better on their fact tests by the end of the study. Some Achievement was assigned if students achieved 70-89% of facts mastered, and No Achievement was determined by scoring anything 70 percent or below.

Table 3

Student Achievement Results by Teacher as a Result of Implementation of PDSA Cycle

Teacher	Observed Significant Achievement	Observed Some Achievement	Observed No Achievement
Mrs. East	15	4	0
Mrs. West	15	3	2
Mrs. North	13	5	2
Mrs. South	14	2	2

Table 3 shows the number of students in each class that met the column criteria. The data indicated that the interventions employed by the teacher participants, in response to their selected problem of practice, lack of student math fact fluency, did produce significant achievement gains in the majority of all students from each class. The primary source of the information came from student fact test data reported in the teacher journals. Mastery was defined as a student producing

an answer within 3.5 seconds, through recall or a highly efficient strategy. The teacher interviews also revealed that all four of the teacher participants reported large increases in student multiplication fact fluency skills. This was corroborated with the fact test scores that were detailed in the journals the teacher kept. All four of the teacher participants noted in their journals that less than fifty percent of their students in each class had mastered their multiplication facts at the beginning of the study. At the end of the action research project the teacher's journals revealed large increases in fact skill acquisition. Mrs. East's class showed that 84% of her students had mastered their facts. Mrs. West's class totaled 75% of students attaining mastery. Mrs. North's class showed the lowest percentage at sixty-eight, and Mrs. South's class showed the greatest increase at ninety-three percent of the students achieving mastery. Overall, the average for all students in the grade achieving mastery was eighty percent. The gains were further referenced by my participant observer/researcher field notes while conducting observations in the classrooms and during the team meetings.

Student Confidence and Competence. Aside from the explicit data in student scores noted above, the teachers also reported that they observed an increase in student confidence and competence in multiplication fact skills. Mrs. East states, "There is a marked confidence in what they are able to do and the positive way they view themselves. It was very apparent when they were independently able to divide with two-digit divisors." Additionally, Mrs. West commented in a team meeting that she noticed as her students mastered their math facts they displayed more self-assurance and were eager to try new math concepts that would be a struggle for children who hadn't mastered their math facts. Furthermore, all teachers reported that the students who mastered their multiplication facts received great satisfaction from helping their peers to practice to increase their levels of mastery.

Research Question #3:

What are the perceptions of the teachers regarding the use of improvement science to inform professional development?

From the research interviews, field notes, and teacher journals, four main themes evolved regarding the perceptions of the teachers on the use of improvement science to inform professional development: collaboration, shared goals/responsibility, process, and trust. Participants all directly stated in some manner that identifying a relevant problem of practice was a highly motivating outcome of the process. They indicated a strong desire to improve their instruction and increase student achievement as a result of this work. The interview probes about improvement science and its relation to professional development and meeting proceedings recorded in the participant observer field notes elicited the majority of the evidence for this research question.

Collaboration. As stated previously, the teacher participants had already established a process in which they met and planned collaboratively prior to participating in this action research project. However, as the course of the study progressed so did the perceptions of the teachers as they employed improvement science to study a problem of practice. They experienced a deepening of their understanding of collaborative work. Common words mentioned by the participants were opportunities, sharing, teamwork, negotiation, and commitment. These common words used were grouped under the overarching theme of collaboration. The words and phrases reflect the teachers' involvement in this study and the wish to grow professionally. All four teacher participants stated their desire to become a better teacher. Phrases such as 'build on my existing knowledge', 'get better at differentiation', and 'set high expectations for learning' were common. This quote from Mrs. South represents the general

sentiment, “I would like to plan new instructional strategies with my peers to better my teaching and help students learn more effectively.” Findings indicate that the teacher researchers reflected more deeply on their practice, constructed new knowledge about their instruction, and made changes to their teaching that will be sustained in the years to come. New knowledge about their instruction now incorporates the search for new strategies grounded in research to implement and test through a reflective cycle such as improvement science. As for changes to their teaching they cited increased use of students reflecting on their own learning and examining the effects of interventions they put into place through the use of measurable criteria. The participants valued teamwork, critical friends to talk over things that went wrong, and a feeling that they were all pulling together. This was indicated again by statements by the teachers. They easily recognized their diversity was a strength. Mrs. North expressed that the tasks of the study group were divided according to personal strengths and personality. Another, Mrs. East, said, “The team atmosphere allows us to see improvements beyond our own classroom.” The teachers appreciated how they gave and received feedback to each other. “I feel supported and not isolated,” said Mrs. West. Over the course of the action research project, I witnessed an increased sense of motivation to improve and a greater level of loyalty to each other among the participants.

Shared goals/responsibility. Teachers today must meet the needs of an array of diverse students. This can be taxing for any one teacher to tackle by themselves. Through the collaborative work environment used in this study the teacher participants set expectations for shared goals and responsibility. This shared responsibility was set from the first meeting when the teachers explored various problems of practice to identify for study. From that point on, they embraced a sense of collective responsibility for student learning. This stemmed from their

desire to share the workload and also maximize student growth by exploring many different instructional options. The teacher participants expressed dissatisfaction prior to the start of the project at not being able to get everything done, excessive mandates, too much grading, prescriptive policies, not enough time for their own personal learning, and lack of personal time. They viewed this action research initiative as a way to explore alleviating all of those challenges while still doing justice for their students. Tasks were divided among the teachers. For example, two of the teachers researched new strategies, another teacher developed the math fact tests to align with the interventions for each cycle, and the fourth teacher would guide the team meetings to keep them focused and on track. Each teacher eagerly volunteered for taking ownership of the selected tasks until they all shared proportionately in the work. Supporting evidence was obtained in observing team meetings. During the team meetings I regularly observed the teachers dividing up research activities, reconfirming goals verbally, and discussing problems or successes experienced in their respective classrooms. Supporting evidence was also obtained via notes made in my field journal and the information the teachers reported when I interviewed them at the end of the study. Four main outcomes were cited by the participants in regards to professional development identified through the use of improvement science. The four outcomes reported for shared goals and/or responsibilities were: the teachers were more creative, they achieved an increase in academic rigor, the workload was decreased due to the sharing of duties, and they realized an increase in understanding of student data.

Table 4 details samples of teacher participant statements regarding the shared goals and responsibility that emerged concerning the use of improvement science during the action research project. There was a commonality among the participants of the themes listed in the

table. The table presents a concise picture of the four main outcomes for this component as evidenced through teacher feedback.

Table 4

Perceptions of Teachers: Shared Goals/Responsibility

Teacher	Creativity	Academic Rigor	Student Data	Workload
Mrs. North		The level of engagement led to students working harder on meeting higher expectations.	Access to greater amounts of student data & information	We got more done because we shared the work.
Mrs. South	Unique ideas were proposed. Some we tried and some we didn't.		I delved deeper into analyzing data than before.	It was awesome to divide up chosen tasks. More accomplished.
Mrs. East	I tried things I wouldn't have before.	The students were challenged to do more.	Not only was I looking at my student data, but data for the entire grade.	Not having to do everything myself allowed me to do much more.
Mrs. West	The interventions were fun and 'outside the box'.	We (teachers) expected the kids to perform at a higher level.		Each teacher taking responsibility for tasks allowed us to do more and try more interventions.

Trust. The teachers' perceptions of the role of trust in this action research project utilizing improvement science was clearly identified both implicitly and explicitly. As it has been stated previously, the teachers were selected, in part, due to their established collaborative pattern of work prior to the study. However, what emerged from this experience was increased attention brought to the conditions under which collaboration is most effective at informing

improved professional practice and leading to increased student achievement. Clearly, the quality of the relationships of this team of teachers was impacted by the heightened level of trust that was established and expressed throughout the course of the project. Nonempirical data strongly suggests that the method of improvement science created an atmosphere and structure that ultimately fostered trust among the teacher participants.

There were many ways in which trust was implicitly expressed. At the inception of the study the teacher participants identified goals and set a framework for the implementation of the use of improvement science. From there the participants were faithful in keeping their word, adhering to timelines and tasks, and attending meetings. This meant they demonstrated their reliability to each other. Being reliable was never overtly expressed, however, it was clearly communicated through actions.

Implicit trust was also conveyed through sharing their thoughts openly during scheduled meeting times when they deconstructed the interventions implemented and the results they found. Each participant listened actively to team members and provided feedback respectfully. There was no observed reluctance to sharing their thoughts, doubts, or possible disagreements. There was a lack of self-promotion. All communication recognized each individual's contribution to the team. Thus, a deep level of trust was gradually built throughout the nine weeks invested in the process.

Also emerging was the team members' perceptions of the faith they had in each other's capabilities. They organized themselves so as to divide the labor and meet obligations set forth at each of the meetings. The teacher participants looked forward to each meeting and sharing the new ideas each person would bring to the table for consideration as interventions to use for the next round of the research cycle.

Finally, there was a clearly demonstrated level of respect. This is infused throughout all of the areas previously discussed, however, its prevalence in the group dynamic warranted being reported. Respect was demonstrated in the form of feedback among the teacher participants. Feedback was given about each other's ideas, methods, and performance. It was both constructive and positive in nature. The feedback allowed the team to see what was working and what wasn't.

The teacher participants also operated under the assumption of honesty. That to truly respect each other and the goals they were working toward, they had to be honest with each other. Being truthful isn't always easy to hear but the teachers understood the importance of this virtue in collaborative teamwork.

While in team meetings, the teachers would give everyone a chance to express their thoughts and opinions. This was not just a form of going through the motion. Each member would actively listen by making good eye contact, asking questions, rephrasing, and asking for clarifications. Due consideration was given to what each participant had to offer. Of note also was the lack of self-promotion on the part of the teacher participants.

Explicit expressions of trust were revealed in several different ways. Initially, the group committed to a core set of values when they established their research goals. They established the necessity of effective communication and being clear about commitments. The foundation was built on their desire to meet in person, as a team, every two weeks at the end of an intervention cycle to deconstruct what they did and plan the next steps going forward. It was also agreed that everyone would calendar the meetings and not let other happenings derail their commitment to the team.

The teacher researchers adhered to the routine that they established for the research process. They committed to the process and proved reliable in keeping the routine. Not one teacher missed a meeting or deadline during the nine weeks of the study. The consistency maintained in the study contributed to an elevated level of trust.

The teacher participants made verbal agreements in the beginning to always be honest with each other. They were very aware of the need for truth in giving their best efforts to generate a genuine action research project and do justice to their students. The teachers kept timely and accurate data on interventions, as well as, speaking openly and honestly during team meetings regarding any discussion items. This process of educators collaboratively making important decisions about their work is what Hargreaves and Fullan (2012) term 'decisional capital'. They have shown how this increases teacher efficacy and value by transforming teachers into solution makers.

Due to the previously identified characteristics of both implicitly and explicitly demonstrated trust, the teachers took risks and tried things as a group that they acknowledged they never would have done individually. The trust built within the group fostered an atmosphere of stepping out of their comfort zones, trying new and innovative approaches, and sharing in the successes and failures together. One such statement by Mrs. North encompassed the benefits of taking risks when she said, "I really wasn't sure that this intervention would work. I had my doubts but you all wanted to give it a try and I am amazed at the results we saw with all of our classes. I'm glad we did it."

Process. The process of improvement science was prevalent in the findings. The findings were evidenced in the team meetings, the participant observer's field notes, and in the interviews at the end of the study. The perceptions of the teachers on process centered largely around the

use of disciplined inquiry to drive improvement as taught by Bryk et al. (2015) in chapter 5. The central part of the process of improvement science used by the teacher participants was the use of the three improvement questions described in the prior methods section:

1. What specifically are we trying to accomplish?
2. What change might we introduce and why?
3. How will we know that a change is actually an improvement?

While simple, these questions got right to the heart of targeting actual improvement. They supported the adopted learning framework of the teacher researchers that involved the teachers hypothesizing about interventions for improvement, testing the interventions, then revising based on outcomes, and repeating the process. This leads to the consideration of the research cycles of plan-do-study-act which will be discussed further under research question number 3. However, teachers felt the improvement questions kept them dialed in to the outcomes without following other tangents that might arise during the process. Mrs. South stated, “I felt like the use of improvement science allowed our team to maintain a laser focus on what we were specifically trying to accomplish.” During team meetings, as the teachers would discuss the results of a given intervention, other issues or wonderings would arise and be pondered for a bit but someone would call them back to the particular task at hand and reflect back to the pertinent improvement question at hand.

The teachers all reported favorably on the use of the improvement science process because it allowed them to learn a great deal in a very short time on a small scale. “I really appreciated the fact that it did not take a significant amount of time to learn valuable information to enable us to increase student achievement and provide better instruction,” stated Mrs. North. Similarly, Mrs.

East stated, “Improvement science provided a method of improvement inquiry that was quick and efficient.”

It was very appealing to the teachers that they did not have to invest a great deal of time in learning how to use improvement science. The teachers referred to this in team meetings and in the interviews at the end of the study. All four teachers agreed that they would use improvement science again in the future as a team. They stated it was valuable but they would use it selectively due to the formality of the procedures to employ it correctly. The teacher participants stated that they would use improvement science in instances when they needed good data to back up a learning initiative or new instructional method.

Research Question #4:

How can teacher action research, using improvement science, close the gap among professional development, evaluation, student learning, and school improvement?

Findings from the data show there were varying and yet very consistent connections among teachers regarding employing teacher action research, using improvement science, to closing the gap among the components of professional development, evaluation, student learning, and school improvement. The information in Table 5 below shows the strength of the connections, which were drawn from my field notes, teacher logs, and participant interviews. The connections were categorized as either Strong Connection, Connection, or Possible Connection. A Strong Connection was categorized if all three sources provided ample evidence. A designation of Connection was given if at least two of the sources provided supporting evidence of the connection. Lastly, a Possible Connection was established if at least one of the sources validated the connection.

Table 5*Teacher Action Research Connections*

Teacher	Professional Development	Evaluation	Student Learning	School Improvement
Mrs. North	SC	C	SC	PC
Mrs. South	SC	C	SC	PC
Mrs. East	SC	C	SC	PC
Mrs. West	SC	C	SC	PC

SC=Strong Connection, C=Connection, PC=Possible Connection, NC=No Connection

Strong Connection. Professional development was the first component explored being tied to action research using improvement science. Table 5 shows that data from all four teacher participants supports the rating of Strong Connection. Every teacher reported in one or more ways that this study proved to be a viable and practical form of professional development. For example, Mrs. North stated in the interview, “Often times you get the most out of talking and problem solving with colleagues in the same situation as you than going to listen to someone, an ‘expert’, speak that has no idea what your situation is like.” Likewise, Mrs. South relayed, “Using improvement science, we had to figure it out. It wasn’t prescriptive. We had to problem solve and change in response to our findings. That is professional development.” They all reported improvement in their practice as a result. Support can be found by Stigler & Hiebert

(1999) in their book *The Teaching Gap*. These authors report that due to the complex nature of teaching, improvements will be most successful if they are developed in the classrooms where teachers teach and students learn. Context is of extreme importance. My field notes reflect a recurring message from the teacher participants that working on a problem central to their practice regarding their specific students is a game changer in the idea, or rather delivery, of professional development. One teacher in a team meeting stated, “There is so much more meaning and buy-in to this process because it deals with the wellbeing of our kids.”

Connection. Evaluation of teachers is another component examined as a tie to the use of improvement science. The finding was that there is a Connection, however, it wasn't strong enough to be classified as Strong Connection. The data recorded showed that all of the participants could link the use of improvement science to the evaluation instrument of their district which was a Danielson model. What I found was that from the outset of this project the teachers were not thinking of the tie to evaluation. Their research work was not guided by the possibility of how this type of improvement of instruction could increase their evaluation scores. Rather, it was primarily an afterthought when reflecting on the study during the interview. When specifically asked about the connection between improvement science and evaluation they would think for a few moments then name where they could see a link to the evaluation instrument (Appendix C, Charlotte Danielson's Framework for Teaching). Mrs. North, Mrs. West, and Mrs. South all cited Domain 4: Professional Responsibilities (4a). Within Domain 4 they specifically named Reflecting on Teaching. Collaboration was identified by Mrs. South, Mrs. West, and Mrs. East. This too falls within Domain 4 under Participating in a Professional Community (4d) and Growing and Developing Professionally (4e). Lastly, Mrs. East alone pointed out how improvement science could be used as a required student growth measure for evaluation and also

Domain 1: Planning and Preparation in which Setting Instructional Outcomes (1c) addresses the important learning identified by teachers because instructional outcomes determine instructional activities.

Strong Connection. In looking at student learning as tied to improvement science the data supported a rating of Strong Connection. In fact, it could be deemed it showed the strongest connection of the four components. Every data source, triangulated, established the connection. It should be noted that the foundation of the teacher research project was to increase student achievement so the strength of the connection was not a surprise. A constant focus on student learning goals was maintained throughout the ten weeks. The rapid tests of instructional strategies proved effective and highly motivational. During a team meeting spent reviewing student data and evaluating the given instructional strategy result, Mrs. East stated, “This process allows us to temporarily forget the many daily issues of teaching and purposefully stay focused on the problem of practice to increase student achievement.” The other teachers acknowledged their agreement with her statement. The determined focus on the goal proved to be effective in examining strategies and improving instructional practice which lead to increased student achievement.

Possible Connection. In looking at how the components tie to overall school improvement the data from this study shows a possible connection. Data collected and reviewed does is not directly attached to a school improvement program or goal. I can identify an imprecise connection founded on teacher feedback and my recorded observations. Unfortunately, I wasn’t able to ascertain how all of the components could close the gap among them. It is possible that action research, using improvement science, can in fact close the gap. However, the small scope of this project was not sufficient to determine such a comprehensive interrelation.

Thus, I don't feel it appropriate to report further on such possibilities other than to report that I feel it would be worth further study in the future. Hawley & Valli (1999) speak directly to the relationship between teacher professional development and school improvement. The authors provide compelling support for the need for this collusive relationship. In further support of this necessary relationship between professional development and school improvement, Sappington et. al (2010) found that effective professional development is central to moving school forward as learning-centered institutions with the capacity for continuous improvement via a systemic frame of school development.

Summary

Marked improvement of professional practice was documented through the use of collaborative action research. Benefits documented were open communication among teachers; purposeful, targeted reflection on interventions and instructional techniques; data driven process; and the action research was context specific to their situation.

The teachers found that student learning increased as a result of the collaborative action research process. Student achievement data revealed the increase in student achievement due to interventions employed by the teachers in response to the selected problem of practice. Also of note, there were documented increases in student confidence levels.

Teachers felt that the use of improvement science did positively inform professional development. The data showed teachers perceived that collaboration, shared goals and responsibility, trust, and process all contributed to a high level of quality professional development. The teachers reported that the use of improvement science was valuable and productive professional development.

As far as teacher action research closing the gap among professional development, evaluation, student learning and school improvement, the data was insufficient to make a definite determination. However, there are some very consistent connections to be noted. Professional development and student learning were found to have strong connections to the action research using improvement science. Evaluation was supported by the data to be connected. Finally, school improvement was documented as having a possible connection supported by teacher feedback but could not be identified as directly attached.

CHAPTER V: CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIONS

This chapter includes six main parts. Firstly, I provide a review of the purpose and participants of the study, as well as the research design and methodology. In section two I summarize the findings and discuss conclusions drawn from the findings in the third section. In the fourth section of this chapter I explore the implications of the study for professional practice, as well as, strategies for implementation on a larger scale based on the analysis of the results of this small scale study. In the fifth section I delineate the limitations of the study and in the sixth section I make recommendations for future studies.

Overview of the Study

School improvement in Illinois continues to be a primary focal point for educational leaders and educational policy makers. Engaging classrooms that meet the needs of all learners has been a driving force in the search for effective and meaningful professional development for teachers. The majority of school reform initiatives are tying together teacher evaluation, professional development, and student outcomes. It then makes sense to link the needs of teachers to meaningful professional development that will, in turn, lead to student growth. This study employed teacher action research, using improvement science, to identify a problem of practice and work through a cycles of reflective inquiry that were naturally embedded in their daily work.

The purpose of this study was to employ collaborative action research using improvement science for teachers to work through problems of practice to examine the effect on their practice and student learning in the natural setting. Also intended, was to explore the teacher perceptions of the use of this methodology. The study was intended to reveal how targeted professional

growth opportunities can be developed for teachers using improvement science. I specifically modeled the work of Anthony Bryk, president of the Carnegie Foundation for the Advancement of Teaching.

Discussion of Findings

Research Question #1: *As the teachers worked through the collaborative action research process using improvement science as a tool for professional development, what improvements did they note in their practice?*

The teachers used the PDSA cycle as an improvement science tool for professional development. Four specific themes were identified by the teachers as improvements of their practice: open communication, reflection, data-driven decisions, and context specific problems. The four themes identified, as a result of the use of the PDSA cycle as an improvement tool, led to changes in their instructional practice. The changes in practice stemmed from the team discussions regarding the interventions implemented during the study.

The quality of instruction students receive has a strong impact on their academic success. The four themes identified all tie back to research on the qualities of effective PLC's. The traits of the above themes share structural commonalities with PLC's to increase effectiveness of teacher instruction. If you recall, DuFour, DuFour, & Eaker (2008) highlight applicable research on the best practice of collaborative inquiry. Engaging in reflective dialogue is considered a core element of successful learning communities (Matthews & Crow, 2010). Further, professional learning communities have been shown to be more effective when teachers attend to a particular development goal multiple times (Desimone, Porter, Garet, Yoon, & Birman, 2002) as was done in this study with the defined problem of practice and aim statement.

Research Question #2: *As the teachers worked through the collaborative action research process using improvement science as a tool for professional development, what improvements did they note in student learning?*

Two primary themes were revealed as teachers determined if an intervention or instructional shift was actually an improvement. The two themes I identified through data analysis were Using Student Data and Confidence for Improvement. Significant gains in student math fact skills were documented. The average increase in all four classrooms totaled 80 percent. Prior to starting the research cycles the teachers hypothesized that there would be increases in student skill levels. However, the increase in student mastery exceeded the teachers' expectations.

Effective interventions require teachers to engage in activities with a clear focus on student learning (Thessin, 2010). Effective dialogue concerning student learning requires artifacts such as test scores and student work (Russell, Stein, Correnti, Bill, Booker, & Schwartz, 2017). There exists extensive research documenting how teacher use student assessment data to make sense of student learning (Datnow & Hubbard, 2015).

Research Question #3: *What are the perceptions of the teachers regarding the use of improvement science to inform professional development?*

Four main themes evolved from analyzing the data regarding the perceptions of the teachers in relation to informing professional development. The value of collaboration, shared goals/responsibility, the process itself, and the trust established were the four themes identified. Analysis of the documentation revealed a deepened understanding of collaborative work. The

findings indicated that the teacher researcher reflected more deeply on their practice, constructed new knowledge about their instruction, and made changes to their teaching.

The findings in this study support what has been documented in seminal research on professional development. Wilson & Berne (1999) found that effective professional development has established characteristics of engaging in the concrete tasks of teaching, assessment, observation, and reflection. Effective professional development must also include experimentation that is participant driven (Ravitch, 2014) and involve sharing of knowledge among educators and a focus on commonalities of practice (Blankstein, 2013). The use of improvement science brings together the necessary qualities of effective professional development and improvement of the process of teaching and learning by doing.

Professional development provides educators opportunities to develop greater subject matter knowledge and profound knowledge.

Research Question #4: *How can teacher action research, using improvement science, close the gap among professional development, evaluation, student learning, and school improvement?*

Findings from the data showed varying yet consistent connections among teachers regarding the use of collaborative action research, using improvement science, to close the gap among the components of professional development, evaluation, student learning, and school improvement. The components were categorized as having either a Strong Connection, a Connection, or a Possible Connection. The study design did not produce direct evidence to determine if IS could close the gap among the four. I feel that this is a worthy research topic to explore in the future. There is not much research available that ties all four of these elements together. I had hoped my study would glean more direct connections but I quickly realized that

the relative simplicity of my study was not adequate to examine such a complex set of relationships.

Summary

This collaborative action research project did show improvement of professional practice. A well-documented drawback of teaching is isolation. Teachers often have little or no time scheduled for professional conversations or teaming. Collaborative action research allows, and even demands, time to talk with each other about teaching, teaching strategies, and student growth. By participating on a team, teachers describe their own teaching strategies and styles, and share their ideas with others. As a team they examine various instructional strategies, learning activities, and curriculum used in their classrooms. Open communication and reflection were found to be drivers of improved professional practice. The teacher participants came together for a shared purpose. They displayed increased creativity in their thinking and were more open to new ideas.

All four teachers documented increases in student learning as a result of using improvement science to guide inquiry using the PDSA cycle to test out an intervention or change idea. There were two ways that the teachers indicated they realized an improvement in student learning – student achievement and skills, and student confidence and competence. The collaboration over the course of the study led to increased intentionality of improving student performance, adoption of new ideas and teaching practices, and a deeper understanding of the problem they identified for improvement. As teacher professional practice improved, student achievement improved.

The use of improvement science did positively inform professional development. IS provided opportunities for teachers to evaluate themselves in the formal structure of the research designed specifically for their targeted problem of practice within their specific school and classroom culture. The research and reflection fostered professional growth and confidence in their work. Through the process the teachers learned more about themselves, their students and their colleagues. Notably, it taught a method of determining ways to continually improve.

The scope of this study was insufficient to determine whether teacher action research can close the gap among professional development, evaluation, student learning, and school improvement. However, there are some very consistent connections documented that would indicate this could be possible. Other research in the field of education would be expected to support this premise.

Implications

The findings of this study provide important implications for teacher practitioners, building administrators, district administrators, teacher educators, and policy makers. In determining the implications of the results of this study, there are three main areas for initial consideration regarding collaborative action research using improvement science: it is an effective form of professional development, it informs professional practice, and it increases student achievement.

Effective Form of Professional Development

One thing that was particularly apparent in the findings of this study is that teachers desire quality, effective professional development. Further, the data demonstrated that context matters. The teachers valued the focus on improvement of their chosen problem of practice in

their actual day-to-day work. Much research has documented the notion that collaboration is at the heart of effective schools (Barth, et al, 2005; Blankstein & Cole, 2008; DuFour, et al, 2008; Gilles, et al, 2010). In fact, it could be argued that collaboration among educators is critical. The findings of my study corroborate published research on the value of collaboration. High-performing schools organize people to take advantage of collective knowledge and skills to create common practices so that the whole is far greater than the sum (Darling-Hammond, et. al, 2017; Hargreaves & Fullan, 2012). Embedded professional learning is designed to improve instruction and student learning by teachers actively participating and constructing professional knowledge. This study's findings concerning job-embedded and context specific professional development efforts substantiate the merit of pursuing this type of professional development for teachers in the schools in which they teach. Educational researchers Castro Garces & Granada (2016) effectively show that teachers' professional development is an ongoing process in which teachers engage to transform their conception and practices around pedagogy, methodology, and educational discipline.

The implications of teacher action research focused on high quality solutions is that all students can succeed and increased support of teachers in all stages of their career. That being said, there was a limitation in this study of the teachers not relying on best practice research for their math problem of practice. The teachers relied primarily on their craft knowledge to frame the problem. Experts in improvement outline the additional need of profound knowledge (Langley, Moen, Nolan, Nolan, Norman, & Provost, 2009). Profound knowledge refers to the actual mechanisms by which an individual goes about implementing changes for improvement. Profound knowledge, as defined by Deming (1994), consists of interplay between theories of systems, variation, building knowledge, and psychology. To improve implementing IS in the

future I would provide for teachers to gain more in-depth knowledge of improvement science prior beginning the process. The participants in this study got approximately an hour of an overview before selecting their problem of practice. I would devote more time for teachers to obtain a detailed examination of the process implementation.

Informing Professional Practice

In appraising professional learning, Fullan, et. al (2006) advocate the need to begin at the classroom, reconstructing the problem and the solution as one of inserting personalization, precision, and teacher learning into the daily experience of students and teachers. Collaborating with peers to achieve a common aim is of vital importance in the teaching field. Education is a field in which teachers expect students to learn the importance of sharing and mediating but often do not put into practice themselves. The teacher participants in this study found the value in a deeper level of collaboration to improve their performance. In considering how collaborative action research informs professional practice, research supports the notion that teacher pedagogy is strengthened as a result. One such study found that teachers become more effective over time when they work in collegial environments (Kraft & Papay, 2014). High performing schools and systems establish the conditions in which teacher knowledge is valued, and there are opportunities for teacher to collaborate, share knowledge, and engage in collaborative professional learning directed toward improving student learning (Blankstein, 2013; Darling-Hammond, et. al, 2017; McLaughlin & Talbert, 2006). Implications for improving education involve recognizing differences in educational contexts. The educational community should be developing policies that leverage teacher professional capital, and take advantage of teachers' individual knowledge and strengths (Hargreaves & Fullan, 2012). Teaching should be highly regarded as a learning profession. Informing professional practice involves being centered in the

actual day to day work of teachers. “When teachers have structured opportunities to explore the nitty-gritty challenges of their practice through thoughtful exchanges with colleagues and in relation to relevant research, they rediscover the passion for learning and their own personal and professional growth that brought them into teaching in the first place” (Hargreaves & Shirley, 2009, p. 93). It seems quite possible the most important outcome of collaborative routines is that teachers learn how to improve their instructional practice.

Increases Student Achievement

In this study student achievement was shown to have increased by collaborative action research using improvement science. Through the process the teachers routinely shared knowledge about theories, methods, instructional strategies, and student learning that was found to be directly linked to increased student achievement. This is supported by a research study by Goddard, Goddard, & Tschannen-Moran (2007) in which the researchers found strong indication that teacher collaboration is associated with increased levels of student achievement through original evidence of a positive and statistically significant relationship. Also, not surprisingly, is that collaboration among teachers is related to greater teacher sense of efficacy (Tschannen-Moran & Barr, 2004). In turn, they found that there is a reciprocal relationship between collective teacher efficacy and student achievement. Thus, based on the findings of this study, I contend that increases in student outcomes are realized when teachers become actively involved in their own professional development. Improvement in teacher practice leads to improvement in student learning. These findings are substantively important when considering the use of collaborative action research.

Increasing student achievement also requires the accurate use of data. Data-driven decision making is a complex process that is often misunderstood or not formalized in

educational settings in relations to improving student learning outcomes (Datnow & Hubbard, 2015). To improve in the use of data I think it important for future efforts in using improvement science to consider the use of common formative assessment. The teachers in this study showed a lack of confidence with what types of measures for improvement to use to document their students' achievement beyond the math fact tests. A recommendation for future research would be to add common formative assessment as part of the process. With formative assessment the focus is on what to change in teacher practice. Much of teacher professional development has been focused on what is easy to deliver, rather than what makes a difference to student outcomes (Wiliam, 2011). The takeaway is that the content of teacher learning should be determined first, and the process should then be chosen to meet that end. Effective formative assessment would be an effectual complement to improvement science to improve professional practice.

Limitations

As with all research, there are limitations to the scope and capacity of what can be addressed. This study was significantly limited by the small number of participants and the small scale of the research project. While the small scale of the project was part of the plan and necessary for practical reasons, it also narrows the generalizability of the resulting data and conclusions. My research reflects the experiences of a particular group of educators being led through a particular improvement science exercise with a specific focus on professional development to inform professional practice. An additional limiting factor was the short study cycle of ten weeks.

In further consideration of limitations, it must be disclosed that the chosen problem of practice of the teacher team was not fully grounded in exemplary practice in math education.

Although the interventions chosen were research-based approaches, the team did not study current research to frame the problem as supported by Bryk et. al (2015) and Mintrop (2016).

Recommendations for Future Research

It goes without saying that the practice of teaching is complex and socially constructed. There has been enduring interest in how to make it more effective for student learning and more fulfilling for the teacher. From this collaborative action research project, I found that the teachers developed a respect for conducting research as a way of learning. Collaborative research offers teachers a systematic (Bryk et al., 2015), collaborative (Ferguson, 2011; Pine, 2009), and participatory (Mills, 2014) process of inquiry that actively undertakes specific, context-based issues of concern. The teachers valued the opportunity to form their professional development to fit their learning needs and those of their specific students. The study grew out of their classroom experience. The impact of the teacher collaborative action research was beneficial for students and had great influence on teacher perceptions of professional development.

This study provided a focused understanding of the components perceived relevant by the teacher participants, but there are now other areas that could be explored with further research. One recommendation for future research is to expand the study to include a greater number of participants to create a larger sample size. Employing more small groups would be an avenue or consider expanding the study to the level of school-wide. It would be beneficial to be inclusive. A mix of grade levels, subject matter, and experience would be a strength. All teachers can learn from one another. Research looking at how the process of action research informed professional practice (Hine & Lavery, 2014) reported findings that propose action research can allow teachers to be innovative in their professional lives. Comparing and contrasting the results from a larger

sample, working through problems of practice, would help identify whether the factors perceived by the teachers are consistent among all participants and/or groups.

A second recommendation for future research would be to conduct a research study examining how teacher action research can close the gap among professional development, evaluation, student learning, and school improvement. Incorporating all of these factors was too complex for the scope of my study. This question alone could be groundwork for an entire research project. There is in existence many studies that look at these components individually, or jointly but not at how they all interplay with one another. The entanglement of these four components would likely produce lasting effects on conducting teacher action research. Therefore, the benefit of doing action research on teachers' career growth as well as on the overall performance of schools is a promising theme to be examined (Morales, Abulon, Soriano, David, Hermosisima, & Gerundio, 2016). The contribution to school improvement would focus on the potential benefits of a teacher's growth and professional development as documented in the evaluation process in relation to the overall performance of the school.

REFERENCES

- Accelerating the agenda: Actions to improve America's high schools.* (2008). National Governors Association: Washington D.C.
- ACT Academy. *Plan, do, study, act (PDSA) cycles and the model for improvement.* Online library of quality, service improvement and redesign tools. Retrieved online 4/16/18 at <https://nhsicorporatesite.blob.core.windows.net>
- Bradley, J. (2014). From 'gotcha' to grow: How principals promote learning in the contest of teacher evaluation. *Journal of Staff Development*, 35(6). Retrieved from www.learningforward.org.
- Barth, R., DuFour, R., DuFour, R., Eaker, R., Eason-Watkins, B., Fullan, M., Lezotte, L., Reeves, D., Saphier, J., Schmoker, M., Sparks, D., & Stiggins, R. (2005). *On common ground: The power of professional learning communities.* Solution Tree: Bloomington, IN.
- Blankstein, A., Houston, P., & Cole, R. (2008). *Sustaining professional learning communities.* Thousand Oaks, CA: Corwin Press.
- Bradley, J. (2014). From 'gotcha' to grow: How principals promote learning in the contest of teacher evaluation. *Journal of Staff Development*, 35(6). Retrieved from www.learningforward.org.
- Blankstein, A. (2013). *Failure is not an option: 6 principles that advance student achievement in highly effective schools.* Thousand Oaks, CA: Corwin Press.

- Brookmyer, J. (2007). Findings from a survey of the CRESS Teacher Research Program. In *Windows on our classroom*, 12, 123-133. Davis: University of California, Davis, School.
- Bryk, A., & Gomez, L. (2007). Ruminations on reinventing an R & D capacity for educational improvement. *Prepared for the American Enterprise Institute Conference, Side of School Reform and the Future of Educational Entrepreneurship*, October 25, 2007.
- Bryk, A., Gomez, L., Grunow, A., & LeMahieu, P. (2015). *Learning to improve: How America's schools can get better at getting better*. Cambridge, MA: Harvard Education Press.
- Bryk, A., & Schneider, B. (2002). *Trust in schools: A core resource for improvement*. Russell Sage Foundation: New York, NY.
- Calhoun, E. (2002). Action research for school improvement. *Educational Leadership*, 59 (6), 18-24.
- Callahan, K., & Sadeghi, L. (2015). *Teacher perceptions of the value of teacher evaluations: New jersey's ACHIEVE NJ*. NCPEA International Journal of Educational Leadership Preparation, 10 (21), 46-58.
- Carnegie Foundation for the Advancement of Teaching. (n.d.). *Using improvement science to accelerate learning and address problems of practice*. Retrieved from <http://www.carnegiefoundation.org/our-ideas/>
- Castro Garces, A.Y., & Martinez Granada, L. (2016). The role of collaborative action research in teachers' professional development. *Issues in Teachers' Professional Development*, 18(1), 39-54. <http://dx.doi.org/10.15446/profile>
- Common Core State Standards Initiative. (2010). www.corestandards.org

- Corey, S. (1954). Action research in education. *The Journal of Educational Research*, 47(5), 375-380.
- Croft, A., Cogshall, J., Dolan, M., Powers, E., & Killion, J. (2010). *Job-embedded professional development: What it is, who is responsible, and how to get it done well*. Issue Brief, April: National Comprehensive Center for Teacher Quality, Mid-Atlantic Comprehensive Center, and the National Staff Development Council.
- Crow, R., Hinnant-Crawford, B., & Spaulding, D. (2019). *The educational leader's guide to improvement science: Data, design, and cases for reflection*. Gorham, ME: Myers Education Press.
- Danielson, C. & McGreal, T. (2000). *Teacher evaluation to enhance professional practice*. Alexandria, VA: ASCD.
- Darling-Hammond, L. (2017). *Empowered educators: How high-performing systems shape teaching quality around the world*. Josey-Bass: San Francisco, CA.
- Darling-Hammond, L. (2010). *The flat world and education: How America's commitment to equity will determine our future*. Teachers College Press: New York, NY.
- Darling-Hammond, L. (2013). *Getting teacher evaluation right: What really matters for effectiveness and improvement*. Teachers College Press: New York, NY.
- Darling-Hammond, L., & McLaughlin, M. (1995). Policies that support professional development in an era of reform. *Phi Delta Kappan*, 76(8), 587-604.

- Darling-Hammond, L., Wei, R., Andree, A., Richardson, N., & Orphanos, S. (2009). *Professional learning in the learning profession: A status report on teacher development in the United States and abroad*. The National Staff Development Council and the School Redesign Network: Stanford University.
- Datnow, A., & Hubbard, L. (2015). Teachers' use of assessment data to inform instruction: Lessons from the past and prospects for the future. *Teachers College Record*, 117(4) 1.
- Deming, W. (2021). *PDSA cycle*. The W. Edwards Deming Institute.
www.deming.org/explore/pdsa.
- Desimone, L., Porter, A., Garet, M., Yoon, K., & Birman, B. (2002). Effects of professional development on teachers' instruction: Results from a three-year longitudinal study. *Educational Evaluation and Policy Analysis*, 24(2), 81-112.
- DeWalt, K., & DeWalt, B. (2011). *Participant observation: A guide for fieldworkers*. Lanham, MD: AltaMira Press.
- Dewey, J. (1904). *The relation of theory to practice in education*.
https://archive.org/stream/relationoftheory00dewe/relationoftheory00dewe_djvu.txt
- Dewey, J. (1916). *Democracy and education: an introduction to the philosophy of education*.
https://archive.org/stream/democracyandedu06dewegoog/democracyandedu06dewegoog_djvu.txt
- Dewey, J. (1938). *Logic: The theory of inquiry*. New York, NY: Holt, Rinehart, and Winston.
- DuFour, R. (2004). What is a professional learning community? *Educational Leadership*. 61(8), 6-11.

- DuFour, R., DuFour, R., & Eaker, R. (2008). *Revisiting professional learning communities at work: New insights for improving schools*. Bloomington, IN: Solution Tree.
- DuFour, R. & Mattos, M. (2013). How do principals really improve schools? *Educational Leadership*. 70(7), 34-40.
- Edmond, N. & Hayler, M. (2013). On either side of the teacher: Perspectives on professionalism in education. *Journal of Education for Teaching: International Research and Pedagogy*, 39(2), 209-221.
- Elmore, R. (2006). *School reform from the inside out: Policy, practice, and performance*. Cambridge, MA: Harvard Education Press.
- Every Student Succeeds Act. (2015). www.ed.gov/essa?src=rn .
- Ferguson, P. (2011). *Action research for professional development: Concise advice for new action researchers*. Teaching development. The University of Waikato: New Zealand.
- Fullan, M., Hill, P., & Crevola, C. (2006). *Breakthrough*. Thousand Oaks, CA: Corwin Press.
- Gardner, D., Baker, P., Vogt, P., & Hodel, R. (2005). Four approaches to professional development. *A working paper from Illinois State University Education Center*.
- Gilles, C., Wilson, J., & Elias, M. (2010). Sustaining teachers' growth and renewal through action research, induction programs, and collaboration. *Teacher Education Quarterly*, Winter.
- Glesne, C. (2011). *Becoming qualitative researchers: An introduction*. Boston, MA: Pearson Education, Inc.

- Goddard, Y., Goddard, R., & Tschannen-Moran, M. (2007). A theoretical and empirical investigation of teacher collaboration for school improvement and student achievement in public elementary schools. *Teachers College Record*, 109(4), 877-896.
- Goe, L., Biggers, K., & Croft, A. (2012). Linking teacher evaluation to professional development: Focusing on improving teaching and learning. *A Research & Policy Brief by the National Comprehensive Center for Teacher Quality*. Retrieved from www.tqsources.org.
- Guskey, T. (2002). Redesigning professional development: Does it make a difference? *Educational Leadership*, 59(6), 45-51.
- Hargreaves, A. & Fullan, M. (2012). *Professional capital: Transforming teaching in every school*. New York, NY: Teachers College Press.
- Hargreaves, A., & Shirley, D. (2009). *The fourth way: The inspiring future for educational change*. Thousand Oaks, CA: Corwin.
- Hawley, W. & Valli, L. (2000). Learner-centered professional development. *Phi Delta Kappa International*, August (27).
- Hawley, W. & Valli, L. (1999). The essentials of effective professional development: A new consensus. In L. Darling-Hammond & G. Sykes (Eds.), *Teaching as the learning profession: Handbook of policy and practice*. San Francisco, CA: Josey-Bass.
- Hayes, N. (1997). *Doing qualitative analysis in psychology*. Psychology Press. United Kingdom, Taylor & Francis.

- Hine, G. & Lavery, S. (2014). Action research: Informing professional practice within schools. *Issues in Educational Research*, 24(2), 162-173. <http://www.iier.org.au/iier24/hine.html>
- Illinois State Board of Education. (2013). Illinois Professional Teaching Standards. Retrieved from www.isbe.net/peac/pdf/il_prof_teaching_stds.pdf .
- Institute for Healthcare Improvement. *Science of improvement: Testing changes*. How to Improve <http://ihi.org/resources/Pages/HowtoImprove/default.aspx>.
- Hinnant-Crawford, B. (2020). *Improvement science in education: A primer*. Gorham, ME: Myers Education Press.
- Joyce, B., & Calhoun, E. (1996). *Learning experiences in school renewal: An exploration of five successful programs*. Eugene, OR: ERIC Clearinghouse on Educational Management.
- Kalolo, J. (2015). A drive towards application of pragmatic perspective in educational research: Opportunities and challenges. *Journal of Studies in Education*. Retrieved from <http://dx.doi.org/10.5296/jse.v5i1.7145>.
- Kassner, L. (2014). Opportunities to personalize teacher learning: Innovative approaches to bridge evaluation and professional development for continuous improvement. *Metropolitan Educational Research Consortium: Virginia Commonwealth University*.
- Kraft, M. & Papay, J. (2014). Can professional environments in schools promote teacher development? Explaining heterogeneity in returns to teaching experience. *Educational Evaluation and Policy Analysis*, 36(4), 476-500.

- Kools, M., & Stoll, L. (2016). *What makes a school a learning organization?* OECD Education working paper no. 137. Paris, France: OECD Publishing
[www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=EDU/WKP\(2016\)11&docLanguage=En](http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=EDU/WKP(2016)11&docLanguage=En)
- Langley, G., Moen, R., Nolan, K., Nolan, T., Norman, C., & Provost, L. (2009). *The improvement guide: A practical approach to enhancing organizational performance*. San Francisco, CA: Jossey-Bass.
- Lewin, K. (1946). Action research and minority problems. *Journal of social issues*, 2(4), 34-46.
- Lewis, C. (2015). What is improvement science? Do we need it in education? *Educational Researcher*, 44(1), 54-61. <https://doi.org/10.3102/001389X15570388>
- Lieberman, A. (1995). Practices that support teacher development: Transforming conceptions of professional learning. *Phi Delta Kappan*, 76(8), 591-596.
- Lomos, C., Hoffman, R., & Bosker, R. (2011). Professional communities and student achievement-A meta-analysis. *School effectiveness and school improvement*, 22(2), 121-148.
- Lortie, D. (1975). *Schoolteacher*. Chicago, IL: University of Chicago Press.
- Marzano, R. (2003). *What works in schools: Translating research into action*. ASCD: Alexandria, VA.
- Marzano, R. & Toth, M. (2013). *Teacher evaluation that makes a difference: A new model for teacher growth and student achievement*. ASCD: Alexandria, VA.

- Matthews, L. & Crow, G. (2010). *The principalship: New roles in a professional learning community*. Boston, MA: Allyn and Bacon.
- McLaughlin, M. & Talbert, J. (2006). *Building school-based teacher learning communities: Professional strategies to improve student achievement*. Teachers College Columbia University: Teachers College Press.
- McLaughlin, M. & Talbert, J. (2001). *Professional learning communities and the work of high school teaching*. Chicago: University of Chicago Press.
- Mertler, C. (2017). *Action research: Improving schools and empowering educators*. Thousand Oaks, CA: SAGE Publications.
- Miles, M., Huberman, A., & Saldana, J. (2014). *Qualitative data analysis: A methods sourcebook*. Thousand Oaks, CA: SAGE Publications.
- Mills, G. (2014). *Action research: A guide for the teacher researcher*. Boston, MA: Pearson.
- Mintrop, R. (2016). *Design-based school improvement: A practical guide for education leaders*. Cambridge, MA: Harvard Education Press.
- Mohr, M. & MacLean, M. (1987). *Working together: A guide for teacher researchers*. Urbana, IL: National Council of Teachers of English.
- Morales, M., Abulon, E., Soriano, P., David, A., Hermosisima, V., & Gerundio, M. (2016). Examining teachers' conception of and needs on action research. *Issues in Educational Research*, 26(3).
- Nichols, S., & Berliner, D. (2010). *Collateral damage: How high stakes testing corrupts America's schools*. Cambridge, MA: Harvard Education Press.

Partnership for Assessment of Readiness for College and Careers. (2016). Retrieved from <http://www.parcconline.org>.

Phillipi, J. & Lauderdale, J. (2018). A guide to field notes for qualitative research: Context and conversation. *Qualitative Health Research*, 28(3); 381-388.
<https://doi.org/10.1177/1049732317697102>

Pineda-Baez, C., Bauman, C., & Andrews, D. (2020). Empowering teacher leadership: A cross-country study. *International Journal of Leadership in Education*, 23(4), 388-414.
<http://1001080/13603124.2018.1543804>

Pine, G. (2009). *Teacher action research: Building knowledge democracies*. Thousand Oaks, CA: Sage Publications, Inc.

Ramani, S., McMahon, G., & Armstrong, E. (2019). Continuing professional development to foster behavior change: From principles to practice in health professions education. *Medical Teacher*. <http://doi.org/10.1080/0142159x.2019.1615608>

Ravitch, S. (2014). The transformative power of taking an inquiry stance on practice: Practitioner research as narrative and counter-narrative. *Perspectives on Urban Education*, 11(1), 5-10.

Russell, J., Stein, M., Correnti, R., Bill, V., Booker, L., & Schwartz, N. (2017). Tennessee scales Up improved math instruction through coaching. *State Educational Standard*, 17(2), 23-27.

- Sappington, N., Baker, P., Gardner, D., & Pacha, J. (2010). A signature pedagogy for leadership education: Preparing principals through participatory action research. *Planning and Changing: An Educational Leadership and Policy Journal*, 41 (3/4), 249-273.
- Schon, D. (1983). *The reflective practitioner: How professionals think in action*. New York: NY: Basic Books.
- Shulman, L., & Shulman, J. (2004). How and what teachers learn: A shifting perspective. *Journal of Curriculum Studies*, 36(2), 257-271.
- Smylie, M. (2014). Teacher evaluation and the problem of professional development. *Mid-Western Educational Researcher*, 26(2), 97-111.
- Spillane, J., Parise, L., & Sherer, J. (2011). Organizational routines as coupling mechanisms: Policy, school and administration, and the technical core. *American Educational Research Journal*, 48(3), 586-620.
- Spote, S., Stevens, W., Healey, K., Jiang, J., and Hart, H. (2013). *Teacher evaluation in practice: Implementing Chicago's REACH students*. University of Chicago Consortium on Chicago School Research: Research Report. <https://consortium.uchicago.edu>.
- Stenhouse, L. (1975). *An introduction to curriculum research and development*. UK: London.
- Stenhouse, L. (1971). The humanities curriculum project. *Theory into Practice*, 10 (3), 154-162.
- Stigler, J., & Hiebert, J. (1999). *The teaching gap: Best ideas for the world's teachers for improving education in the classroom*. New York, NY: Free Press.
- Stringer, E. (2008). *Action research in education*. Upper Saddle River, NJ: Pearson Education.

- Thessin, R. (2010). *A qualitative study of teachers' work in professional learning communities in a small urban district*. (Doctoral dissertation). Retrieved from <https://search.proquest.com/docview/857923368/abstract/41E0741771244A32PQ/1>
- Vogel, L. (2010). *Leading standards-based education reform: Improving implementation of standards to increase student achievement*. New York, NY: Rowman & Littlefield Education.
- Vogt, W., Gardner, D., & Haefele, L. (2012). *When to use what research design*. New York, NY: The Guilford Press.
- Wei, R., Darling-Hammond, L., Andree, A., Richardson, N., & Orphanos, S. (2009). Professional learning in the learning profession: A status report on teacher development in the U.S. and abroad. *National staff development council*. Dallas, TX.
- Wei, R., Darling-Hammond, L., & Adamson, F. (2010). *Professional learning in the United States: Trends and challenges*. Dallas, TX: National Staff Development Council and Stanford, CA: Stanford Center for Opportunity Policy and Education.
- Wenner, J., & Campbell, T. (2017). The theoretical and empirical basis of teacher leadership: A review of the literature. *Review of Educational Research*, 87(1), 134-171. <https://doi.org/10.3102/0034654316653478>
- William, Dylan. (2011). *Embedded Formative Assessment*. Bloomington, IN: Solution Tree Press.
- Wilson, S., & Berne, J. (1999). Teacher learning and the acquisition of professional knowledge: An examination of research on contemporary professional development. *Review of Research in Education*, 24, 173-209.

Youngs, P. (2013). Using teacher evaluation reform and professional development to support common core assessments. *Center for American Progress*. Retrieved from www.americanprogress.org.

APPENDIX A: INTERVIEW QUESTIONS

1. What were you specifically trying to accomplish?
2. Were you able to make improvements?
3. How did you know that a change was an improvement?
4. What are your perceptions in this study of the Plan-Do-Study-Act process in regards to improving your professional practice?
5. Do you feel that the use of improvement science effected professional development? Did it improve your practice?

APPENDIX B: STAFF RECRUITMENT EMAIL

From: Carol Munson

To: Teacher Participant Prospects

Teachers,

This email is to follow up on the informational meeting you attended regarding participation in my teacher action research study. Having received additional information about the study and its purpose, if you would like to be considered for participation please return a confirmation email to me by Monday, May 20. I will notify all interested candidates via email on Tuesday, May 21 of their acceptance status. Thank you for your time, interest, and consideration.

Respectfully,

Carol Munson, Principal

APPENDIX C: CHARLOTTE DANIELSON’S FRAMEWORK FOR TEACHING

Charlotte Danielson’s FRAMEWORK FOR TEACHING

<p>DOMAIN 1: Planning and Preparation</p> <p>1a Demonstrating Knowledge of Content and Pedagogy • Content knowledge • Prerequisite relationships • Content pedagogy</p> <p>1b Demonstrating Knowledge of Students • Child development • Learning process • Special needs • Student skills, knowledge, and proficiency • Interests and cultural heritage</p> <p>1c Setting Instructional Outcomes • Value, sequence, and alignment • Clarity • Balance • Suitability for diverse learners</p> <p>1d Demonstrating Knowledge of Resources • For classroom • To extend content knowledge • For students</p> <p>1e Designing Coherent Instruction • Learning activities • Instructional materials and resources • Instructional groups • Lesson and unit structure</p> <p>1f Designing Student Assessments • Congruence with outcomes • Criteria and standards • Formative assessments • Use for planning</p>	<p>DOMAIN 2: The Classroom Environment</p> <p>2a Creating an Environment of Respect and Rapport • Teacher interaction with students • Student interaction with students</p> <p>2b Establishing a Culture for Learning • Importance of content • Expectations for learning and achievement • Student pride in work</p> <p>2c Managing Classroom Procedures • Instructional groups • Transitions • Materials and supplies • Non-instructional duties • Supervision of volunteers and paraprofessionals</p> <p>2d Managing Student Behavior • Expectations • Monitoring behavior • Response to misbehavior</p> <p>2e Organizing Physical Space • Safety and accessibility • Arrangement of furniture and resources</p>
<p>DOMAIN 4: Professional Responsibilities</p> <p>4a Reflecting on Teaching • Accuracy • Use in future teaching</p> <p>4b Maintaining Accurate Records • Student completion of assignments • Student progress in learning • Non-instructional records</p> <p>4c Communicating with Families • About instructional program • About individual students • Engagement of families in instructional program</p> <p>4d Participating in a Professional Community • Relationships with colleagues • Participation in school projects • Involvement in culture of professional inquiry • Service to school</p> <p>4e Growing and Developing Professionally • Enhancement of content knowledge / pedagogical skill • Receptivity to feedback from colleagues • Service to the profession</p> <p>4f Showing Professionalism • Integrity/ethical conduct • Service to students • Advocacy • Decision-making • Compliance with school/district regulation</p>	<p>DOMAIN 3: Instruction</p> <p>3a Communicating With Students • Expectations for learning • Directions and procedures • Explanations of content • Use of oral and written language</p> <p>3b Using Questioning and Discussion Techniques • Quality of questions • Discussion techniques • Student participation</p> <p>3c Engaging Students in Learning • Activities and assignments • Student groups • Instructional materials and resources • Structure and pacing</p> <p>3d Using Assessment in Instruction • Assessment criteria • Monitoring of student learning • Feedback to students • Student self-assessment and monitoring</p> <p>3e Demonstrating Flexibility and Responsiveness • Lesson adjustment • Response to students • Persistence</p>