ABSTRACT

Christine Hallmark Catalano, OPENING DOORS THROUGH INSTRUCTIONAL COACHING: EXPLORING HOW SOCIAL CAPITAL THEORY ENHANCES COLLEGIAL FOCUS AND INTENTIONAL STRUCTURES IN AN INSTRUCTIONAL COACHING MODEL (Under the direction of Dr. Martin Reardon). Department of Educational Leadership, February 2018.

Teachers working in silos and in isolation from their colleagues characterize how we have always done business in education. Closed classroom doors are the norm. In today's educational environment of high stakes accountability, school districts across the nation are grasping for techniques to improve teacher effectiveness. Many school districts have adopted instructional coaching models to improve teacher practice. Current models of instructional coaching oftentimes do not result in institutionalized changes in educator practice, improved student achievement, nor do they build collective teacher efficacy. Haphazard implementation of instructional coaching models often leaves coaching structures that lack focus and intentionality and are ineffectively overlaid onto the social network of a school. The challenge lies in leveraging the social capital that coaching could potentially offer to educators.

The purpose of this case study was to determine if a multi-tiered coaching model, viewed through the construct of social capital theory, contribute to high teacher efficacy and, by association, to high student achievement. The study examined coaching processes and teased out how these processes harnessed the social capital of the professionals in the building, thereby creating an achievement oriented environment. The study served to benchmark the elements of a coaching model that contribute to changes in educator practice. Social network analysis and grounded theory were used to triangulate findings.

A multi-tiered instructional coaching theory emerged from the data collected through the analysis of four social networks within a school, analysis of collective efficacy, and a detailed

consideration of interview data. Results from this study warrant the inclusion of four main concepts into any instructional coaching model—whether it is a small-scale implementation in an individual school or large-scale implementation across a district. These concepts include: expanded inclusion of social capital constructs, simultaneously embedded human capital constructs, refined collegial focus, and inclusion of peer coaching processes in a coaching model. Educational leaders will benefit from this study as it will provide a lens through which current coaching models can be evaluated and will ultimately provide a framework of best practices to leverage social capital within schools through instructional coaching.

OPENING DOORS THROUGH INSTRUCTIONAL COACHING: EXPLORING HOW

SOCIAL CAPITAL THEORY ENHANCES COLLEGIAL FOCUS AND INTENTIONAL

STRUCTURES IN AN INSTRUCTIONAL COACHING MODEL

A Dissertation

Presented to

The Faculty of the Department of Educational Leadership

East Carolina University

In Partial Fulfillment

Of the Requirements for the Degree

Doctor of Education in Educational Leadership

by

Christine Hallmark Catalano

February, 2018

OPENING DOORS THROUGH INSTRUCTIONAL COACHING: EXPLORING HOW

SOCIAL CAPITAL THEORY ENHANCES COLLEGIAL FOCUS AND INTENTIONAL

STRUCTURES IN AN INSTRUCTIONAL COACHING MODEL

by

Christine Hallmark Catalano

APPROVED BY:

DIRECTOR OF DISSERTATION:_____

R. Martin Reardon, PhD

COMMITTEE MEMBER:_____

Karen Jones, PhD

COMMITTEE MEMBER:_____

Matthew Militello, PhD

COMMITTEE MEMBER:_____

Mark Cockrell, EdD

INTERIM CHAIR OF THE DEPARTMENT OF EDUCATIONAL LEADERSHIP:

_____

Marjorie Ringler, EdD

DEAN OF THE GRADUATE SCHOOL:

_____

Paul Gemperline, PhD

ACKNOWLEDGEMENTS

I am profoundly beholden to my dissertation chair, Dr. Martin Reardon, without whom I would never have arrived at this point. Your endless feedback and patience are truly appreciated. Thank you for the profound thought your questions, assignments, and discussions always challenged me with.

I also wish to acknowledge my dissertation committee members, Dr. Mark Cockrell, Dr. Karen Jones, and Dr. Matthew Militello who agreed to support my study. I am indebted to you for the time and support your commitment has provided to me.

Thank you to my cohort colleagues for staying the course with me. All of those evening and weekend classes, projects, presentations, discussions, and writing sessions served to build lasting memories. I am humbled by your collective leadership, dedication, and expertise.

To the educators who gave their time to participate in my study, I thank you. It has been a privilege to hear your stories. Your tireless commitment to children is inspirational.

Above all, I am deeply beholden to my family for sticking with me through the journey that has gotten me to this point. To my children, Savannah and Rocco, for forgiving my divided attention and to my husband, Larry, for the patience and devotion that inspired me each day. Without your unending love, support, and encouragement this journey would not have been possible.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1: NAMING AND FRAMING THE PROBLEM OF PRACTICE

There are all of these people here I don't know by sight or by name.

And we pass alongside each other and don't have any connection.

And they don't know me and I don't know them.

Carson McCullers, The Member of the Wedding

Teachers working in silos and in isolation from their colleagues characterize how we have always done business in education. Closed classroom doors are the norm. What will happen when the doors are thrown open and colleagues are invited in?

Problem of Practice

In today's educational environment of high stakes accountability, school districts across the nation are grasping for techniques to improve teacher effectiveness (Denton & Hasbrouck, 2009; Knight, 2012). Oftentimes this improvement is aimed at addressing human capital through training, professional development, or certification processes (Coleman, 1988; Daly, Moolenaar, Der-Martirosian, & Liou, 2014) or physical capital through the adoption of new textbooks, technology devices, or programs (Daly, 2010; Hite, Hite, Mugimu, & Nsubuga, 2010; Putnam, 2000). These solutions imply that improving teacher effectiveness lies outside of the bounds of an individual teacher and the school. Conversely, a focus on the development of social capital results in seeking a solution within the social network of a school (Coburn, Mata, & Choi, 2013; Dika & Singh, 2002; Daly, Moolenaar, Der-Martirosian, & Liou, 2014).

School effectiveness is limited when educators view the solution to improving student achievement outside of themselves and the bounds of the school. Significant research has been conducted on teacher efficacy and more recently on collective teacher efficacy which is the collective perception of teachers that staff have a positive impact on their students (Goddard,

Hoy, & Woolfolk, 2000). Research is clear that strategies which effectively build teacher efficacy within a school building will lead to increased student achievement (Hattie, 2012).

Instructional coaching is a ubiquitous term fundamentally describing a professional development (Gross, 2012) process in which educators provide support to one another to improve instructional effectiveness and positively impact student achievement (Denton & Hasbrouck, 2009; Gallant & Gilham, 2014; Knight, 2012; Parker, Wasserman, Kram, & Hall, 2015). Coaching, in this sense is comprised of two distinct components: roles (Gallant & Gilham, 2014) and processes (Bachkirova, Sibley, & Myers, 2015), which account for a wealth of variance in coaching models (Denton & Hasbrouck, 2009). Oftentimes districts employ content specific coaches at a centralized level to engage teachers in a process of professional development aimed at improving human capital through training or certifications or implementing physical capital such as textbooks, technology or programs (Atteberry & Bryk, 2011; Coburn et al., 2013; Denton & Hasbrouck, 2009; Gross, 2012). This external coaching structure is superimposed over the social process within a school building. As a result, many current models of instructional coaching do not result in institutionalized changes in educator practice, improved student achievement, nor do they impact collective teacher efficacy. The challenge lies in leveraging the social capital that coaching could potentially offer to educators.

Instructional coaching has been haphazardly deployed in many schools as a result of hasty implementation due to federal grant timeline requirements (Deussen, Coskie, Robinson, & Autio, 2007; Neufeld & Roper, 2003; Poglinco, Bach, Hovde, Rossenblum, Saunders, & Supovitz, 2003). This haphazard implementation often leaves coaching structures that lack focus and intentionality and are ineffectively overlaid onto the social network of a school. Many longitudinal studies of coaching implementation document the rise and fall of effective coaching

structures that can be directly linked to the fact that the coaching model was not intentionally built to lie within the existing social network of a school (Atteberry & Bryk, 2011; Bidwell & Yasumoto, 1999; Coburn et al., 2013; Gross, 2012).

Context of Problem of Practice

This investigation will focus on a public school district in the southeastern United States. This school district (referred to subsequently by the pseudonym of "Riverside Public Schools") has implemented a variety of coaching models system wide for many years. Largescale, systemic implementation was first seen in 2002 in response to federal No Child Left Behind legislation (U.S. Congress, House Committee on Education and the Workforce, 2001). As federal funding decreased and eventually ceased, instructional coaching models continued through supplemental funding. The current reality is that coaches are funded through a variety of local, state and federal categories and support educators in exceptional children, migrant education, instructional technology, vocational education and K-12 core curriculum and instruction.

Instructional coaching in Riverside Public Schools has been present for many years, however teacher effectiveness as measured by student achievement has steadily declined. Instructional coaching is costly and is not producing an adequate return on investment. It is imperative that the Riverside Public Schools investigate changes that can be made to the current instructional coaching model and ultimately implement improvements to increase the effectiveness and impact of coaching system-wide. This investigation addresses three problems with the current instructional coaching model: (a) the current impact on student achievement is too low, (b) the financial cost of the current coaching model is too high when compared to student achievement, and (c) too little emphasis on social capital is present in the current coaching model.

3

Riverside Public School district has a total of 28 facilities serving 16,183 students pre-kindergarten through grade 13. These facilities are comprised of 16 elementary schools, 6 middle schools, 4 traditional high schools, and 2 non-traditional secondary schools. In 2015-16 Riverside Public Schools employed 861 full time teachers and 24.5 educational specialists and instructional facilitators, both job descriptions fitting the definition of instructional coach used for this investigation. A total operating budget of $136,388,859 for the 2015-16 school year included allocations in the amount of $1,420,179 to instructional coach salaries. As Knight (2012) uncovered in a study of the cost of instructional coaching, salaries are simply the start of the financial impact coaching has on an educational system. Loss of time in the classrooms, funds set aside to pay for substitute teachers, for conference registrations, associated travel expenses, and more all add to this basic instructional coach salary expenditure.

At this time instructional coaching does not result in institutionalized change in educator practice, nor in increased student achievement, in fact over the last 15 years, Riverside Public Schools has seen a distinct downward trend in student achievement. This trend is illustrated by closely analyzing state normed assessment data.

The state administered English Language Arts (ELA) and Math End of Grade (EOG) assessments for all students in grades three through eight and End of Course (EOC) assessments for all students enrolled in specific ELA or Math high school courses. Student results from these assessments substantiate the downward trend. Data from the State Department of Public Instruction is available for 2001 through 2016 end of year summative assessments in ELA and Math. Over this 15 year time span, every public school in the state administered EOG and EOC assessments for ELA and Math. The state analyzed and published data sets that include school, district, and state percent proficient on each assessment administered for each year. The state

reports individual student performance in levels ranging from 1 to 5. Students scoring a level 3, 4, or 5 are considered grade level proficient, while students scoring levels 1 or 2 are considered not grade level proficient. State and district proficiency is calculated by the percent of students that score within grade level proficiency –performing at a level 3, 4, or 5 on the EOG or EOC assessments.

To illustrate trends in student achievement over time, I focused on district proficiency and state proficiency on the same standardized EOG and EOC assessments for English Language Arts and Math (North Carolina Department of Public Instruction, 2016), as shown in Figures 1 through 4. I compiled the district percent proficient and state percent proficient data for every EOG and EOC assessment and calculated the difference between the state proficiency and the district proficiency. I refrain from analyzing district percent proficient data alone because that analysis would not accurately convey the trend in student achievement, given that the assessments, standards, and norming changed over the 15 year period. Every student across the state however experienced these same changes in assessments, standards, and norming; therefore comparing the state proficiency to the district proficiency provides a more accurate picture of student achievement trends over time.

In Figure 1, I plot the difference between the state proficiency and Riverside Public School proficiency on ELA EOG standardized assessments for Grades 3 through 8 between 2001 and 2016. Each point on the graph, depicted by a number, represents the difference between state percent proficient and district percent proficient in each of Grades 3 through 8 for a particular ELA EOG assessment administered in a given year. Each year, six EOG assessments were administered for ELA—one assessment per grade level for Grades 3 through 8. The line on the graph connects the means of the difference scores between state and district percent
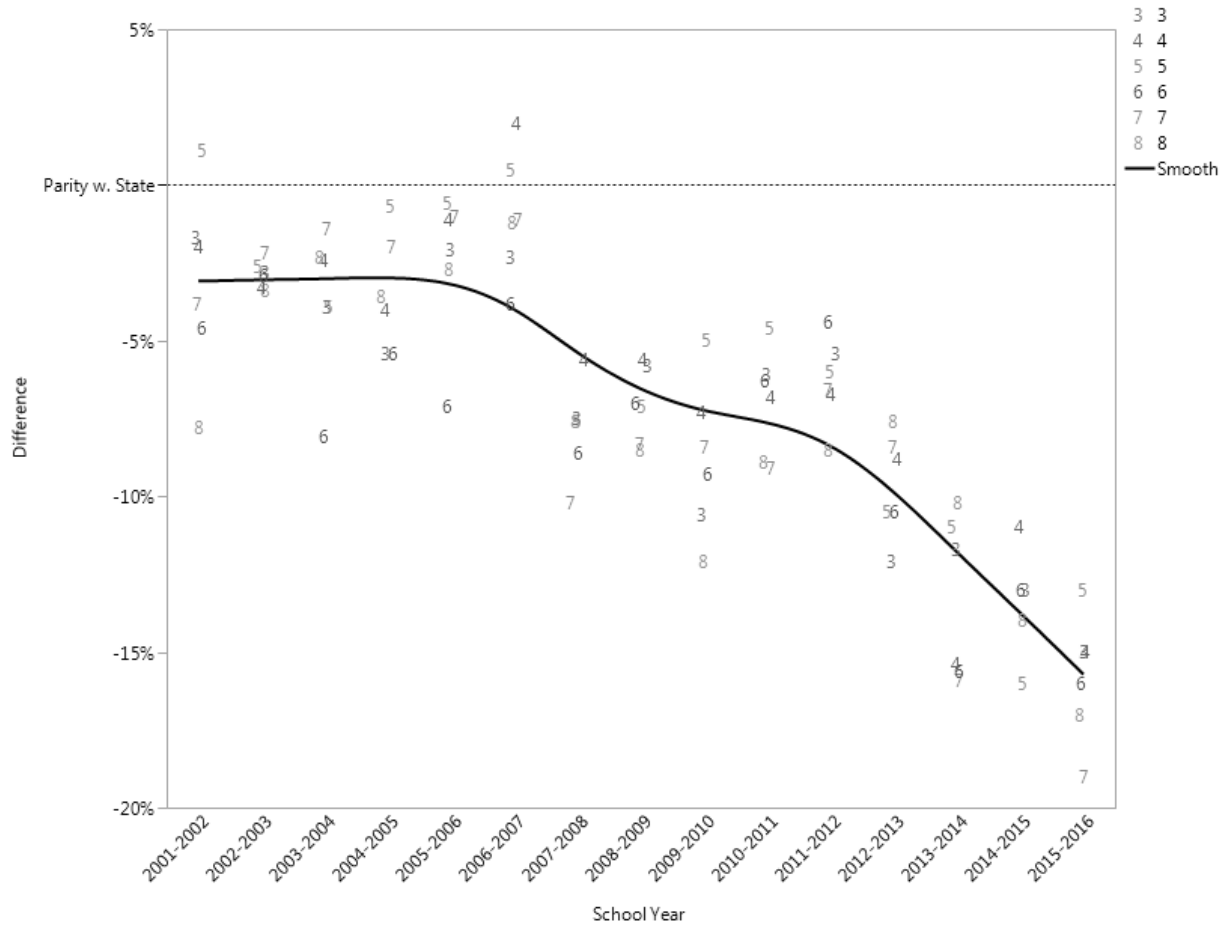
Note. The difference between state and Riverside Public Schools proficiency on Grades 3-8 ELA EOG testing graph with smooth curve overlay ($\lambda = .03$). Data points are identified on the graph by grade level numbers. The line connects the means of the difference scores across Grades 3 through 8 by year, thereby constituting a trend line. Data compiled by C. Catalano from NC Department of Public Instruction; Accountability and Service Division. http://www.ncpublicschools.org/accountability/reporting/

Figure 1. Difference between state and Riverside Public Schools proficiency on Grades 3-8

ELA EOG.

proficient across the six grade levels for each year, compellingly illustrating the downward trend in student achievement over the 15 year time span. The graph clearly illustrates that, while the mean of the difference scores across Grades 3 through 8 has never ventured into positive territory since 2001 (which would have indicated that the Riverside students exceeded the percent proficient of the children across the state), the situation has worsened in recent years.

Figure 2 mirrors Figure 1, and plots the high school ELA EOC assessment difference between the state proficiency and district proficiency from 2001 to 2016. Only one assessment is administered for ELA at the high school level; therefore the trend line simply connects differences in proficiency over time. The biggest difference between the Grades 3 through 8 ELA EOG and high school ELA EOC trend lines is the notably less discrepant difference between 2001 and 2003 at the high school level. Although there is arguably more variation in the trend line, the same overall downward trend is evident for the high school ELA achievement—at least from 2003 to 2016.

Demonstrating parallel analysis for math results, as I illustrate in Figures 3 and 4, student achievement in math has shown a comparable downward trend. In Figure 3, I plot the mean of the difference between the state percent proficient and Riverside Public School percent proficient across Grades 3 through 8 by year on math EOG standardized assessments between 2001 and 2016. As above, each point on the graph represents the difference between state and district proficiency for an EOG math assessment administered to students in Grades 3 through 8 in a given year. The line on the graph depicts the mean of the difference scores across Grades 3 through 8 by year, illustrating the inconsistent but overall downward trend over the 15 year time span. Again, the mean of the difference scores Grades 3 through 8 has never ventured into positive territory since 2001.
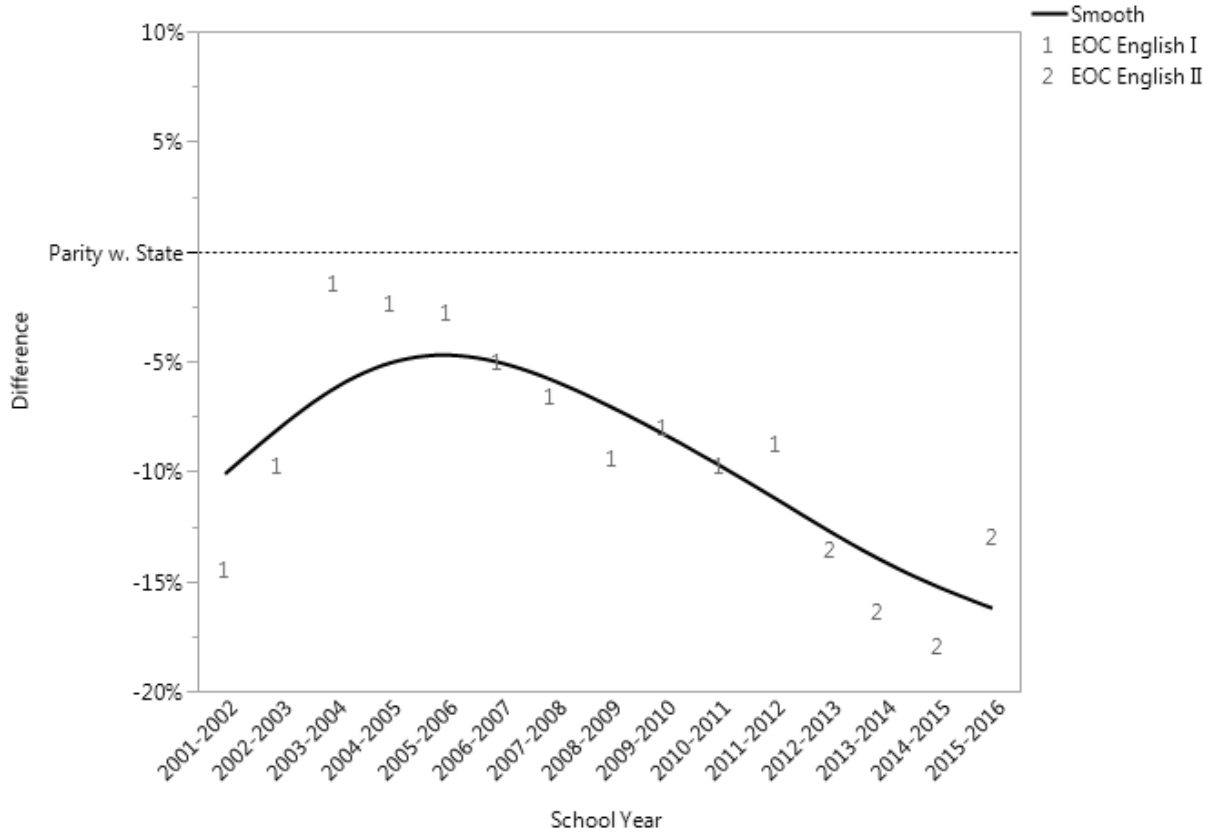
Note. Graph of the difference between state and Riverside Public Schools proficiency on High School ELA EOC testing with smooth curve overlay ($\lambda = .03$). Data points are identified on the graph such that 1 = EOC English I and 2 = EOC English II. The line connects the difference between state and district proficiency by year, thereby constituting a trend line. Data compiled by C. Catalano from NC Department of Public Instruction; Accountability and Service Division. http://www.ncpublicschools.org/accountability/reporting/

Figure 2. Difference between state and Riverside Public Schools proficiency on high school

ELA EOC.
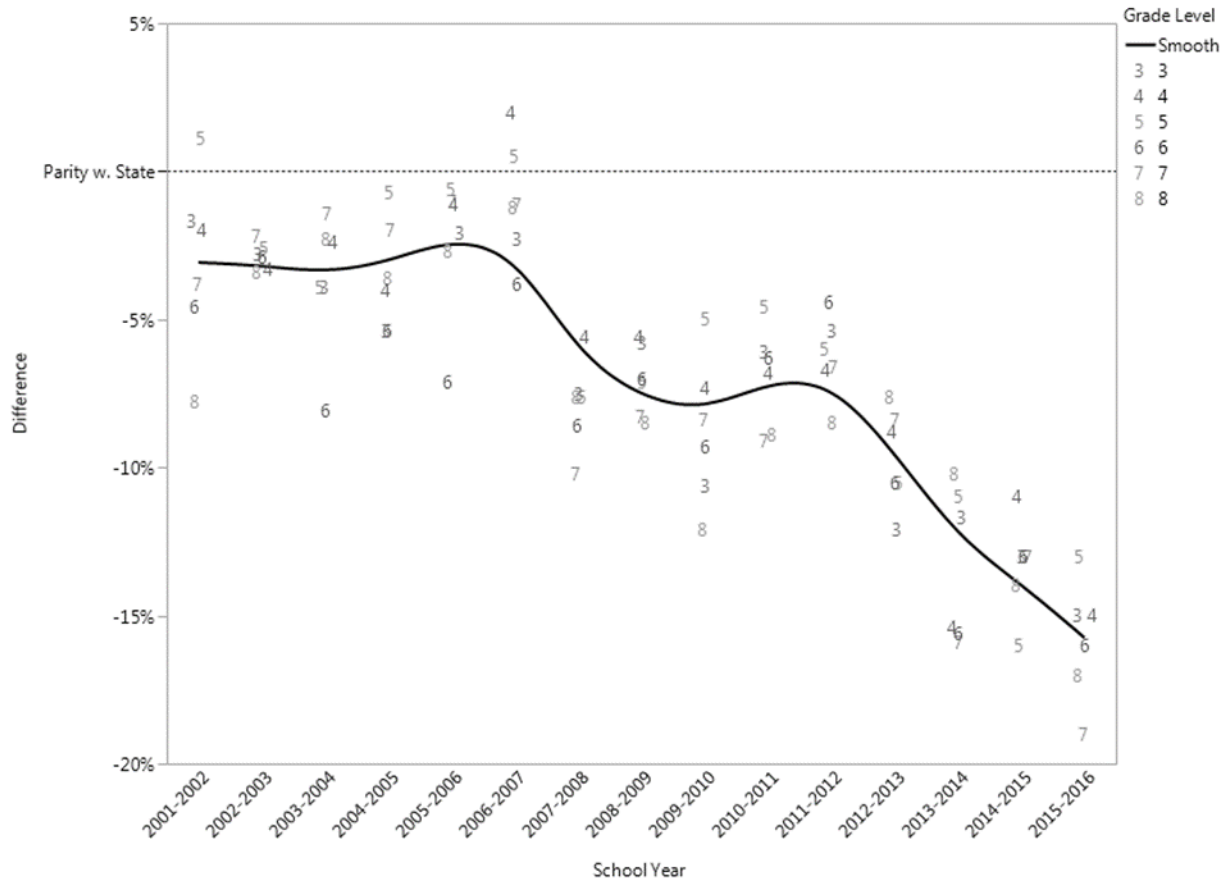
Note. Graph of the difference between state and Riverside Public Schools proficiency on Grades 3-8 Math EOG testing graph with smooth curve overlay ($\lambda = .03$). Data points are identified on the graph by grade level numbers. The line connects the means of the difference scores across Grades 3 through 8 by year, thereby constituting a trend line. Data compiled by C. Catalano from NC Department of Public Instruction; Accountability and Service Division. http://www.ncpublicschools.org/accountability/reporting/

Figure 3. Difference between state and Riverside Public Schools proficiency on Grades 3-8
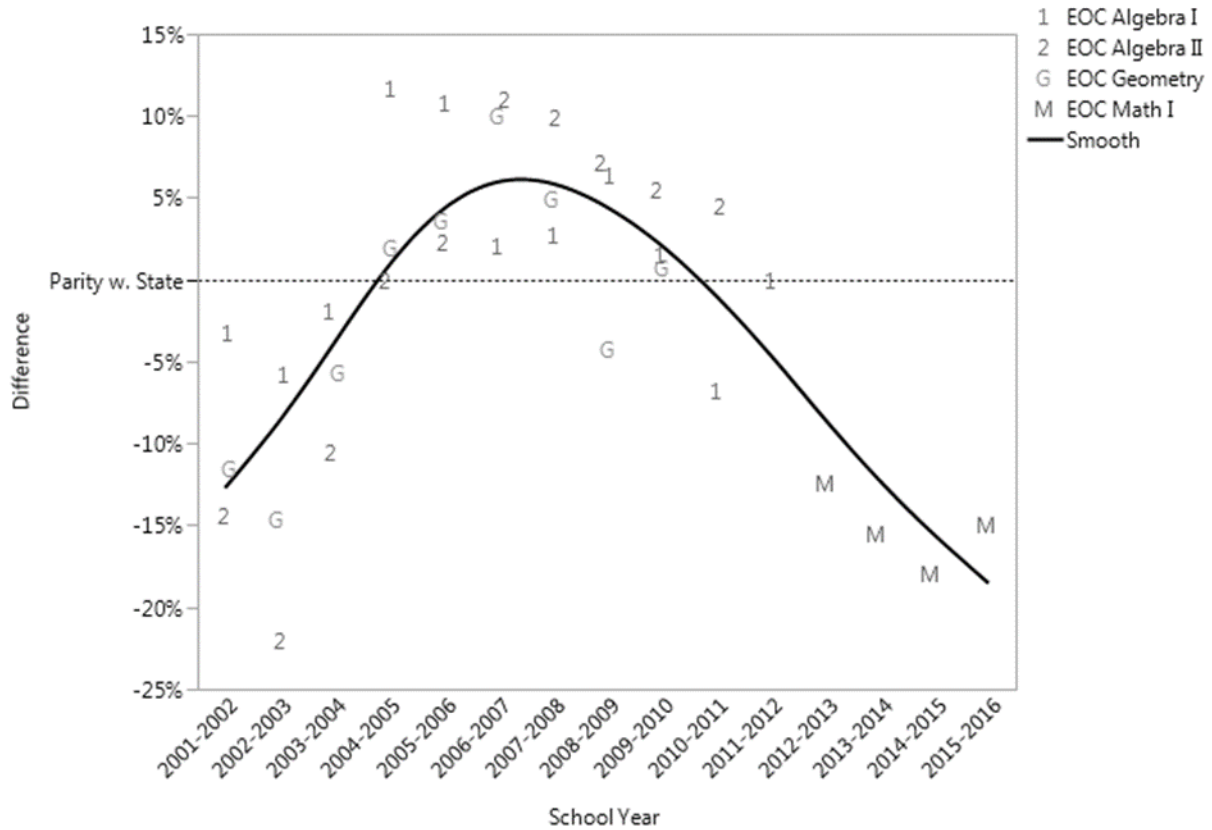
Math EOG.

Note. Graph of the difference between state and Riverside Public Schools proficiency on High School Math EOC testing with smooth curve overlay (λ = .03). Data points are identified on the graph such that 1 = EOC Algebra I, and so forth (as indicated in the legend). The line connects the means of the difference scores by year, thereby constituting a trend line. Data compiled by C. Catalano from NC Department of Public Instruction; Accountability and Service Division. http://www.ncpublicschools.org/accountability/reporting/

Figure 4. Difference between state and Riverside Public Schools proficiency on High School

Math EOC.

In Figure 4, I plot the difference between state and Riverside Public School proficiency results from high school math EOG assessments. The number of data points plotted across the years varies between one and three because the number of assessments administered at the high school level progressively decreased from three EOC math courses assessed to one EOC math course since 2001. The extreme high values noted in Figure 4, from 2004-2005 through 2011-2012 school years that contribute to a high mean value are primarily associated with district EOC math proficiency in Algebra I and Algebra II. Results from these two assessments are above the state proficiency between 2004 and 2010. Of this series of four graphs, Figure 4 is the only one in which the trend line ventures into positive territory (meaning that the mean difference in student proficiency in math in the district exceeded the mean student proficiency in the state). Notably, from 2011-2012 to 2015-2016 the means of the difference scores settle into double digit negative trajectory. As with the ELA data, it is clear that the overall trend in student math achievement is on a downward trajectory.

In Table 1, I list the mean of the difference between state percent and district percent proficient across all assessments administered in a given year—the data that are depicted in the trend lines in Figures 1 through 4. In comparing the state proficiency to the district proficiency across grade spans and subject areas by year from 2001 through 2016, it is evident that student achievement has shown a distinct downward trend. This is most evident over the last 5 years, during which the mean proficiency difference of -6.3% (3-8 ELA EOG), -7% (3-8 Math EOG), -8.8% (High School ELA EOC), and -6% (High School Math EOC) in the 2011-2012 school year decreased to a difference of -15.8% (3-8 ELA EOG), -16.7% (3-8 Math EOG), -13% (High School ELA EOC), and -16.4% (High School Math EOC) in the 2015-2016 school year.

Table 1

Difference between State and Riverside School District EOG and EOC Percent Proficient

School Year	3-8 ELA EOG Difference	3-8 Math EOG Difference	HS ELA EOC Difference	HS Math EOC Difference
2001-2002	-3.1%	-3.2%	-14.5%	-5.4%
2002-2003	-2.9%	-2.7%	-9.8%	-6.5%
2003-2004	-3.7%	-2.3%	-1.5%	-3.5%
2004-2005	-3.5%	-2.2%	-2.4%	0.0%
2005-2006	-2.4%	-7.8%	-2.8%	-3.4%
2006-2007	-1.0%	-8.9%	-5.0%	-3.3%
2007-2008	-7.9%	-9.3%	-6.6%	-4.3%
2008-2009	-7.1%	-5.0%	-9.4%	-2.3%
2009-2010	-8.8%	-6.8%	-8.0%	-3.6%
2010-2011	-7.0%	-6.3%	-9.8%	-5.0%
2011-2012	-6.3%	-7.0%	-8.8%	-6.0%
2012-2013	-9.7%	-14.6%	-13.6%	-14.3%
2013-2014	-13.3%	-17.5%	-16.4%	-17.2%
2014-2015	-13.3%	-17.0%	-18.0%	-17.1%
2015-2016	-15.8%	-16.7%	-13.0%	-16.4%

Note. Data compiled by C. Catalano from NC Department of Public Instruction; Accountability and Service Division. Retrieved from http://www.ncpublicschools.org/accountability/reporting/

Recovery Plan

The response of Riverside Public Schools to the distinct downward trends in student ELA and math achievement has been to increase professional development support for teachers, in part through the implementation of various coaching models. Unfortunately, as amply demonstrated by reference to the empirical data in other cases, instructional coaching in Riverside Public Schools has been ineffective in improving student achievement. As noted in Figures 1 through 4 and Table 1, when compared to the state percent proficient for ELA and math, student proficiency in Riverside Public Schools has experienced a distinct downward trend despite the inclusion of instructional coaching as an intervention.

In order to reverse this downward trend in student achievement, schools in Riverside Public Schools need to produce greater than predicted growth in student performance on the EOG and EOC assessments in ELA and math. The State Board of Education uses the Education Value-Added Assessment System (EVAAS) to calculate student growth values (SAS Institute Inc., 2016), yielding the data from the EOG and EOC assessments that enabled me to develop the above gap analysis between the achievements of students in Riverside Public Schools compared to students statewide. The downward trend depicted in Figures 1 through 4 and Table 1 is mimicked in the EVAAS School-wide Accountability Growth measures for the schools in Riverside Public School district. The EVAAS growth index measures student growth in achievement on EOG and EOC ELA and math assessments, and is reported as an EVAAS Growth Index, as shown in Table 2. The composite percent proficient indicates the overall percentage of students in the school that met the state grade level proficiency targets of a level III, IV, or V on the EOG and EOC ELA and math assessment. The numerical growth index measures are categorized by the state as Met Expected Growth (growth index measures of -2.0 to

13

Table 2

EVAAS School-Wide Accountability Growth Measures

School	Grade Span	Composite Percent Proficient***	EVAAS Growth Status	EVAAS Growth Index
School A	K-2	*	*	*
School U	K-2	*	*	*
School BB	K-2	*	*	*
School B	K-5	57.1	Exceeded	3.29
School C	K-5	39.7	Met	-1.59
School D	K-5	45.6	Not Met	-3.41
School E	K-5	48.2	Met	-1.54
School G	K-5	56.3	Not Met	-3.18
School H	K-5	28.9	Met	0.22
School I	K-5	50.9	Met	0.94
School K	K-5	40.7	Met	-1.18
School N	K-5	46.8	Met	0.62
School R	K-5	50.9	Met	-1.34
School Y	K-5	44.2	Met	1.46
School Z	K-5	59.6	Not Met	-3.47
School AA	K-5	27.4	Met	-1.27
School F	6-8	51.1	Exceeded	3.09
School J	6-8	44.2	Not Met	-2.75
School L	6-8	24.2	Not Met	-2.28

Table 2 (continued)

School	Grade Span	Composite Percent Proficient***	EVAAS Growth Status	EVAAS Growth Index
School M	6-8	25.2	Not Met	-4.61
School T	6-8	41.3	Not Met	-7.86
School W	6-8	44.7	Exceeded	2.21
School O	6-12	<5	Not Met	-2.91
School P	9-12	32.2	Not Met	-10.02
School S	9-12	35.0	Not Met	-14.49
School V	9-12	38.7	Met	-1.45
School X	9-12	52.4	Met	1.85
Eagle High School**	9-13	82.8	Exceeded	4.94

Note. 2015-16 EVAAS School-Wide Accountability Growth index and status for each school in Riverside School District. Data compiled by C. Catalano from NC Department of Public Instruction; Accountability and Service Division. Retrieved from http://www.ncpublicschools.org/accountability/reporting/
*K-2 schools do not administer NC EOG or NC EOC reading or math assessments.
**School where interventions have been in place. This school will be the focus of the investigation.
***Performance composite of percent grade level proficient calculated by dividing the total number of assessments administered by the total number of assessments resulting in grade level proficiency (assessments in which students scored level 3, 4, or 5).

2.0), Exceeds Expected Growth (growth index measures above 2.0), or Not Met Expected

Growth (growth index measures below -2.0).

As shown in Table 2, Riverside Public Schools is in an unenviable situation. The 2015-

2016 EVAAS School-wide Accountability Growth index measures range from -14.49 to 4.94.

Table 2 includes data from all 28 schools in Riverside Public Schools and is sorted by grade

span. Although the majority of schools at all grade spans have shown little to no growth during

the 2015-16, the most notable negative growth occurred at the secondary level with only three

out of 12 middle and high schools exceeding growth. In fact, the four schools with the lowest

growth index in Riverside Public Schools were secondary schools. Conversely, the school with

the highest growth index was a secondary school (referred to subsequently by the pseudonym of

"Eagle High School").

Since 2005, Eagle High School has used school funds to implement a different type of

instructional coaching model as compared to the districtwide model. Eagle High School's

coaching model includes an external, contracted instructional coach and peer instructional

coaching. This model embeds constructs of social capital theory; through the inclusion of multi-

tiered instructional coaching processes—a one to one external instructional coaching process and

a peer instructional rounds coaching process (Lofthouse & Leat, 2013; Parker et al., 2015;

Rivera-McCutchen & Panero, 2014; Zwart, Wubbels, Bergen, & Bolhuis, 2009), both

incorporating a structured feedback cycle that is focused through a common instructional

framework.

As illustrated in Figure 5, 2015-2016 EVAAS growth data indicates that, of 25 Riverside

Public Schools involved in state-wide testing, 10 (40%) did not meet expected growth, 11 (44%)

met expected growth, and 4 (16%) exceeded expected growth. If Riverside Public Schools
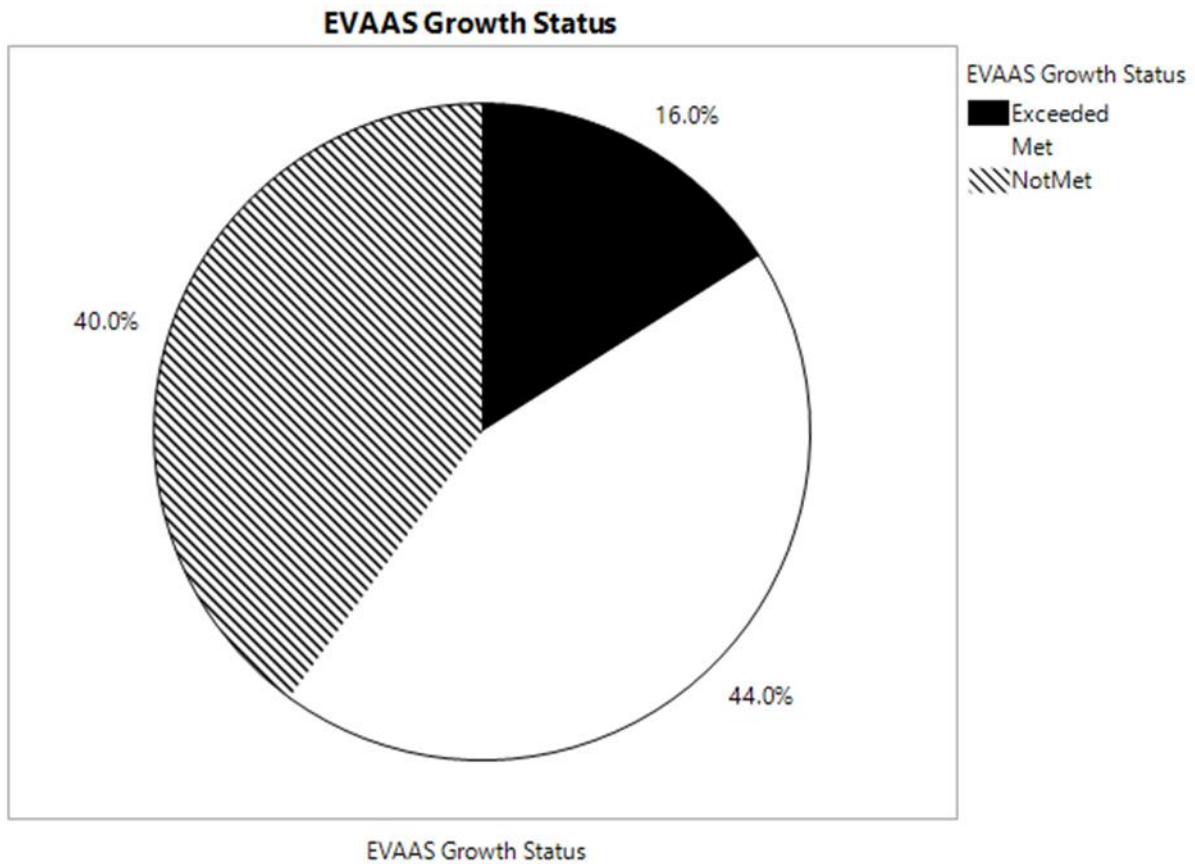
EVAAS Growth Status

EVAAS Growth Status

- Exceeded
- Met
- NotMet

16.0%

40.0%

44.0%

EVAAS Growth Status

Note. Data compiled by C. Catalano from NC Department of Public Instruction; Accountability and Service Division. Retrieved from http://www.ncpublicschools.org/accountability/reporting/

Figure 5. Riverside Public Schools EVAAS Growth Status.

continue to exhibit these student achievement characteristics, it is difficult to envision how the difference in proficiency between the state percent proficient and Riverside Public Schools percent proficient will diminish. From the perspective of this study, these data make it clear that the financial investment in instructional coaching is not yielding an adequate return on investment in terms of student achievement.

Purpose of Study

The purpose of this case study was to determine if the multi-tiered coaching model at Eagle High School, viewed through the construct of social capital theory, contribute to high teacher efficacy and, by association, to high student achievement. My study examined the coaching processes in place at Eagle High school, and teased out how these processes harnessed the social capital of the professionals in the building, thereby creating an achievement oriented environment that I associate with high student achievement and empirically determined high collective teacher efficacy. The study served to benchmark the causal elements of why the coaching model at Eagle High School yields institutionalized changes in educator practice, high collective teacher efficacy and high student achievement.

Currently, instructional coaching in Riverside Public School District is not associated with institutionalized change in educator practice, nor high student achievement in all schools across the district. An outstanding exception to this generalization is Eagle High School. Through an embedded case study using Eagle High School as a critical case school (Yin, 2014), the properties and dimensions (Corbin & Strauss, 2015) of the social interactions that characterize the instructional coaching context at Eagle High School were delineated in order to revise and inform Riverside Public School's districtwide instructional coaching model.

This case study explored how embedding constructs of social capital theory; through the inclusion of multi-tiered instructional coaching processes—a one to one external instructional coaching process and a peer instructional coaching process (Lofthouse & Leat, 2013; Parker et al., 2015; Rivera-McCutchen & Panero, 2014; Zwart et al., 2009), both incorporating a structured feedback cycle that is focused through a common instructional framework served to embed key components of social capital theory in such a way that led to institutionalized changes in teacher practice. As depicted in Table 3, the following theory of action will guide my study.

Instructional coaching may enact changes in educator practice if:

1. Instructional coaching harnesses *social capital* by strengthening ties (relationships) and facilitating the flow of resources (peer expertise);

2. *Intentional coaching structure* is purposefully designed to strengthen the ties and flow of resources within the school's existing social network; and

3. The coaching model has, at its foundation, a clearly articulated, transparent, *collegial focus* designed to strengthen ties and focus the flow of resources, as measured by collective efficacy scores (Goddard & Hoy, 2003) and social network measures—density, degree centrality, and ego reciprocity.

The constructs of social capital, intentional coaching structures, and collegial focus are defined and discussed separately in the following section, but it is appropriate to point out that they are highly interrelated, as follows.

Social capital is inherent within a social network and includes nodes (people), ties (the relationship among people), and resources (expertise of peers within a network) (Coleman, 1988; Nahapiet & Ghoshal, 1998; Penuel, Riel, Krause, & Frank, 2009; Putnam, 2000). Social capital

Table 3

Theory of Action for Multi-Tiered Instructional Coaching Case Study

Proposed Strategy If we do this….	Then "x" will happen	And we will see this results in….
Implement multi-tiered instructional coaching to include: • One-to-one coaching process • Peer rounds coaching process *Proposition 1: Instructional coaching harnesses social capital by strengthening ties (relationships) and facilitating the flow of resources (peer expertise)*	Teachers will engage in dialogue around effective practice, receive multiple levels of feedback, and expand their network of connections	Collective Efficacy scores Social Network Measures (density, centrality, and reciprocity)
Intentionally structure a feedback cycle into all coaching processes. *Proposition 2: Intentional coaching structure is purposefully designed to strengthen the ties and flow of resources within the school's existing social network*	Feedback about teacher practice will be actionable, continuous, and encourage reflection.	Interview data Degree Centrality Ego Reciprocity
Focus feedback on a common framework for instruction. *Proposition 3: The coaching model has, at its foundation, a clearly articulated, transparent, collegial focus designed to strengthen ties and focus the flow of resources.*	Feedback will be focused and targeted on a common set of strategies, creating a common language.	Interview data Degree centrality Ego Reciprocity

is not a tangible asset but is instead the network of social interactions that facilitate the spread of knowledge and resources through social relationships (Daly, 2010). Social network theorist distinguish between two different types of networks (Cole & Weinbaum, 2010; Moolenar & Sleegers, 2010). The flow of resources through an instrumental network consist of formal information such as knowledge or skills for contributory purposes. Information flowing through an expressive network is informal information such as advice or social details for collegial support purposes. Thus, social capital theory draws attention to not only the social network itself but also the intangible assets that flow within the network through both formal (*instrumental*) and informal (*expressive*) interactions (Moolenar & Sleegers, 2010). Thus, instructional coaching should facilitate both the instrumental and expressive flow of resources through a social network (Cole & Weinbaum, 2010).

The *intentional structure* of an instructional coaching model can either enhance or impede the flow of resources within a social network (Coburn et al., 2013; Penuel et al., 2009; Spillane, Hopkins, & Sweet, 2015). Proposition 2 of the theory of action for this study declares that coaching structures should be intentionally designed to leverage the social capital within a school. Coaching models that heavily rely on human capital development through training or certification outcomes and models that focus on physical capital such as technology, textbooks or programs will not lead to strongly institutionalized changes in practice to the degree to which they fail to address the social network within a school (Coburn et al., 2013; Coleman, 1988; Daly et al., 2014; Daly, 2010; Dika & Singh, 2002; Hite et al., 2010; Putnam, 2000).

Collegial focus is comprised of anything that organizes joint activity (Bidwell & Yasumoto, 1999; Feld, 1981; Lofthouse & Leat, 2013; Yasumoto, Uekawa, & Bidwell, 2001). This can include content or departmental affiliation, hobbies, and pedagogical affinity. Focus can

be described in social network theory as the degree to which individuals expend time and energy toward a joint activity associated with a given topic (Feld, 1981). A common instructional framework that is strongly institutionalized within a school offers a constraining focus that encompasses broad pedagogical application across departments, but is focused enough along content departmental lines to engender shared activity through a coherent response to similar problems of practice. In addition, a collegial focus on pedagogy is within the educators' circle of influence and not tied to capricious funding or organizational trajectory. A common instructional framework adds a discernable pedagogical focus that, while intangible, constitutes a collegial focus which can easily be embedded into any funded initiative.

Organizational Improvement Goal

The goal of this investigation is to demonstrate that embedding social capital theory into an instructional coaching model can achieve a return on investment as measured by increased collective teacher efficacy and social network measures of density, degree centrality, and ego-reciprocity. This goal was achieved by studying the effectiveness of embedding the constructs of social capital theory into coaching processes within Eagle High School, as judged by collective efficacy standardized scores (Goddard & Hoy, 2003). My ultimate intention is to use these findings to inform and develop a plan for full implantation of a refined coaching model in other schools in Riverside Public School District.

Evidence was collected relevant to three distinct units of analysis: (a) the social network as a whole within the school, (b) teachers who have been employed at Eagle High school for up to and including 4 years, and (c) teachers who have been employed 5 or more years at the school. A whole network analysis was conducted at the onset of the study to measure network density, ego reciprocity, and degree centrality quantitatively. These data were validated (or otherwise)

22

with interview data, collective efficacy scores, and field notes to explore each educator's perceptions of how the social structure patterns and collegial focus impacted their teacher effectiveness by leading to changes in practice as well as changes in their perception of the collective efficacy of colleagues. As conceptualized earlier, my hope that the totality of my findings will support the replication of the instructional coaching model in place at Eagle High School into other schools across the district.

Key Questions and Tasks

The overall research question for this case study is: What aspects of instructional coaching are likely to result in improved student achievement across schools? This inquiry will be explored further with the following question: How does embedding social capital theory into an instructional coaching model impact teacher practice and collective teacher efficacy?

A mixed methods approach to data collection producing (1) quantitative data using surveys to map the social network of the school and measure collective teacher efficacy; and (2) qualitative data through interviews and field notes to explore teacher perceptions of how social structural patterns and collegial focus lead to institutionalized changes in teacher practice and positively impact collective teacher efficacy. The following propositions were explored. Instructional coaching may enact changes in educator practice if:

1. Instructional coaching harnesses *social capital* by strengthening ties (relationships) and facilitating the flow of resources (peer expertise);

2. *Intentional coaching structure* is purposefully designed to strengthen the ties and flow of resources within the school's existing social network; and

3. The coaching model has, at its foundation, a clearly articulated, transparent, *collegial focus* designed to strengthen ties and focus the flow of resources.

As teachers at Eagle High School engage in multi-tiered coaching processes their classroom doors are opening and their colleagues are being invited in. I propose that the peer coaching practices inherent in peer coaching, combined with a traditional external coaching structure, and all focused through a common instructional framework serve to embed key components of social capital theory in such a way that leads to institutionalized changes in teacher practice and positively impact collective teacher efficacy.

Definition of Terms

Collective Teacher Efficacy – The collective perception of teachers that faculty have a positive impact on their students (Goddard et al., 2000).

Degree Centrality – The number of ties emanating from a given node (Borgatti et al., 2013). Centrality for directed data can be reported as in-degree (the number of incoming ties to a given node) and out-degree (the number of outgoing ties from a given node) (Wasserman & Faust, 2009).

Density – The number of ties in the network, expressed as a proportion of the possible number of ties (Borgatti et al., 2013, p. 150).

Ego-reciprocity – The number of reciprocated ties as a proportion of the total possible ties for a given node (Borgatti et al., 2013).

External Coaching – An instructional coaching model employing a former educator who serves as a specialist supporting teachers, usually in a one-to-one coaching capacity, as they engage in the coaching cycle to improve instructional practice (Bachkirova et al., 2015; Deussen et al., 2007; Gallant & Gilham, 2014).

Instructional Coaching – A professional development (Gross, 2012) process in which educators provide support to one another to improve instructional effectiveness and ultimately

24

positively impact student achievement (Denton & Hasbrouck, 2009; Gallant & Gilham, 2014; Knight, 2012; Parker et al., 2015). Coaching, in this sense, is comprised of two distinct components: roles (Gallant & Gilham, 2014) and processes (Bachkirova et al., 2015), which account for a wealth of variance in coaching models (Denton & Hasbrouck, 2009).

Nodes – The individual people incorporated within a social network (Coleman, 1988; Nahapiet & Ghoshal, 1998; Penuel et al., 2009; Putnam, 2000).

Peer Coaching – An instructional coaching model in which colleagues partner together to serve as coaches to one another (Lofthouse & Leat, 2013; Parker et al., 2015; Rivera-McCutchen & Panero, 2014; Zwart et al., 2009) as they engage in the coaching cycle to improve instructional practice.

Resources – The expertise of peers within a network (Coleman, 1988; Nahapiet & Ghoshal, 1998; Penuel et al., 2009; Putnam, 2000).

Social Capital – Social capital is not a tangible asset but is instead the network of social interactions that facilitate the spread of knowledge and resources through social relationships (Daly, 2010). Social capital is comprised of two dimensions;

(a) the *structural dimension* (Moolenaar & Sleegers, 2010), which describes the pattern of ties within a social network, and

(b) *collegial focus* (Bidwell & Yasumoto, 1999), which include the specific content exchanged in a social network.

Ties – The relationship between nodes or people in a social network (Coleman, 1988; Nahapiet & Ghoshal, 1998; Penuel et al., 2009; Putnam, 2000).

CHAPTER 2: A REVIEW OF THE LITERATURE

Social Capital Theory

Social Capital lies within a social network and includes nodes (people), ties (the relationship between people), and resources (expertise of peers within a network) (Coleman, 1988; Nahapiet & Ghoshal, 1998; Penuel et al., 2009; Putnam, 2000). Social capital is not a tangible asset but is instead the network of social interactions that facilitate the spread of knowledge and resources through social relationships (Daly, 2010). Thus, social capital theory is comprised not only of the social network itself but of the intangible assets that flow within the network through both formal (*instrumental*) and informal (*expressive*) interactions (Moolenar & Sleegers, 2010). Instructional coaching should facilitate the instrumental and expressive flow of resources through a social network (Cole & Weinbaum, 2010).

Social capital is comprised of two distinct dimensions; (1) the *structural dimension* (Moolenaar & Sleegers, 2010) which describes the pattern of ties within a social network and (2) *collegial focus* (Bidwell & Yasumoto, 1999) which include the specific content exchanged in a social network. Strong structural dimensions form dense ties which facilitate the dissemination of knowledge and information and can, when intentionally focused on specific outcomes, result in positive change. Conversely, weak structural dimensions with few ties contribute to a sense of isolation and impede the flow of information and resources in the network (Cole & Weinbaum, 2010).

Schools operate within a primarily informal social context comprised of subgroups distinguished by department, proximity or team. The density of ties between educators can be attributed to perceived pedagogical similarity. Of concern is the limited knowledge of peer expertise, also known as *expertise transparency* (Baker-Doyle & Yoon, 2010) due to isolation

within most school settings. The informal nature of the social network within a school can and often is counter to externally imposed change initiatives. In this way, the informal social structure of schools can work against the goals of an external coaching model.

Coaching is a social phenomenon and is most effective when structured to reside within a schools culture. Daly's (2010) social network theory posits that relationships and collegial support are the main underpinnings to efforts to increase teacher engagement. Effective coaching therefore should be embedded in the culture of a school fostering the development of collegial relationships and support systems.

Intentional Structure

The *intentional structure* of an instructional coaching model can either enhance or impede the flow of resources within a social network (Coburn et al., 2013; Penuel et al., 2009; Spillane et al., 2015). Coaching structures should be intentionally designed to leverage the social capital within a school. Coaching models that heavily rely on human capital development through training or certification outcomes and models that focus on physical capital such as technology, textbooks or programs will not lead to strongly institutionalized changes in practice because they fail to address the social network within a school (Coburn et al., 2013; Coleman, 1988; Daly et al., 2014; Daly, 2010; Dika & Singh, 2002; Hite et al., 2010; Putnam, 2000). Penuel, Riel, and et al. (2009) investigated how the *internal structure* of a school community impacted the distribution of resources (expertise) and level of change. In the study, two elementary schools embarking on a large scale change initiative were explored. Findings pointed to the intentional structure of the implementation having primary impact on the success of the change effort. Internal structures that are intentionally built to capitalize on the current social network, existing routines, practices and artifacts are more likely to meet with success. My study

27

investigated how embedding coaching into existing structures such as peer coaching processes can increase the likely hood of instructional coaching having a positive impact on changing educator practices and impacting teacher effectiveness.

Spillane et al. (2015) examined the role formal and informal *organizational structure* plays in tie formation and resource flow. The longitudinal study investigated 28 elementary schools within two mid-sized school districts. Results indicated that formal leadership positions such as coaches and content specialists, and informal like content teacher leaders in close proximity tend to serve as a network hubs, facilitating dense ties and the flow of resources in most school social networks. This study points to the importance of mapping the existing network prior to initiating a coaching model in order to harness the formal and informal leaders with the school social structure. Using this information to plan intentional structures that take into account how *social capital* resources will flow through the network is vital to the success of a coaching initiative.

In their study of the scope, frequency and distribution of activities in a coaching initiative, Atteberry and Bryk (2011) found that the most effective coaching models had one to one coaching ratios that were very low. The study explored 17 schools across the United States using a literacy coaching model. This model involved a one to one coaching relationship using observation, modeling and feedback. This *intentional structure* is a replication of the coaching structure that my study of Eagle High School's coaching model explored. The addition of peer coaching to the one to one coaching in my study enabled very low coach to coachee ratios at a much lower cost. This multi-tiered coaching model using both external coaches and internal peer coaches also embeds the coaching model into the schools existing professional learning community and routines thus harnessing the *social capital* within the school.

Collegial Focus

In their longitudinal study of four elementary schools within a school district, Coburn et al. (2013) focused on the ways a teacher's social network was impacted by district policy. The district investigated during this study was implementing a new math curriculum and included several key structural features in the district policy for implementation. In year 1, schools were required to hire a part time math coach (in most cases this person also served as a part time teacher within the school); weekly joint planning meetings and biweekly professional development; and summer professional development for select teachers was offered. In year 2, cross district and cross grade level professional development sessions were implemented; continued professional development was provided to coaches. Finally in year 3, the district withdrew support for the reform. The resource flow and tie formation over the course of the three years peaked in year 2 as a result of the robust infusion of expertise and increased opportunities for collegial collaboration around the topic of the math reform. These strong ties were so newly created that when the district professional development and collaboration support shifted to a new topic, the flow of resources related to the math reform was negatively impacted.

Three key concepts emerged from the Coburn et al. (2013) study finding that district policy can: (1) shape tie formation and influence the structure of the social network within a school; (2) serve to mobilize resources that teachers access within their informal social networks thus enhancing the benefit of the flow of resources within a network; and (3) enhance the ways that teachers talk together by introducing new opportunities for interaction. This study not only points to the need for *intentional coaching structures* but for a broad *collegial focus* that is not subject to the capricious ebb and flow of physical and human capital within a district.

Intentionality and focus are major components of coaching theory. Strong collegial social networks tend not to spring up spontaneously within a school building. Bidwell and Yasumoto (1999) explain a "theory of the collegial social control of teachers' instructional beliefs and practices that centers on the idea of the *collegial focus,* which is the application of Feld's *social focus* construct" (p. 234). Instructional practice is socially controlled by an educator's embeddedness within a social network. These networks within schools spring up informally through a variety of processes –however when analyzed, educators tend to embed themselves into networks of like contents (departmental), proximity (location) and tenure (generational years of experience).

Collegial focus is the topic of study in Bidwell and Yasumoto's (1999) investigation of the social organization of 13 high schools. The study set out to discover what mechanisms impact the processes that enable a social group to affect the trajectory of common work activities or *collegial focus*. Three key findings emerged from the study: (1) the embeddedness of an educator in the organization of a social network affect the flow of resources and the capacity for facilitating this flow; (2) informal social networks tend to form department based collegial foci; and (3) pedagogical division within departments is more likely to appear if strong norms of practice are institutionalized. This study points to the construct that an effective coaching model must take into account existing *collegial focus* and build upon this existing *social capital*. The inclusion of a broad collegial focus through a common instructional framework that can apply across a variety of different content departments is vital to the multi-tiered coaching model under investigation in the current study.

Instructional Coaching

Throughout the last decade, federal legislation spurred school systems and educational leaders to incorporate various models of educational coaching as school accountability and funding was tied to inclusion of strategies to improve student achievement (Denton & Hasbrouck, 2009). Coaching models involve some level of financial commitment and are implemented as part of a professional development model to improve teacher effectiveness with the ultimate goal of impacting student achievement in a positive manner (Knight, 2012).

For the purpose of this investigation, coaching will refer to a professional development practice in which an educator provides support to other educators in order to improve instructional effectiveness and ultimately impact student achievement. Deussen et al. (2007) indicated that "coaching occurs when a more knowledgeable professional works closely with another professional to increase productivity or to meet some predetermined outcome" (p. 5). This broad definition encompasses many different staff positions within most school systems. The terms coach, facilitator, lead teacher and specialist have historically been used interchangeably to refer to an educator who formally provides support to colleagues (Cox, Bachkirova, & Clutterbuck, 2014; Denton & Hasbrouck, 2009; Lofthouse, Leat, & Towler, 2010).

Cox et al. (2014) point to a diversity in coaching approaches distinguished by how they incorporate three elements: (1) knowledgeable coaches and reflective clients; (2) collaborative coaching relationships and (3) coaching context including practical elements of time and space, as well as social, political and economic factors. Lofthouse et al. (2010) distinguish between mentoring career transitions and coaching educators to improve practice. Several researchers have identified categories of instructional coaching models defined by the role of coach

31

(Lofthouse et al., 2010; Neufeld & Roper, 2003; Poginco et al., 2003). A review of the literature related to instructional coaching reveals two categories of coaching models, external coaching and peer coaching.

External Coaching

The vast majority of coaching models have historically been characterized by external coaching roles (Lofthouse et al., 2010). These models employ a former educator who serves as a specialist supporting teachers, usually in a one to one coaching capacity, as they engage in the coaching process to improve instructional practice (Bachkirova et al., 2015; Deussen et al., 2007; Gallant & Gilham, 2014). Knight (2012) found external coaching models to be between 6 to 12 times more expensive that traditional approaches to professional development.

Bachkirova et al. (2015) found that external coaches perceive their role as a "collaborative explorer" as opposed to an expert who imparts knowledge and point to a process that is positive, client focused, and fluid as opposed to time bound. In addition, the authors found that coaching sessions which challenged educators through unusual events were more apt to result in successful changes in practice. These findings support the inclusion of a peer coaching model.

Gallant and Gilham (2014) investigated an external coaching model in effect at a primary school with two external coaches employed to support 12 to 14 like grade span teachers. The study solicited input from 22 coachees about their perception of why some coaching goals were more attainable than others. Results indicated that educators at varying stages in their career require different forms of coaching pointing to a multi-tiered coaching model.

Peer Coaching

Several studies point to colleagues partnering together to serve as coaches to one another (Lofthouse & Leat, 2013; Parker et al., 2015; Rivera-McCutchen & Panero, 2014; Zwart et al., 2009) as a model which not only is more cost effective because the model does not require a separate coach to work one on one with teachers (Knight, 2012), but produces lasting results as the process inherent in the model builds a collaborative culture within the social network of a school (Parker et al., 2015; Thurlings, Vermulen, Kreijns, Bastiaens, & Stijnen, 2012; Zwart et al., 2009).

Fidelity to the coaching process is cited as an important factor in ensuring that peer coaching models are effective at changing educator practice. Thurlings et al. (2012) investigated the feedback process inherent in a reciprocal peer coaching model. Findings indicate that a skilled facilitator is the key to ensuring that feedback is positive, goal directed and repeated. A study by Rivera-McCutchen and Panero (2014) points to the use of evidence based data and a clear collaborative process to facilitate the kinds of interactions that produce lasting changes in practice.

A study conducted by Lofthouse and Leat (2013) supports the inclusion of a transparent collegial focus in a reciprocal peer coaching model citing competing political influences such as accountability measures as hindering the effectiveness of peer coaching. In contrast, Ladyshewsky (2002) and Zwart et al. (2007) point to the fact that reciprocal peer coaching models which are focused and intentionally structured produce positive results in changing practice.

Collective Teacher Efficacy

Collective teacher efficacy, based on Bandura's (1986) Social Cognitive Theory has been widely studied and has strong conceptual and empirical evidence to support its application. In line with Goddard et al. (2000) collective teacher efficacy is defined as the collective perception of teachers that faculty have a positive impact on their students. For the purpose of this investigation, collective teacher efficacy will be viewed through the conceptual framework of social cognitive theory viewing self-efficacy as a judgement that effects action, thought and attitude; not as a single trait that defines a person or a group.

Perceived self-efficacy can be influenced by cognitive, motivational, affective, and selection processes and can contribute to academic development on three distinct levels (Bandura, 1993). The first is perceived self-efficacy at the student level and manifests itself in the student's perception of their ability to control learning and master concepts. This perception in turn determines a student's aspirations, motivation and accomplishments. The second measure of self-efficacy is at the teacher level, determining the degree to which a teacher perceives their ability to motivate students and promote learning. A teacher's perceived self-efficacy impacts the type of learning environment they create for their students, which in turn impacts student level self-efficacy. As Bandura (1993) posits the third is collective self-efficacy which is a teacher's belief not in their own efficacy but their perception of their colleague's efficacy. Faculty perceived efficacy positively correlates to school level achievement (Bandura, 1993; Goddard, Goddard, Kim, & Miller, 2015; Ross, Hogaboam-Gray, & Gray, 2010).

Bandura (1986) identifies four types of social experiences that produce information that impacts efficacy beliefs: (1) mastery experience, (2) vicarious experience, (3) social persuasion, and (4) affective states. Adams & Forsyth (2006) argue that viewing collective efficacy solely

34

from their source, for example collective efficacy from mastering concepts, ignores important contextual and environmental variables. Their study of 79 schools found that the structure of the school, especially enabling structures that promote collective action, have a larger impact on collective teacher efficacy than socio economic status. Similarly many studies point to school contextual factors significantly impacting collective teacher efficacy. In a study of 2,170 teachers in 141 elementary schools, Ross et al. (2010) found that school process variables facilitating teacher ownership of success and failures contribute to collective teacher efficacy by prompting teachers to think about mastery experiences and by providing opportunities for teachers to observe colleagues allowing for vicarious experience.

Goddard et al. (2015) elaborated on the empirical evidence supporting the use of collaborative structures to impact student achievement through collective teacher efficacy. The study found that the degree to which teachers engaged in collaborative activities to improve instruction was positively correlated to a principal's instructional leadership. They concluded that principal leadership is necessary to develop teacher collaborative practices and is necessary to in turn work toward improving student achievement.

The ultimate aim of the present study is to connect instructional coaching to increased student achievement. The proven connection between student achievement and collective teacher efficacy beliefs supports the use of collective teacher efficacy measures to investigate the impact multi-tiered instructional coaching has on student achievement.

A review of the literature supports the interconnectedness of the three constructs to coaching—social capital, structural intentionality, and collegial focus, which this study explored, and lends credence to the selection of an embedded case study methodology seated firmly in the pragmatic ontology. The exploration, data collection and analysis were undertaken from the

reflective epistemology assuming the generation of meaning encompasses aspects of interaction

that are interrelated to other systems of meaning (Corbin & Strauss, 2015).

CHAPTER 3: METHODOLOGY

Study Plan

The goal of this investigation was to explore how embedding social capital theory into an instructional coaching model can achieve a return on investment by changing educator practice, improving teacher effectiveness, and increasing student achievement. This goal was achieved by illuminating the incorporation of three constructs of social capital theory into the instructional coaching processes. Analysis documented whether these interventions resulted in institutionalized changes in teacher practice and positively impacted collective teacher efficacy.

An embedded single-case design (Yin, 2014) was used to explore a critical case in which social capital theory (Coleman, 1988; Daly, 2010; Granovetter, 1973; Nahapiet & Ghoshal, 1998; Penuel et al., 2009; Putnam, 2000) is embedded within the constructs of a multi-tiered instructional coaching model implemented at Eagle High School. Using a mixed method design (Creswell, 2014) the social network within the school was analyzed as a whole and random sampling preceded by stratification for the number of years an educator worked within the school was used to select a sample for detailed analysis of the instructional coaching model's impact on collective teacher efficacy and institutionalized changes in teacher practice. Consistent with grounded theory analysis, theoretical sampling was used to code the initial survey and interview data in order to tease out salient concepts that informed further sampling and subsequent analysis (Corbin & Strauss, 2015). This data collection, coding, analysis, and sampling cycle continued until saturation was achieved.

Case study was the most apt methodology for this inquiry as it enables the researcher to investigate a critical case that has multiple variables and a limited number of data points (Yin, 2014). Several sources of data linked to a multi-tiered instructional coaching model at Eagle

High School was collected with the goal of validating the data to support three theoretical propositions related to the constructs of social capital, structural intentionality, and collegial focus. The intent of this investigation was to provide evidence that embedding constructs of social capital theory into an instructional coaching model results in institutionalized changes in teacher practice and positively impact collective teacher efficacy.

Evidence was collected to inform three distinct units of analysis as outlined in Table 4: (1) the social network as a whole within the Eagle High School, (2) teachers who worked at the school for up to and including 4 years (ego-network 1), and (3) teachers who worked at the school for 5 or more years (ego-network 2). As Table 4 illustrates, the whole network analysis was conducted at the onset of the study to map network density, ego reciprocity, degree centrality, and collective efficacy quantitatively. These data were validated (or otherwise) with subsequent interview data and field notes to explore educator's perceptions of how the social structure patterns and collegial focus impacted their teacher effectiveness by leading to changes in practice. It is hoped that this evidence will support the replication of the instructional coaching model into other schools across the district by benchmarking causal elements of why the coaching model at Eagle High School yields higher collective teacher efficacy. My study began with a survey to determine if collective teacher efficacy, social network density, reciprocity, and centrality were present at high levels.

Case Study Question and Propositions

How does embedding social capital theory into an instructional coaching model impact teacher practice and collective teacher efficacy?

Table 4

Logic Model – Data Collection and Analysis in an Embedded, Single-Case Design

		Kinds of Data			
Unit Being Analyzed	Survey	Interview Teachers	Interview Admin.	Interview Coach	Field Notes
Coaching Social Network	Nodes, ties, structural dimensions; Collective Teacher Efficacy	Validate Social Network data, infer transparent flow of information through network; infer link between collegial foci, intentional structure and outcomes	Validate Social Network data, infer transparent flow of information through network; infer link between collegial foci, intentional structure and outcomes	Validate Social Network data, infer transparent flow of information through network; infer link between collegial foci, intentional structure and outcomes	Validate Social Network data, infer transparent flow of information through network; infer link between collegial foci, intentional structure and outcomes
Educator 1 (0-5 Years)	Ties, structural dimensions; Collective Teacher Efficacy	Validate social network & Collective Teacher Efficacy data	Infer link between collegial foci, intentional structure and outcomes	Infer link between collegial foci, intentional structure and outcomes	Validate Social Network data, infer link between collegial foci, intentional structure and outcomes
Educator 2 (6+ Years)	Ties, structural dimensions; Collective Teacher Efficacy	Validate social network & Collective Teacher Efficacy data	Infer link between collegial foci, intentional structure and outcomes	Infer link between collegial foci, intentional structure and outcomes	Validate social network & Collective Teacher Efficacy data

Instructional coaching may enact changes in educator practice if:

1. Instructional coaching harnesses *social capital* by strengthening ties (relationships) and facilitating the flow of resources (peer expertise);

2. *Intentional coaching structure* is purposefully designed to strengthen the ties and flow of resources within the school's existing social network; and

3. The coaching model has, at its foundation, a clearly articulated, transparent, *collegial focus* designed to strengthen ties and focus the flow of resources, as measured by changes in a educator's collective efficacy score (Goddard & Hoy, 2003) and changes to the social network measures—density, degree centrality, and ego reciprocity.

As teachers at Eagle High School engage in multi-tiered coaching processes their classroom doors are opening and their colleagues are being invited in. I propose that the interventions inherent in one to one coaching, peer coaching, a structured feedback cycle, and all focused through a common instructional framework, serve to embed key components of social capital theory in such a way that leads to institutionalized changes in teacher practice and positively impact collective teacher efficacy. Table 5 details the intervention, data source, and analysis method planned for each case study proposition. These will be discussed in detail in subsequent sections.

Eagle High School currently has one external coach who works with all teachers on implementing the school's common instructional framework. In addition, peer instructional coaching is present as teachers engage in peer instructional rounds twice per month. Eagle High School holds a strongly institutionalized belief that students read, write, think and talk in every classroom every day. This collegial focus underpins six strategies (group work, discourse, questioning, scaffolding, reading to learn and writing to learn) which serve as a common

40

Table 5

Case Study Design

Proposition	Intervention	Data Source	Analysis
Instructional coaching must harness social capital by strengthening ties and facilitating the flow of resources in the network.	Peer Instructional Rounds	Collective Teacher Efficacy Scale (Goddard & Hoy, 2003) Social Network Survey Interviews Field Notes	Measure of Collective Teacher Efficacy Network Density Degree Centrality Reciprocity Coded concepts that stand for the data Thought process for each round of coding
The coaching model must have at its foundation a clearly articulated, transparent collegial focus designed to strengthen ties and focus the flow of resources.	Common instructional framework	Collective Teacher Efficacy Scale (Goddard & Hoy, 2003) Social Network Survey Interviews Field Notes	Measure of Collective Teacher Efficacy Degree Centrality Ego Reciprocity Coded concepts that stand for the data Thought process for each round of coding

Table 5 (continued)

Proposition	Intervention	Data Source	Analysis
Intentional coaching structures must be deliberately designed to strengthen the ties and flow of resources within the school's existing social network.	Feedback cycle	Collective Teacher Efficacy Scale (Goddard & Hoy, 2003)	Measure of Collective Teacher Efficacy
		Social Network Survey	
		Interviews	Degree Centrality Ego Reciprocity
		Field Notes	Coded concepts that stand for the data
			Thought process for each round of coding

instructional framework for the current external instructional coach as well as for the peer

instructional coaching model present within the school. These strategies are further focused

during the peer coaching process as teachers identify not only the pedagogical strategy they are

implementing, but translate this strategy into a student learning question that focuses data

collection efforts during the rounds process.

Multi-tiered instructional coaching as defined in this model includes repeated use of a

feedback cycle by external coaches, administrators, and peers; linked together through three

constructs: (1) social capital, (2) intentional structures, and (3) collegial focus. The coaching

process includes three distinct steps which will be referred to as the *feedback cycle* in this

investigation. The first action step in the feedback cycle is stage setting and is comprised of an

educator sharing details about the lesson to be observed or a professional dilemma to be

discussed. This step is guided by the question: what are we looking for and how will we collect

the data? The purpose for this step is to ensure that feedback is focused on the educators' desired

outcome of the coaching session.

The second action step in the feedback cycle is data collection occurs during direct

classroom observation. The purpose of this step is to collect focused evidence to inform feedback

during the final stage in the feedback cycle.

The final action step in the feedback cycle is reflection/debrief and includes a focused

feedback discussion where evidence collected during the observation step is shared, discussion is

focused on making meaning of the evidence data, and refining subsequent actions. The purpose

of this step is to use evidence to engage educators in reflective dialogue to collectively improve

practice.

Social Network Analysis and Grounded Theory

Grounded theory was used to analyze the quantitative social network analysis data, collective teacher efficacy data, interview data, and field notes. As Corbin and Strauss (2015) contend, this method of analysis allows for the reduction of a vast amount of data into salient concepts that can be applied to the case study propositions in order to generate meaning. Several levels of analysis occurred beginning with collecting data to support basic level concepts by importing interview data into NVivo (2017, NVivo 11 for Windows Pro Version 11.4.1.1064) and coding each source. This initial analysis was compared to the case study propositions and informed several subsequent levels of analysis which recoded existing data sources or imported additional data to answer the research questions.

Social Network Analysis (SNA) was utilized to investigate how three constructs of social capital theory (embeddedness, structure, and focus) impact collective teacher efficacy when embedded in a multi-tiered instructional coaching model. SNA uses multiple levels of analysis to investigate a social network (Borgatti & Ofem, 2010; Gündüz-Ogüdücü & Etaner-Uyar, 2014; Nahapiet & Ghoshal, 1998; Scott, 2012). SNA survey data measured the density, centralization, and reciprocity of the network as a whole and then analyzed node level data measures of degree centrality and ego-reciprocity. Daly et al. (2014) and Gündüz-Ogüdücü and Etaner-Uyar (2014) define the metric of network density as the ratio of the number of ties as a proportion of the total number of possible ties between educators. Goddard et al.'s (2000) Collective Teacher Efficacy long form scale was utilized to calculate the collective teacher efficacy of each staff member as well as for the whole school.

Survey Data

The case study survey was administered at the onset of the study using the Qualtrics online survey platform. The survey began with a question soliciting informed consent to participate in the research. It included three sections: demographic information, social network survey, and collective teacher efficacy scale. Unfortunately, the Collective Efficacy Scale questions on the Qualtrics survey were invalid due to the inclusion of a "neither" option. Consequently, all survey respondents were administered a paper copy of the Collective Efficacy Scale and calculations were tabulated manually and carefully checked to ensure accuracy.

All faculty listed in the social network survey were asked to complete the online Qualtrics survey. The survey included 12 total demographic and social network questions as detailed in Table 6. Questions 1 through 7 requested informed consent and demographic information. Two questions, Q8 and Q9, were intended to measure instrumental networks to get a sense of the flow of teaching and learning information through the social network. Question 8, *In the grid below, please check off how often you speak to each individual about student learning (assessments, feedback, mastery of standards, etc.)*, specifically invoked student learning to get a sense of the student specific information flowing throughout the network, as opposed to social interaction in general. Discussing student learning may indirectly lead to changes in practice if the discussion moved to specific teaching strategies that are effective to address student learning. Question 9, *In the grid below, please check off how often you speak to each individual about teaching strategies (Collaborative Groupwork, Critical Reading, Writing, Questioning, Discourse, etc.)*, specifically addressed teaching strategies, and was included to get a sense of the flow of information related to specific strategies that teachers utilized. This question is directly

Table 6

Social Network Survey

Question Number	Survey Item
Q1	Consent
Q2	Your name
Q3	What is your age?
Q4	What is your gender?
Q5	How many years have you worked in education?
Q6	How many years have you worked at your current school?
Q7	What department do you work in?
Q8	In the grid below, please check off how often you speak to each individual about student learning (assessments, feedback, mastery of standards, etc.).*
Q9	In the grid below, please check off how often you speak to each individual about teaching strategies (Collaborative Groupwork, Critical Reading, Writing, Questioning, Discourse, etc.).*
Q10	In the grid below, please check off how often each individual listens to you about a problem you are facing.*
Q11	In the grid below, please check off how often you speak to each individual about a problem they are facing.*

Notes: Questions 1-6 gather basic demographic data and will be multiple choice items, Questions 7-10 gather social network data and are included in a grid form in the survey instrument with the first name and last initial of all colleagues within the school.
*Gridded response choices will included: (1) Once a year or less, (2) Every few months, (3) Every few weeks, (4) Once a week, (5) Every day.

linked to changes in educator practice as teachers discuss specific strategies that they can try in their own classrooms.

The final two questions (Q10 and Q11) were intended to measure the informal expressive networks within Eagle High School. Question 10, *In the grid below, please check off how often each individual listens to you about a problem you are facing,* specifically referred to a person discussing their problems with another person, and question 11, *In the grid below, please check off how often you speak to each individual about a problem they are facing*, specifically referred to others listening to another person share their problems. Both Question 10 and Question 11 included to get a sense of the flow of personal information through the network. These two questions provide information on the degree of relational trust and collegiality within the network.

SNA requires the use of participant names during the collection process, but the actual teacher names were replaced after the data were collected to preserve anonymity. My study also included the collection of data through interviews. The interview sample was randomly selected based on survey response, therefore identifiable information had to be collected. Confidentiality was ensured through several procedures designed to protect the data during collection, storage, analysis, and reporting. First, all data were stored on the secure PiratePort server at East Carolina University.

The second confidentiality procedure involved distributing surveys via the ECU Qualtrics platform using the personal link tab in that platform to generate a custom distribution link for individually selected email contacts. The email included a brief description of the research, a request to complete the survey, and an explanation of the incentive terms. It also included a letter of introduction and a copy of the informed consent information as attachments.

The third procedure to ensure confidentiality while also maintaining reliability was to create a key linking participant names to a unique number identifier. The fourth procedure to ensure confidentiality included recoding all data (including interview data) to replace names with the numerical identifier prior to analysis. The unique number identifier used the naming format of "Educator N" or "EN"with N equaling the unique number assigned to replace each participant's name.

Adjacency matrix and network graph. Social network survey (see Table 6) data were represented in a series of algebraic representations called adjacency matrixes. An adjacency matrix is a square array of numerical elements arranged in rows and columns with as many rows and columns as nodes in the graph (Borgatti, Everett, & Johnson, 2013; Wassermsn & Faust, 2009). Each cell represents information about the relations of the given node. Adjacency matrices can be unweighted (dichotomized), where 0 or 1 represents the absence or presence, respectively, of a tie between nodes or weighted (valued) where the value represents the frequency of interaction between two nodes or the number of relational ties.

Social network survey data from Qualtrics were imported into UCINET (Version 6.646, Borgatti, Everett, & Freeman, 2002) where an adjacency matrix was completed for each network question category. NetDraw was then used to draw a whole network graph illustrating each network question category. From these data sets whole network measures of density and degree centralization, indegree and outdegree centrality were calculated; and the dyad level metric of ego reciprocity was calculated. These calculations are explained in detail in subsequent sections.

Density. Density is calculated as the number of ties in a network displayed as a proportion dividing the number of observed ties in a network by the total number of possible ties within the same network (Borgatti et al., 2013; Knoke & Yang, 2008; Wasserman & Faust,

2009). Wasserman and Faust (2009) contend that network density alone is an oversimplified measure of centrality and thus should be analyzed in conjunction with other network measures; therefore I also considered ego reciprocity and degree centrality were used to triangulate the network density measures, in an effort to more accurately portray the intervention effect.

Degree centrality. Degree centrality is a basic measure of network structure and is the number of ties incident on a given node (Borgatti et al., 2013). As described by Wasserman and Faust (2009), centrality for directed data can be reported as indegree (the number of incoming ties to a given node) and outdegree (the number of outgoing ties from a given node). Indegree represents the number of incoming ties a given node receives and is an index of prestige in a network as nodes with a high number of incoming ties have a high level of access and control over network capital. Outdegree centrality represents the number of outgoing ties a given node reports (Wasserman & Faust, 2009). Degree centrality is

$$C_D(N_i) = d(n_i) = X_{i+} = \sum_j X_{ij} = \sum_j X_{ji}$$

Where $C_D(N_i)$ is the degree centrality for node i with X_{ij} representing the number of outgoing ties for node i and X_{ji} representing the number of incoming ties for node i.

Wasserman and Faust (2009, p. 179) propose a standardized measure for degree centrality in order to compare centrality measures across networks. This standardized calculation will be utilized:

$$C_D(N_i) = \frac{d(N_i)}{g - 1}$$

Where $C_D(N_i)$ is the degree centrality for node i, $d(N_i)$ is the degree (or realized incidents) for node $i,$ and $g - 1$ represents the total possible incidents for node i as nodes cannot be connected to themselves (no self loops).

Centrality measures begin with measures at the node level, may compare individual nodes by ranking centrality measures, and may be calculated to combine node level data into group degree centralization to compare multiple networks. The following calculation will be utilized to compute group level centralization:

$$C_D = \frac{\sum_{i=1}^{g}[C_D(n^*) - C_D(n_i)]}{g - 1}$$

Where $C_D(n^*)$ is the maximum node centrality present in a given network, $C_D(N_i)$ is the degree centrality for node i, and $g - 1$ represents the total possible incidents for node i as nodes cannot be connected to themselves (no self loops). This group level calculation measures the variability of node level centrality. Graph centralization was reported as indegree graph centralization and outdegree graph centralization depicting a summary of the range of centralization across the network.

Ego reciprocity. Wasserman and Faust (2009) propose three dyadic isomorphism classes in which reciprocity is represented as an unordered ordered pair. The first isomorphism class is a mutual dyad (M) represented as $D_{ij} = (X_{ij}, X_{ji})$ whereas node i chooses node j and j chooses i represented as $i \leftrightarrow j$. In this instance $X_{ij} = 1$ and $X_{ji} = 1$, so the dyad is represented as $D_{ij} = (1,1)$. The second isomorphic class is an asymmetric dyad (A) which can represent data in one of two states as either i chooses j but j does not choose i represented as $i \rightarrow j$ that is $X_{ij} = 1$ and $X_{ji} = 0$, with the dyad represented as $D_{ij} = (1,0)$ or j chooses i but i does not choose j represented as $i \leftarrow j$ that is $X_{ij} = 0$ and $X_{ji} = 1$, with the dyad represented as $D_{ij} = (0,1)$. The final isomorphism class is a null dyad (N) where neither i nor j choose the other whereas $X_{ij} = X_{ji} = 0$, so the dyad is represented as $D_{ij} = (0,0)$.

Ego reciprocity is the number of reciprocated ties as a proportion of the total possible ties for a given node (Borgatti, et al. 2013). This metric can only be computed on directed network data at the dyad level and requires data be displayed in an adjacency matrix with ordered pairs as described above. In a directed network with g nodes the measure of all possible arcs is calculated $g(g-1)/2$. Wasserman and Faust (2009) suggest calculating the frequencies of each isomorphism class as:

Mutual dyads

$$M = \sum X_{ij}X_{ji} \text{ where } i < j$$

Asymmetrical dyads

$$A = X_{++} - 2M$$

where X_{++} equals the number of ties present in the network

Null dyads

$$N = \left(\frac{g(g-1)}{2}\right) - A - M$$

In this calculation each dyad is counted only once as there are $g(g-1)/2$ dyads, however there are g(g-1) ordered pairs of actors. In this sense, reciprocity is the number of unordered pairs of actors and the arcs connecting them. Analysis of ego reciprocity begins by studying the proportion for all isomorphism classes as well as for all present ties

Mutual dyad reciprocity

$$\frac{M}{g(g-1)/2}$$

Asymmetrical dyad reciprocity

$$\frac{A}{g(g-1)/2}$$

Ego reciprocity

$$\frac{M + A}{g(g - 1)/2}$$

Collective Efficacy Scale

Table 7 shows the Collective Efficacy Scale (CE-Scale) which is comprised of 21 items

which have been extensively tested for both validity and reliability by creators Goddard et al.

(2000). Collective efficacy is calculated by reversing the scale for items 3, 4, 8, 10, 11, 12, 16,

18, 19, and 20 then totaling the items for all 21 responses. The higher the total, the greater the

collective efficacy. The whole school collective teacher efficacy can be calculated by finding the

mean of all faculty responses. It is necessary for this investigation to compare the collective

efficacy of Eagle High school to other educator groups in order to determine if the intervention

of peer and one to one coaching impact collective efficacy. For this reason, the standardized

score will be utilized to compare Eagle High to the normative sample. Goddard et al. (2000)

propose converting the Collective Efficacy Scale score to a standardized score using the

following algebraic calculation:

$$SdS \ for \ CE = \frac{100(CE - 4.1201)}{.6392 + 500}$$

Interview Protocol

Initially, I interviewed five educators. They were randomly selected from the faculty

based on their years employed at the school. This information was obtained from the

demographic information section of the survey. Consistent with grounded theory analysis,

theoretical sampling was used to code the initial interviews in order to tease out salient concepts

that informed further sampling and subsequent analysis (Corbin & Strauss, 2015). This data

collection, coding, analysis, and sampling cycle continued until saturation was achieved. The

Table 7

Collective Efficacy Scale, Long Form (CE-Scale, Form L)

Question #	Statement	Ratings*
Q1	Teachers in the school are able to get through to the most difficult students.	1 2 3 4 5 6
Q2	Teachers here are confident they will be able to motivate their students.	1 2 3 4 5 6
Q3	If a child doesn't want to learn teachers here give up.	1 2 3 4 5 6
Q4	Teachers here don't have the skills needed to produce meaningful student learning.	1 2 3 4 5 6
Q5	If a child doensn't learn something the first time the teachers will try another way.	1 2 3 4 5 6
Q6	Teachers in this school are skilled in various methods of teaching.	1 2 3 4 5 6
Q7	Teachers here are well prepared to teach the subjects they are assigned to teach.	1 2 3 4 5 6
Q8	Teachers here fail to reach some students because of poor teaching methods.	1 2 3 4 5 6
Q9	Teachers here in this school have what it takes to get the children to learn.	1 2 3 4 5 6
Q10	The lack of instructional materials and supplies makes teaching very difficult.	1 2 3 4 5 6
Q11	Teachers in this school do not have the skills to deal with student discipline problems.	1 2 3 4 5 6
Q12	Teachers in this school think there are some students that no one can reach.	1 2 3 4 5 6
Q13	The quality of school facilities here really facilitates the teaching and learning process.	1 2 3 4 5 6

Table 7 (continued)

Question #	Statement	Ratings*
Q14	The students here come in with so many aadvantages they are bound to learn.	1 2 3 4 5 6
Q15	These students come to school ready to learn.	1 2 3 4 5 6
Q16	Drugs and alcohol abuse in the community make learning difficult for students here.	1 2 3 4 5 6
Q17	The opportunities in this community help ensure that these students will learn.	1 2 3 4 5 6
Q18	Students here just aren't motivated to learn.	1 2 3 4 5 6
Q19	Learning is more difficult at this school because students are worried about their saftey.	1 2 3 4 5 6
Q20	Teachers here need more training to know how to deal with these students.	1 2 3 4 5 6
Q21	Teachers in this school truly believe every child can learn.	1 2 3 4 5 6

Note. Collective Teacher Efficacy survey items are adapted from the Collective Efficacy Scale, Form L (Copyright© Goddard & Hoy, 2003).
*Ratings: (1) Strongly Disagree, (2) Disagree, (3) Somewhat Disagree, (4) Somewhat Agree, (5) Agree, (6) Strongly Agree.

number of further interviews as well as the randomized selection criteria was informed by the concepts derived from each stage of analysis.

I made every effort to employ an unstructured interview format to provide a rich data set for analysis (Corbin & Strauss, 2015). Each interview began with the following introduction:

Tell me about your teaching experience at this school. I want to hear your thoughts on how the entire faculty impacts student learning. I want to hear the story in your own words. After you have completed your narrative, if I have questions about what you have said or need clarification about a topic, I will ask you. But for now, just talk freely.

I listened to each participant's response to the opening statement, which covered the topic and questions in Q1 outlined in Table 8, noting when and to what degree the participant discussed each of the 7 topics. As the participant ended his or her narrative, I prompted topics not discussed or needing further elaboration using the topic format *talk to me about.* Table 8 incudes possible questions used only in the event that the participant needed more detailed probing to elicit each topic in sufficient depth.

Table 8

Interview Protocol

Question Number	Topic Talk to me about…	Question
Q1.	Perceived impact of faculty on student learning	How effective do you feel the school is at educating students? What factors do you feel contribute to this impact?
Q2.	The common instructional framework	Tell me about how you incorporate the common instructional framework.
Q3.	Changes in practice	What changes in practice did you experience this year? What changes in practice do you feel your colleagues have experienced this year?
Q4.	Peer instructional rounds	Share your experience with peer instructional rounds and how, if at all this process impacted that change? How, if at all do you think this process has impacted your colleagues change in practice?
Q5.	Professional learning communities	Did your professional learning community meetings support this change? How? How do you think your professional learning community meetings supported your colleagues in changing their practice?
Q6.	The instructional coach	Share your experience with your instructional coach and how this impacted the change?

Table 8 (continued)

Question Number	Topic Talk to me about…	Question
Q7.	Effectiveness	Do you feel you are more effective right now than you were at the start of the school year? Why?
		Do you feel your colleagues are more effective now than they were at the start of the school year? Why?

CHAPTER 4: RESULTS

The purpose of my investigation was to determine if the multi-tiered coaching model at Eagle High School, viewed through the constructs of social capital theory, contributed to high teacher efficacy and, by association, high student achievement. My study served as a benchmarking investigation which examined the coaching processes in place at Eagle High School, teased out how these processes harnessed the social capital of the professionals within the building, and delineated the properties and dimensions of the social interactions characteristic of the instructional coaching context in order to revise and inform Riverside Public School's districtwide instructional coaching model. My study looked at two distinct groups of educators within the school to investigate how embedded each group was in the social networks within the school. The first group included educators who had been employed at Eagle High School for between 0 and 4 years, and the second group included educators who had been employed at the school for 5 or more years.

I utilized a mixed methods approach to data collection, gathering (1) quantitative data by means of a social network survey and augmenting the social network data with the outcome of teachers' responses on the Collective Efficacy Scale (Goddard & Hoy, 2003), and (2) qualitative data through interviews and field notes in order to triangulate my theorizing. The social network survey yielded responses from 11 out of a potential 15 educators. Social Network Analysis (Borgatti et al., 2013; Wasserman & Faust, 2009) was conducted on the 11-member network of respondents, as non-respondent data were removed, yielding an analysis of 110 possible pair-wise combinations across four different sub-networks emerging from the survey data. Eight of the 11 social network survey respondents were interviewed about their overall experience at Eagle High School, as well as their perceptions of peer instructional rounds, and one-to-one

coaching. All eight educators who were interviewed also completed the Collective Efficacy Scale (Goddard & Hoy, 2003). They were asked to complete it prior to their interview. The remaining three social network survey respondents were given a copy of the Collective Efficacy Scale, and were asked to complete it and return to me. In all, nine of the 11 social network survey respondents completed and returned the Collective Efficacy Scale. In order to provide insight into potential biases in my study, I have provided a summary of the characteristics of non-respondents in Appendix D. Figure 6 provides a summary of the participation of the Eagle High School teachers in my study.

Respondent Characteristics

As shown in Table 9, of the 11 social network survey respondents, six (55%) had been employed at Eagle High School for up to and including 4 years, and five (45%) had been employed at the school for 5 or more years. Of the eight interviews I conducted, three interviewees (38%) had been employed at the school for 5 or more years, and five (63%) had worked at the school for up to and including 4 years. During the interviews conducted with some of the social network survey respondents, employment at the school was further delineated as two (E6 and E8) of the eight educators interviewed explained that they were in their first year at Eagle High School. Notably, two educators (E4 and E9) drew a distinction between themselves and the newer staff members. They both indicated they had been at the school for several years, and asserted that they had a solid understanding of the unique processes for collaboration within the school. When recounting their experience at the school in relation to their colleagues, it was clear to me that they considered themselves among the "experienced" staff. The self-confidence of E4 and E9 regarding the collaborative processes in Eagle High School highlights the link

Eagle High School Educators
n=15

Social Network Survey
n=11

Interview Participants
n=8

Collective
Efficacy
Survey
n=8

Non-Interview
Participants
n=3

Collective
Efficacy
Survey
n=2
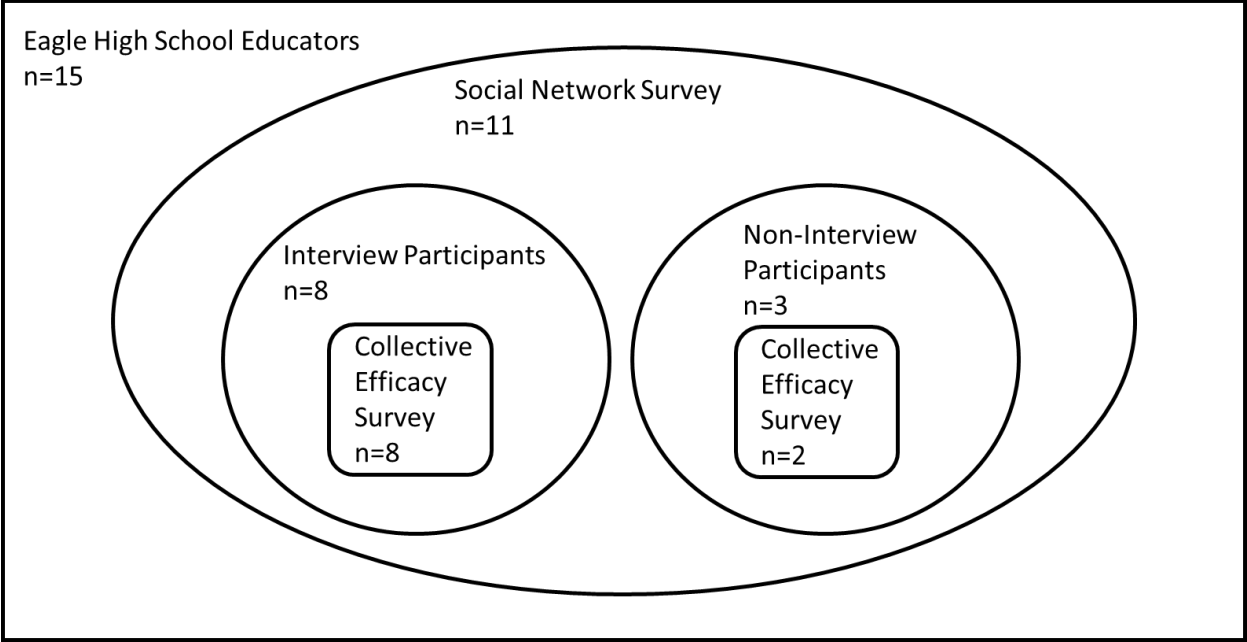
Figure 6. Summary of Eagle High School educators' participation.

Table 9

Demographic Composition of Social Network Survey Respondents

Educator	Years in Education	Years at Eagle High School	Content Area
E1	10 to 19 years	5 to 9 years	English Language Arts
E2*	20 to 29 years	10 to 19 years	Social Studies & Support Staff
E3*	5 to 9 years	5 to 9 years	English Language Arts
E4*	10 to 19 years	0 to 4 years***	Social Studies
E5	over 30 years	0 to 4 years	Foreign Language
E6*	5 to 9 years	0 to 4 years**	English Language Arts
E7*	10 to 19 years	0 to 4 years	Science
E8*	20 to 29 years	0 to 4 years**	Administrator
E9*	5 to 9 years	0 to 4 years***	Science
E10*	over 30 years	5 to 9 years	Mathematics
E11	over 30 years	5 to 9 years	Instructional Coach

Note. *Indicates a survey respondent who also participated in an interview. **Indicates educators in their first year at Eagle High School. ***Indicates educators who are ending their 4th year of employment at the school.

between longevity and familiarity with the local mores of collaboration, as both these educators were ending their fourth year at the school.

Notwithstanding the above comments about the pertinence of longevity, the demographic components of the social network survey revealed comparisons between "years in education" and "years at Eagle High School." As shown in Table 9, three (27%) of participating Eagle High School educators were in their first 10 years in education, three (27%) were in the mid-range of their career with 10 to 19 years of experience, and the remaining five (45%) educators had 20 or more years of experience in education.

Broad Confirmation of Propositions

To recap, my investigation was structured around three propositions. The first, proposition 1 (Instructional coaching harnesses social capital by strengthening ties (relationships) and facilitating the flow of resources (peer expertise) in the network) was intended to look at the effectiveness of peer coaching processes. My intent was to investigate whether the peer coaching processes impacted the flow of information through the network. One-to-one coaching may result in a very one-sided flow of capital through a network as the coach provides feedback and information to an individual educator. Ultimately, that coached educator can either act on the information or not. While there is a chance that this coached educator will share the information with another colleague, the one-to-one coaching processes themselves do not serve to directly diffuse information through the school network. Peer coaching, however, is intended specifically to diffuse information through the network as educators engage in deliberate processes that require colleagues to come into their classrooms to collect data and then to share their observational data when they are done. This peer coaching process is intended to leverage social capital. In general, both network and interview data served to validate this proposition.

The second proposition (an intentional coaching structure is purposefully designed to strengthen the ties and flow of resources within the school's existing social network) was intended to look not only at the connections across the social networks but also to tease out whether or not it is the specific coaching structures that are serving to diffuse information across the network. The phenomenon that I studied through the lens of proposition two was specifically the feedback cycle that was operationalized by both the instructional coach and the peer coaching processes in existence at the school. The highly structured process of holding a pre-conference to discuss what the observers would be looking for when they observed a colleague, the data collection phase that drove the feedback cycle, and the culminating debrief session to discuss the data constituted an intentional structure. This ensured that peer coaching leveraged the existing social capital among the educators within the building and empowered the feedback cycle, resulting in educators collectively honing their professional practice.

The third proposition (the coaching model has, at its foundation, a clearly articulated, transparent collegial focus designed to strengthen ties and focus the flow of resources in the network) was intended to look at exactly what information was flowing through the network. Eagle High School had a common instructional framework that consisted of a set a strategies with which the teachers were generally familiar. These constituted something analogous to an instructional vocabulary which it was expected teachers would use consistently to teach their content. In researching this proposition, the focus of my attention was the common instructional framework.

Social Network Survey

As discussed above, I distributed a social network survey to educators at Eagle High School. The survey included a total of 12 demographic and social network questions as detailed

in Table 6. Questions 1 through 7 solicited informed consent and demographic information. These were followed by four questions that were specifically oriented to disclosing the social network in Eagle High School. Question 8 prompted respondents as follows: "In the grid below, please check off how often you speak to each individual about student learning (assessments, feedback, mastery of standards, etc.)." I envisioned responses to this prompt would provide evidence regarding the flow of student-specific information through the formal instrumental network. Recall that an instrumental network is one in which formal information such as knowledge or skills flow through the network for contributory purposes (Cole & Weinbaum, 2010; Moolenar & Sleegers, 2010).

Discussing student learning may indirectly lead to changes in practice, particularly if the discussion moves to specific teaching strategies that might be effective in promoting student learning. Hence, my second network question, Question 9, prompted respondents as follows, "In the grid below, please check off how often you speak to each individual about teaching strategies (Collaborative Groupwork, Critical Reading, Writing, Questioning, Discourse, etc.)." I envisioned that responses to this prompt would provide evidence regarding the flow of information related to specific strategies that teachers utilize. This question is directly linked to changes in educator practice as teachers discuss specific strategies to try in their own classrooms. The question informed the second formal instrumental network around teaching strategies.

Questions 10 and 11 are effectively mirror images intended to document the informal, expressive networks at Eagle High School. Recall that an expressive network is one in which informal information such as advice or social details flow through the network for collegial support purposes (Cole & Weinbaum, 2010; Moolenar & Sleegers, 2010). Question 10 prompted respondents as follows, "In the grid below, please check off how often each individual listens to

you about a problem you are facing," whereas Question 11 prompted "In the grid below, please check off how often you speak to each individual about a problem they are facing." I envisioned responses to these two questions would provide evidence to document the flow of personal information through the network. The archetypical network that exhibits strong collegial ties is characterized by a high degree of relational trust. Questions 10 and 11 were intended to quantify this measure. Further, Question 11 was intended to elicit educators' perceptions about their personal embeddedness within the network. My intention was to compare the responses to Questions 10 and 11 to get a complete picture of the level of relational trust and collegiality within the school. Both relational trust and collegiality have been shown to significantly impact the diffusion of innovation and information through a network, so it is vital to get a complete picture of this measure (Moolenaar & Sleegers, 2010; Penuel, Frand, & Krause, 2010).

Adjacency Matrices

Data from each of the four network questions were recorded in individual adjacency matrices in *Microsoft Excel* and later processed using *Ucinet 6 for Windows* (Borgatti et al., 2002). An adjacency matrix "is a matrix in which the rows and columns represent nodes and an entry in row *i* and column *j* represents a tie from *i* to *j*" (Borgatti et al., 2013, p. 18). In other words, a particular respondent is "adjacent" to the colleague he or she identifies in response to the prompt. The survey yielded directed data, as all educators were asked to report outgoing ties with other educators. Directed data preserves the sense of who identified whom. As shown in Appendix E for Question 8, the anonymous identifiers for all respondents are recorded in column 1, and repeated across the columns of row 1, yielding a square matrix. The directionality of the tie is implied as "from row to column." This raises an important point in that the meaning

65

conveyed by the entries in an adjacency matrix are inherent in the interpretation of those entries, not in the nature of the entries themselves.

Valued adjacency matrices. The point I have just made about the meaning conveyed by the entries in the adjacency matrix underlies the fact that the four social network question items yielded valued data which related to the frequency of collegial interaction around four topics: Q8 student learning, Q9 teaching strategies, Q10 personal problems, and Q11 others problems. My survey prompted educators to report the frequency of interaction around each topic reported as "never" and "once a year or less" (both coded as "0" in the valued adjacency matrices to reflect my judgement that such infrequent interactions were very unlikely to be pertinent to either teaching and learning or interpersonal relationships—in retrospect, I could well have omitted "never"), "every few months" (coded as "1" in the valued adjacency matrices), "every few weeks" (coded as "2" in the valued adjacency matrices), "once a week" (coded as "3" in the valued adjacency matrices), and "every day" (coded as "4" in the valued adjacency matrices).

As these data were constructed from self-reported responses to my social network survey, however the validity of such data has been called into question. For example, in an interorganizational network study, Calloway, Morrissey, and Paulson (1993) commented that "since surveys rely on individual memories, the quality of the data can be suspect on the grounds of reliability" (p. 381). One method for enhancing the reliability of self-reported social network survey responses is to dichotomize the responses (Calloway et al., 1993). Hence, in my study, the valued network data were dichotomized (recoded into binary form) for my analysis of strong and weak ties in two distinct ways.

Greater than 2 (GT2) dichotomized adjacency matrices. The first set of dichotomized data, referred to subsequently as GT2 (greater than 2), took the valued adjacency matrix and

recoded all values greater than "2" as the presence of a strong tie, and "1" and all other values as "0." Essentially, this GT2 data identified reported weekly or daily interaction as the presence of a strong tie, coded as "1" in the dichotomized adjacency matrix. All other identified frequency of interaction was considered as a self-reported weak tie and thus coded as "0."

Greater than 1 (GT1) dichotomized adjacency matrices. The second set of dichotomized data, referred to subsequently as GT1 (greater than 1), recoded the original valued data so that all values greater than "1" were coded as a strong tie—represented by "1" in the binary data—and all other values were coded as "0" (a weak tie). The dichotomized GT1 matrices essentially coded every few weeks, weekly, and daily interactions as the presence of a strong tie.

The peer coaching processes of my project were structured to occur every two weeks, so the GT1 data would include these formal instrumental interactions while the GT2 data would not. These dichotomized data allowed me to investigate the distinction between frequent weekly and daily (GT2) interaction-based informal (expressive) networks with the less frequent, but still telling, frequencies of interaction characterizing GT1 formal (instrumental) networks in which interaction occurred every few weeks or more frequently (GT2 + "every few weeks").

My intent was to tease out whether the peer coaching structures of my project resulted in the formation of tighter networks outside of the peer coaching process itself by arguably leveraging the social capital inherent in Eagle High School as educators sought each other out independent of the coaching structures to discuss teaching and learning. These three methods for representing the four social networks in adjacency matrices (valued, GT2, and GT1), along with subsequent social network measures of these adjacency matrices, yielded deeper insights which

were further enriched by interview and field notes in order to triangulate the social network structures and optimize the validity and reliability of my study.

Importing my *Microsoft Excel* spreadsheets into *Ucinet 6 for Windows*, I dichotomized my valued network data for analysis of strong and weak ties as described above. I conducted four levels of analysis on both the valued and dichotomized adjacency matrices and the subsequent dichotomized graphs, beginning with a very high level look at network cohesion. At each subsequent level of analysis, I drilled down further into the network to tease out data to support or counter each proposition.

Selected Network Measures

My discussion of the social network measures on which I chose to focus for my study (density, degree centralization, and reciprocity) will begin with group level analysis and progress to offering a detailed look at each network graph, along with node and dyad-level analysis of each measure. Where necessary, measures from the valued adjacency matrices will be discussed to substantiate my findings. To reiterate, my study utilized the valued, GT2, and GT1 adjacency matrices to empirically consider the concepts of network density, group level degree centralization, and group level dyad reciprocity as follows.

Empirical network density measures represent the overall number of reported ties as a fraction of the total possible number of ties. For a valued network, network density is the total of all values divided by the total possible number of ties. In my study, density measures were calculated in three different ways for each of the four social networks. The first calculation (shown as Q#-Valued in Table 10) used valued social network data that preserved the self-reported frequency of interaction through weighted ties with "0" indicating yearly or no interaction, "1" indicating interaction every few months, "2" indicating interaction every few

68

Table 10

Valued and Dichotomized Network Density

	Density	Number of ties*	Standard Deviation	Average Degree*	Alpha
Q8-Valued	2.273	250	0.862	22.727	
Q9-Valued	1.973	217	0.825	19.727	
Q10-Valued	1.991	219	1.057	19.909	
Q11-Valued	2.055	226	1.025	20.545	
Q8-Dichot GT2	0.336	37	0.472	3.364	0.848
Q9-Dichot GT2	0.191	21	0.393	1.909	0.722
Q10-Dichot GT2	0.318	35	0.466	3.182	0.837
Q11-Dichot GT2	0.309	34	0.462	3.091	0.831
Q8-Dichot GT1	0.873	96	0.333	8.727	0.987
Q9-Dichot GT1	0.836	92	0.370	8.364	0.983
Q10-Dichot GT1	0.718	79	0.450	7.182	0.966
Q11-Dichot GT1	0.800	88	0.400	8	0.978

Note. Density calculations with $g = 11$ nodes (educators). *Average degree and number of ties are weighted for the Valued data.

weeks, "3" indicating interaction weekly, and "4 indicating daily interaction. Thus, there were 440 potential weighted ties in the valued network data. Valued density in my study quantifies how cohesive a network is with a range from "4" (when all educators interact daily with all other educators) through to "0" (when none of the educators report interacting with any other educator on a daily basis). Thus, valued network densities close to four signify a dense network of connections in which most possible ties are realized at the highest frequency of interaction (daily), while a valued network density close to zero signifies a network characterized by a sparse network of connections in which few of the possible ties are realized and most at the lowest frequency of interaction (yearly or no interaction).

The subsequent two calculations dichotomized the valued data in two distinct ways, both yielding a potential 110 total possible number of ties. As with the valued calculations, in the GT1 and GT2 calculations, density quantifies the cohesion of a network—in both these instances with a range from "1" (when all educators interact with all other educators in the network) through to "0" (when no educator interacts with any other educator in the network). Thus, a dichotomized network density close to one signifies a dense network in which nearly all possible ties are realized, while a dichotomized network density close to zero characterizes a sparse network in which few of the possible ties are realized.

The first dichotomized density calculation (shown as Q#-Dechot GT2 in Table 10), dichotomized the valued data, recording valued ties greater than 2 (weekly and daily frequency of interaction) as the presence of a strong tie, coded as "1" in the dichotomized adjacency matrix, and recording all remaining ties as representing null or weak ties as discussed above, coded as "0."

70

The second dichotomized calculation focused on the GT1 measure which was similar to the GT2 measure but dichotomized the valued data differently by recording ties greater than "1" as the presence of a strong tie (frequency of interaction including every few weeks, weekly, and daily)—coding these as "1" in the dichotomized adjacency matrix used to calculate density—and coding all remaining ties as "0" representing null or weak ties.

Calculation and Analysis of Group Level Social Network Measures

Comparing the network densities of the Q8 student learning and the Q9 teaching strategies networks marked the starting point of my description of the formal instrumental network characterized by a flow of information about teaching and learning. As depicted in Table 10, social network survey Question 8 (How frequently do you talk with this person about student learning?) yielded the highest density of valued, dichotomized GT2, and dichotomized GT1 representation of ties (2.273, 0.336, and 0.873 respectively) when compared to the other three social network questions. By stark comparison, Question 9 (How frequently do you talk with this person about teaching strategies such as those found in the common instructional framework?) yielded the lowest density of ties for both the valued and GT2 calculation (1.973 and 0.191 respectively). The stark difference between the network densities in the valued and GT2 calculations of the Q8 (2.273 and 0.336 respectively) and Q9 (1.973 and 0.191 respectively) networks invites conjecture about the teaching and learning environment of Eagle High School— especially given the comparability of the dichotomized GT1 calculations (0.873 for Q8 and 0.836 for Q9).

Interpreting the network densities, it appears that teachers relate to each other about student learning much more than they do about the common instructional framework, with "every few weeks" making a marked difference. The GT1 social network calculations are the

only depiction of network density yielding the instrumental teaching and learning networks (Q8 and Q9) more dense than the expressive trust networks (Q10 and Q11). Arguably, this goes to the heart of the instructional leadership endeavor. Presuming that the common instructional framework is both age-appropriate and pedagogically sound, it should provide the quintessential frame of reference for instructional interactions among teachers. Clearly, whether one chooses to regard "every few weeks" as potentially impacting instructional practice makes a difference. If one decides that "every few weeks" is insufficient and focuses on the GT2 outcomes and the valued outcomes, the preeminence of the common instructional framework is not in evidence at Eagle High School, giving rise to my open conjecture about the focus of interactions among teachers about student learning and the extent to which these interactions add value to the instructional environment. This is a key finding of my study, and I will return to it below.

Question 10 (How often do others listen to you about a problem you are facing?) and Question 11 (How often do you speak to others about a problem they are facing?) exhibited highly comparable densities in all three methods of density calculations. Regardless of the inclusion of "every few weeks" in GT1 or its exclusion in GT2, the density of the Q10 and Q11 networks—what I refer to as the two trust networks—remain comparable.

In the GT1 calculations, including the more frequent interaction associated with the peer coaching process at Eagle High School, the density of Q9 (0.836) was higher than the densities of the trust networks (0.718 for Q10 and 0.800 for Q11). However, in the GT2 calculation including only the more frequent "daily" and "weekly" interaction, the trust networks (0.318 for Q10 and 0.309 for Q11) were notably denser than the Q9 teaching strategies network (0.191). These data warrant the conclusion that outside of the peer coaching processes, the expressive trust networks at Eagle High School were strong.

Continuing to focus on Table 10, in the GT1 calculations, the trust networks (Q10 and Q11) yielded the lowest calculation of network density. There are two possible explanations for this. First, the peer coaching processes, which occur twice monthly, significantly increase interaction about teaching and learning as the process requires that teachers discuss student learning and the common instructional framework (collegial focus). These biweekly processes guarantee interaction about teaching and learning as all educators at Eagle High School engage in the peer instructional coaching feedback cycle. All other interaction remaining the same, the inclusion of the increased frequency of instrumental interaction associated with the peer rounds process in the GT1 network does not signify a change in the expressive (Q10 and 11) network but instead an increase in the density of the teaching and learning network due to the increased interaction associated with the peer coaching process.

Another contributing explanation for these patterns of relations within the GT1 calculation is the possibility that the peer coaching processes do not engender trusting relationships in which staff freely discuss their problems. The peer instructional coaching process requires staff to observe a colleague and provided targeted feedback to the colleague during a debrief session. This type of interaction may, in the absence of a strong expressive network within the school, constrain the flow of information through the trust networks. Both of my conjectures will be confirmed or otherwise through the detailed analysis of the node level network data and interview data, discussed later in this chapter.

Finally, in Table 10, "Alpha" is a measure of connectivity in the network, ranging from 0 (trees and simple networks) through to 1 (a completely connected network). In this instance, all networks are comparably connected, with the Q9 GT2 network being notably less connected. By

definition, connectedness can only be calculated for dichotomous networks, which is why three are no alpha figures for the four valued networks.

Recall that GT1 = GT2 + "every few weeks". Eagle High School scheduled peer coaching twice a month—meaning the process was required every few weeks—and the difference for the three calculations (valued, GT1, and GT2) in density suggested the pattern in density calculations across adjacency matrices depicts this temporal property. Thus, the extent of exposure to teaching strategies and student learning discussions increases through the peer coaching processes inherent in the coaching model at Eagle High School. These coaching structures clearly impact the flow of information through the network warranting a closer look at the coaching structures. The premise that the coaching structures at Eagle High School increased interaction related to teaching and learning is a key finding of my study and will be returned to in subsequent analysis.

While my conjectures based on density are warranted, Wasserman and Faust (2009) caution using density calculations in isolation, as they are oversimplified measures and can be misleading, especially when calculations are analyzed on small networks such as those in my study. For this reason, an early design decision I made involved the incorporation of interview data to substantiate claims. However, before proceeding to share and discuss my qualitative data, I will proceed to discuss two further perspective on my social network data: degree centrality and ego reciprocity. Both of these have the potential to add additional layers of complexity to the simple density metrics in order to further describe group network cohesion and centrality.

Group Level Degree Centralization

Empirical group degree centralization measures are summarized in Table 11. Again, this measure was calculated using all three methods of populating an adjacency matrix (valued, GT2,

and GT1). Group degree centrality "quantifies the range or variability of the individual actor indices" (Wasserman & Faust, 1994, p. 180) in a network with a range from "1" (when one educator interacts with all other educators and the other educators each only interact with that one person) and "0" (when all educators have an equal number of connections). Thus, a group centralization index close to one signifies an uneven network of connection in which few educators are central within the network, while a group centralization index close to 0 characterizes a network in which educators are evenly connected.

The valued and dichotomized GT1 calculations of group centralization are very low, ranging from 0.0694 to 0.310. The fact that, in the valued and GT1 calculations, all four networks were characterized by a pattern of connections in which educators were fairly evenly connected with many central educators is likely due to the fact that less frequent interactions were included in both of these network calculations. The only frequency of interaction not included in the valued data were no interactions (reported as "never" in the Social Network Survey), and the frequencies excluded from the GT1 calculations were no interactions and yearly interactions.

The dichotomized GT2 calculations of group degree centrality were generally within the mid-range, with most group centralization indices across the four networks being close to 0.500. There was statistically more variability in the GT2 calculations of network group centralization with a stark difference in the teaching and learning networks (Q8 and Q9) between the outdegree and indegree centralization indices. When looking at incoming ties, the teaching

Table 11

Freeman Group Level Degree Centrality

	Valued Outdegree Cent.	Valued Indegree Cent.	Dichot. GT2 Outdegree Cent.	Dichot. GT2 Indegree Cent.	Dichot. GT1 Outdegree Cent.	Dichot. GT1 Indegree Cent.
Q8	0.0637	0.0294	0.5100	0.2900	0.1400	0.1400
Q9	0.0569	0.0294	0.5600	0.2300	0.1800	0.1800
Q10	0.0625	0.0694	0.4200	0.4200	0.3100	0.3100
Q11	0.0444	0.0444	0.4300	0.4300	0.2200	0.2200

Note. Graph (group level) centralization index is represented as a proportion.

and learning networks were fairly evenly connected with a Q8 indegree centralization index of 0.290 and a Q9 indegree centralization index of 0.230. Conversely, when analyzing outgoing ties within the teaching and learning networks, group centralization indices were in the mid-range with a group outdegree centralization index of 0.510 in the Q8 network and 0.560 in the Q9 network. As seen in Table 11, outgoing ties were neither sparsely connected nor evenly connected.

These data suggest that within the GT2 calculations, the instrumental teaching and learning networks are characterized by an uneven network of outgoing connections in which a moderate number of educators emerge as central within the network and control information that flows out into the network. The instrumental teaching and learning networks are characterized by a more even network of incoming connections in which few educators emerge as central within the network. There are more educators who have outgoing ties with many other educators within the network, so access to incoming network information is greater than control over outgoing information.

As seen in Table 11, within the GT1 calculations of the four social networks, which include frequency of interaction reported "every few week" and thus included ties associated with the peer coaching process at Eagle High School, there was a stark difference in the group centralization indices between the instrumental teaching and learning networks (Q8 and Q9) and the expressive trust networks (Q10 and Q11). The teaching and learning networks were characterized by low group centralization indices (0.140 for the Q8 network and 0.180 for the Q9 network). Conversely, the trust networks were less central with group centralization indices of 0.310 for the Q10 network and 0.220 for the Q11network.

These data suggest that, within the GT1 calculations, the teaching and learning networks are characterized by a small number of central educators with a fairly even network of connections. The trust networks are more hierarchical with slightly more central educators within the calculations. As in the density calculations discussed above, there are two possible explanations for this disparity in the GT1 network. The peer coaching processes, which occur twice monthly, significantly increase interaction about teaching and learning as the process requires that teachers discuss student learning and the common instructional framework (collegial focus). The fact that the disparity between the instrumental teaching and learning networks and the expressive trust networks is only noted in the GT1 calculation of group degree centralization supports this key finding. As discussed above, these biweekly processes guarantee interaction about teaching and learning as all educators at Eagle High School engage in the peer instructional coaching feedback cycle. All other interaction remaining the same, the inclusion of the increased frequency of instrumental interaction associated with the peer rounds process in the GT1 network does not signify a change in the expressive (Q10 and 11) network but instead an increase in the centrality of educators in the teaching and learning network due to the increased interaction associated with the peer coaching process.

As with the analysis of network density, another possible explanation for this disparity in the GT1 calculations is the possibility that peer coaching processes do not engender trusting relationships in which staff freely discuss their problems. The peer instructional coaching process requires staff to observe a colleague and provided targeted feedback to the colleague during a debrief session. This type of interaction may, in the absence of a strong expressive network within the school, constrain the flow of information through the trust networks yielding a more central network. It is likely, given these conclusions have been substantiated by both the density

and degree centralization measure, that both of these conclusions are warranted. Both will be further explored during my node level network and interview analysis.

Group Level Dyad Reciprocity

Empirical ego reciprocity indices, calculated on the valued, GT2, and GT1 adjacency matrices (described previously) for each of the four social networks (Q8, Q9, Q10, and Q11) are summarized in Table 12. Ego-reciprocity quantifies the extent to which educators mutually exchange resources within the network, with a range from "1" (when all dyads present in the network are reciprocal dyads) through to "0" (when none of the dyads present in the network have reciprocal connections). Thus, a group reciprocity index close to one signifies a network in which information flows freely through the network at a fairly equitable rate, while a group reciprocity index close to zero characterizes a network in which information is constrained and does not flow freely through all dyads in the network.

As Table 12 indicates, the lowest reciprocated ties across all calculations are present in the Q9 teaching strategy network (0.105) for the GT2 calculations which, as discussed above, excludes the less frequent interactions associated with the coaching structures at Eagle High School. Conversely, the reciprocity of the Q9 teaching strategy network in the valued and GT1 calculations, which include the less frequent interactions associated with the coaching structures at Eagle High School, are among the highest reciprocity indices across the four social networks. The reciprocity indices for the Q9 network in both the valued and GT1 calculations rank second across the four networks within each calculation, with Q9 reciprocity indices of 0.836 for the valued calculation and 0.736 for the GT1 calculation.

These data suggest that, while teaching strategies are mutually discussed within the coaching structures at Eagle High School, the discussion of teaching strategies are less prevalent

Table 12

Dyad Based (Ego) Reciprocity

	Dyad Based Reciprocity	All Dyads (M+A)	Symmetrical (Mutual) Dyads	Asymmetrical Dyads
Q8-Valued	0.945	55	52	3
Q9-Valued	0.836	55	46	9
Q10-Valued	0.815	54	44	10
Q11-Valued	0.796	54	43	11
Q8-Dichot GT2	0.233	30	7	23
Q9-Dichot GT2	0.105	19	2	17
Q10-Dichot GT2	0.400	25	10	15
Q11-Dichot GT2	0.436	25	16	9
Q8-Dichot GT1	0.778	54	42	12
Q9-Dichot GT1	0.736	53	39	14
Q10-Dichot GT1	0.612	49	30	19
Q11-Dichot GT1	0.692	52	36	16

Note. In the dyad-based method, the reciprocity value indicates the proportion of dyads present in the network that are reciprocal (proportion does not include null dyads).

outside of the coaching processes. Teachers tend not to mutually discuss teaching strategies in their frequent (every day or every week) discussions. In fact, the highest ranking reciprocity index for the GT2 calculations is present within the expressive trust networks (Q10 and Q11) with reciprocity indices of 0.400 and 0.436 respectively, indicating that educators at Eagle High School have a higher tendency to discuss their problems (Q10) or others problems (Q11) with one another outside of the coaching processes (GT2 calculations), but they tend not to discuss student learning or teaching strategies to the same extent. This informs the premise that the extent to which information related to teaching and learning is mutually exchanged increases through the peer coaching processes inherent in the coaching model at Eagle High School, a key finding in my investigation further discussed below.

Reciprocated relationships are important to organizational learning (Daly, 2010). A network with a high number of reciprocated ties (mutual dyads) is more likely to support organizational learning, since educators have a high tendency to discuss mutually pertinent information related to the organizational learning topics. These mutual dyads are more likely to initiate and sustain interaction associated with organizational learning (Daly, 2010).

Node Level Network Measures

My node level social network analysis utilized the GT2 adjacency matrices to empirically consider the concepts of degree centrality and ego reciprocity for each educator and visually represent density in social network graphs. My decision to conduct this more detailed analysis on the GT2 network was to tease out what coaching processes, if any, contributed to strong ties outside of the patterns of relationships already empirically discerned from the group level social network analysis on the valued and GT1 indices. My decision was based on the premise that the GT2 network represents authentic interactions that occurred more frequently than the less

frequent interaction associated with the coaching model. In this way, I hoped to gain insight into the extent to which the common instructional framework (collegial focus) spread throughout the network.

While the valued data and dichotomized GT1 data support the conclusion that the coaching processes in place yield a high degree of social capital related to teaching and learning, the fact that this phenomenon is not mimicked in the GT2 data—representing more frequent interaction—informed my decision to visualize the GT2 data in an effort to uncover patterns of relationships across the four social networks (Q8 student learning, Q9 teaching strategies, Q10 personal problems, and Q11 others problems). Using the GT2 adjacency matrices as the foundation of more detailed analysis is theoretically justifiable as it looks at the network in the absence of ties associated with the structured peer coaching process in an effort to determine empirically to what extent the flow of information across the four networks has diffused beyond the coaching process itself.

Node Level Analysis of the Q8 Student Learning Network

Empirical degree centrality measures summarized in Table 13 represent the Q8 Student Learning network using the GT2 methods of analysis. Recall that the GT2 binary dichotomized adjacency matrix described previously coded "1" for weekly and daily interaction. The maximum number of indegree ties, outdegree ties, and nodal degree in my data set was 10, 10, and 20 respectively.

Degree centrality. Degree centrality is simply the nodal degree or the number of ties emanating from a given node. My investigation included the calculation of nodal degree by analyzing non-directed ties, as well as the calculation of centrality for directed data reported as

Table 13

Node Level Degree Centrality for Q8 Student Learning Social Network

	E1	E2	E3	E4*	E5*	E6*	E7*	E8*	E9*	E10	E11
Q8 Out	1	4	3	7	1	2	8	0	8	1	2
Q8 In	3	6	4	4	4	2	2	3	3	6	0
Q8 Node	4	10	7	10	5	4	10	3	11	7	2

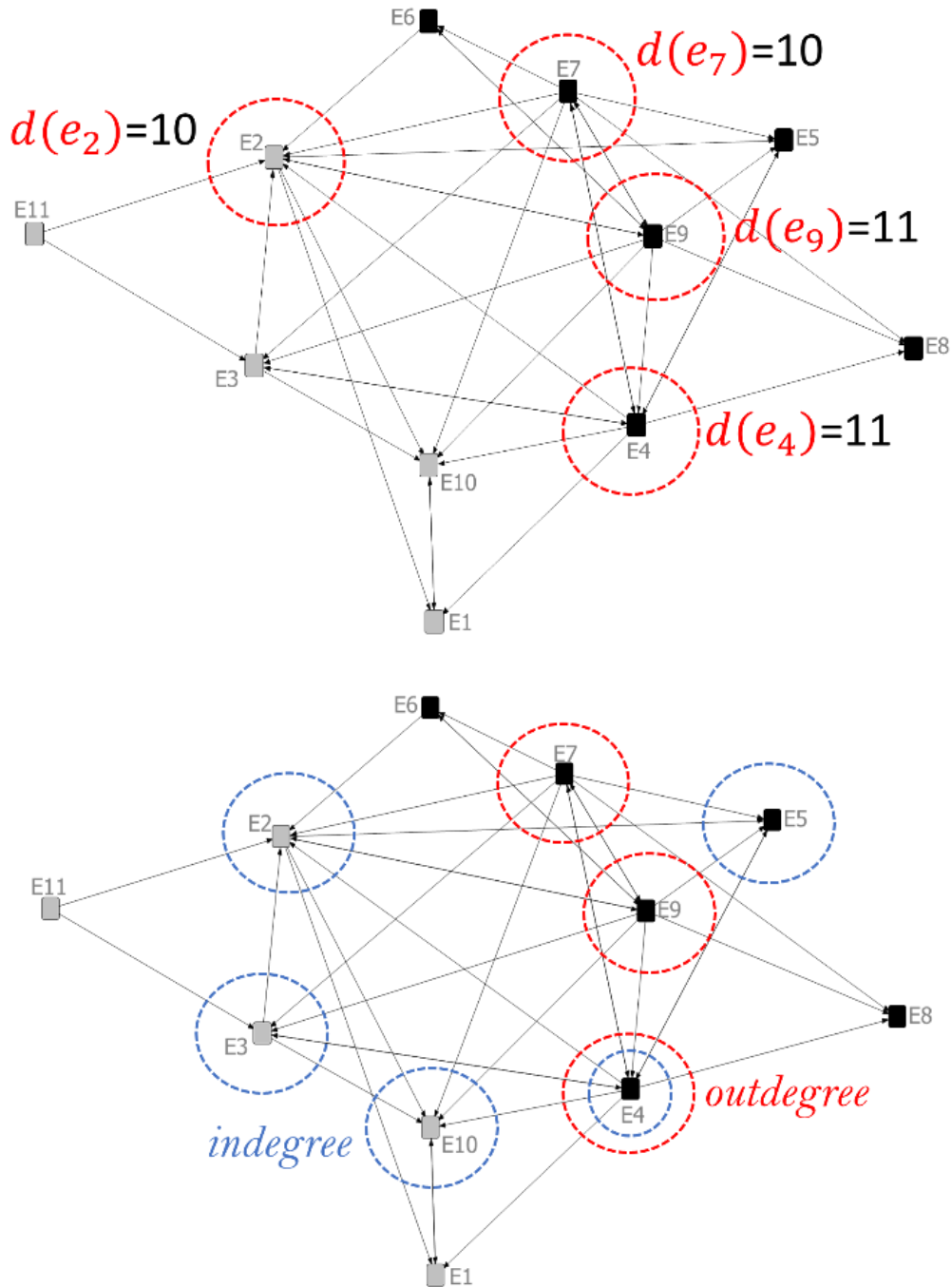*Note*. *Indicates educators with up to and including 4 years of employment at Eagle High School.

in-degree (the number of incoming ties to a given node) and out-degree (the number of outgoing ties from a given node).

Figure 7 visually represents the Q8 student learning network degree centrality measures. The top network graph shows the educators with the highest ranking non-directed nodal degree circled. As the social network graph shows, there were four educators who had the most overall connections with their colleagues (see the teacher identification in parentheses; capitalization of the "e" in this graphic display is not supported in *Ucinet 6*). The two most central educators within the Q8 student learning network, with a non-directed nodal degree of 11 were E4 and E9. Both educators were ending their fourth year of employment at the school. As described above, though considered in the group of educators with the least number of years employed at the school, they both clearly considered themselves veteran members of the staff and knowledgeable about the unique coaching structures the school utilized. The two educators ranking second highest in the Q8 student learning network, with a non-directed nodal degree of 10, were E2 (the most senior educator in terms of years of employment at the school with 10 to 19 years) and E7 (an educator employed at the school for between 0 and 4 years).

E11 emerged as the educator holding the most peripheral position in the Q8 student learning network with a non-directed nodal degree of 2 as seen in Table 13. This educator is the instructional coach. Interview data confirmed that the instructional coach is contracted to be at the school to engage teachers in the one-to-one instructional coaching process two or three days per month. This schedule accounts for the low frequency of interaction.

The bottom network graph in Figure 7 depicts the educators with the highest number of indegree and outdegree connections in the Q8 (GT2) student learning network. A network with high degree centrality is characterized by educators who have access to (indegree) and control

84

Note. Network measures (using the dichotomized GT2 adjacency matrix) of Nondirected nodal degree –highest rank (top graph), Node level degree centrality –highest rank indegree and outdegree (bottom graph). Black shaded nodes represent educators who have been employed in the school for up to and including 4 years; Grey shaded nodes represent educators who have been employed in the school for 5 or more years. E11 is the school instructional coach scheduled to support the Eagle High School staff 2 to 3 days per month.

Figure 7. Q8 Student Learning network graphs depicting high ranked degree centrality.

over (outdegree) the resources that are flowing through the network. Three educators (E4, E7, and E9) emerge as having the highest number of outgoing connections related to student learning. As seen in Table 13, E7 and E9 both report having daily or weekly interactions about student learning with eight other educators while E4 reports having daily or weekly interaction discussing student learning with seven colleagues. While these three educators serve as brokers controlling a high degree of information about student learning flowing out into the network these three educators did not all rank high in incoming connections. In fact, E7 and E9 have few incoming connections with an indegree centrality index of 2 and 3 respectively as seen in Table 13. These two educators self-reported significant outgoing student learning contact with other educators however they do not have a significant amount of incoming information. This may indicate a constrained flow of information about student learning through these two educators.

Conversely, E4, as seen in Figure 7, not only ranks high for outgoing student learning interaction but also ranks high for incoming student learning interaction. As Table 13 shows, E2 and E10 have the highest number of incoming connections with an indegree centrality index of 6. E3, E4, and E5 have the second highest number of incoming connections with an indegree centrality index of 4. These five educators have high prestige within the student learning network as others report seeking them out to discuss student learning, thereby giving them access to information from multiple educators. The extent to which this information flows through the network can be inferred by comparing these five educators outdegree centrality index as described above for E4, E7, and E9. While E3, E5, and E10 have a high number of incoming connections around student learning, they reported a very low number of outgoing connections, suggesting that they constrain the flow of student learning information through the network. Like E5, E2 not only ranks high overall nodal degree centrality, they also ranks high for indegree

centrality. When comparing E2's indegree centrality index (6) with his/her outdegree index (4), it is clear that both E2 and E4 are very central, brokering the most information flowing through the Q8 (GT2) student learning network.

E2 and E4, both social studies teachers, are experienced staff with four or more years of employment at Eagle High School. The fact that these two individuals emerge as central educators within the Q8 student learning network supports the premise that instructional coaching processes expand educator's networks increasing the likelihood of practices spreading beyond content networks that typically characterize secondary schools. This, also, is a key finding in my study and will be explored further later in the investigation.

Ego reciprocity. The final node-level network measure analyzed in my investigation was ego reciprocity which is visually represented for the Q8 (GT2) student learning network in Figure 8. Empirical ego reciprocity calculated from the GT2 adjacency matrices for the Q8 student learning network is summarized in Table 14. Ego-reciprocity is a dyad-level index that measures the extent to which educators mutually exchange resources within the network. The measure depicts four patterns of relationships as a proportion of dyads in which each node is incident. In this way, ego reciprocity does not account for the total number of connections a node has but, instead, the proportion of dyads in which the node is incident that represent a particular state (either mutual, asymmetric out, or asymmetric in). Null dyads are calculated by subtracting the total of the three isomorphism states (mutual, asymmetric in, and asymmetric out) from the total possible dyad combinations. Null dyads represent the difference between the total number of dyads possible and the actual number of mutual and asymmetric dyads in which a node is incident.
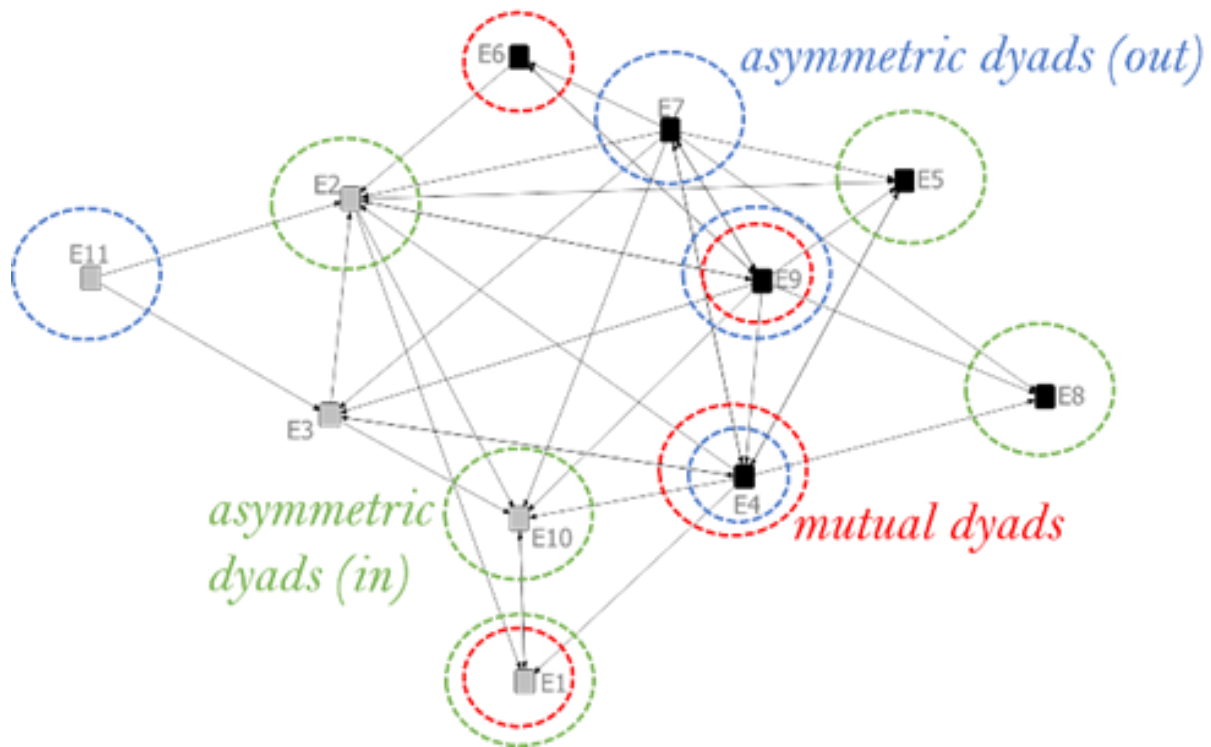
Note. Network measures (using the dichotomized GT2 adjacency matrix) of dyad reciprocity – highest rank isomorphic classes circled. Black shaded nodes represent educators who have been employed in the school for up to and including 4 years; Grey shaded nodes represent educators who have been employed in the school for 5 or more years. E11 is the school instructional coach scheduled to support the Eagle High School staff 2 to 3 days per month.

Figure 8. Q8 Student Learning network graph depicting high ranked ego reciprocity.

Table 14

Node-Level (Ego) Reciprocity Statistics

	E1	E2	E3	E4*	E5*	E6*	E7*	E8*	E9*	E10	E11
Q8 Mutual	.333	.111	.167	.375	.250	.333	.250	.000	.375	.167	.000
Q8Out/Asym	.000	.375	.400	.800	.000	.500	1.00	.000	1.00	.000	1.00
Q8 In/Asym	1.00	.625	.600	.200	1.00	.500	.000	1.00	.000	1.00	.000

Note. All values are Proportions. "Mutual" gives proportion of ego's undirected contacts with whom ego has reciprocated ties. "Out/Asym" gives proportion of ego's non-symmetric ties that are outgoing. "In/Asym" gives proportion of ego's non-symmetric ties that are incoming. *Denotes educators with up to and including 4 years of employment at Eagle High School.

As can be seen in Figure 8 and shown empirically in Table 14, within the Q8 (GT2) student learning network all educators (with the exception of E3) were high ranking in proportion of either mutual, asymmetric in, or asymmetric out dyads. A high proportion of the dyads involving E4 and E9 were asymmetric out (ego reciprocity of .800 and 1.00 respectively) and mutual dyads (ego reciprocity of .375 for both educators). The high proportion of dyads involving E1 were asymmetric in (ego reciprocity of 1.00) and mutual dyads (ego reciprocity of .333).

An ego reciprocity index of 1.0 signifies that all arcs (lines) incident on a given node are the same isomorphic class. Recall that there are three isomorphic classes in which educators can be present in. The first is a mutual dyad in which both educators report interacting with the other. In a network graph, this is depicted as a double headed arrow between two nodes (representing educators). The last two isomorphic classes are asymmetric dyads (reported as either asymmetric out or asymmetric in) in which one educator reports a connection with another, however the other educator does not report a connection with that person. An educator present in an asymmetric out dyad is represented graphically by a node with an arrow pointing out to another node. Likewise, an educator present in an asymmetric in dyad is represented graphically by a node with an arrow pointing in. Null dyads represent unrealized connections between two educators.

As can be seen in Table 14, all arcs incident on E7, E9, and E11 represented asymmetric out dyads. Similarly, all arcs incident on E1, E5, E8, and E10 represented asymmetric in dyads. Asymmetrical dyads represent pairs of nodes with non-mutual ties. These dyads likely represent two nodes which do not share the same resources therefore they exhibit unidirectional ties that were not reciprocated. While reciprocated ties characterize networks which support

organizational learning and were more likely to initiate and sustain change (Daly, 2010), Wasserman and Faust (1994) contend that networks with a high number of asymmetrical dyads were in an intermediate state with the potential to lead to mutuality if resources related to the change were flowing freely through the network. While a high number of educators were present in asymmetric dyads in the student learning network, this network was not the network that characterized a direct link to the intended organizational change. It is necessary to look closely at both of the instrumental teaching and learning networks to determine the extent to which the pattern of ties is likely to lead to organizational learning. Thus, the GT2 calculations of the Q9 teaching strategy network will be discussed subsequently.

As Figure 8 shows, the Q8 (GT2) student learning network has four educators (E1, E4, E6, and E9) who are incident in a high proportion of mutual dyads. While these four educators had a high proportion of mutual dyads, a closer examination shows that E1 and E6 had one mutual arc out of a total of three arcs yielding the second highest ego reciprocity index of 0.333. E4 and E9 have the highest ego reciprocity index of 0.375, however a closer examination of these two educators as seen in Figure 8 shows that E4 and E9 had three mutual arcs out of eight total arcs. While at face value the indices appear similar between the four educators with high ranking ego reciprocity, a close examination shows that the extent to which E4 and E9 leverage social capital in the student network is greater due to their higher number of total ties (nodal degree). As discussed previously, E4 (a social studies teacher) and E9 (a science teacher) are educators ending their fourth year at Eagle High School. The fact that these two educators emerge as having a high nodal degree as well as having a high proportion of mutual dyads (ego-reciprocity) supports the conclusion that structures ensure that educators quickly (in less than

four years) learn the collaborative processes and internalize the norms of interaction at Eagle High School.

Density. My investigation was an attempt to discern how the one-to-one and peer coaching processes at Eagle High School harnessed the social capital of the professionals in the building, thereby creating an achievement-oriented environment that I associate with high student achievement, facilitated through empirically determined high collective teacher efficacy. Figure 9 visually represents the GT2 adjacency matrix for the Q8 Student Learning network showing that this network was characterized by a total of 37 incidents on 11 nodes. The network density (0.336) shows that approximately one third of all possible ties were realized within this network.

It is clear in looking at the Q8 Student Learning network in Figure 9 that E2, E3, E4, E7, E9, and E10 hold a central position within the network forming essentially a circle of close knit ties with E1, E5, E6, E8, and E11 occupying peripheral positions with strikingly fewer ties. This network graph (see Figure 9) and associated reciprocity measures do not exhibit significant differences between the staff who have been at the school for fewer than five years and staff who have been employed at the school for five or more years.

Node Level Analysis of the Q9 Teaching Strategy Network

Empirical degree centrality measures summarized in Table 15 represent the Q9 Teaching Strategies network using the GT2 data.

Degree centrality. Degree centrality is simply the nodal degree or the number of ties emanating from a given node. Figure 10 visually represents the GT2 adjacency matrix for the Q9 Teaching Strategies network showing the educators with the highest ranking non-directed nodal degree circled. E8 (the principal) and E11 (the instructional coach) emerged as the educators
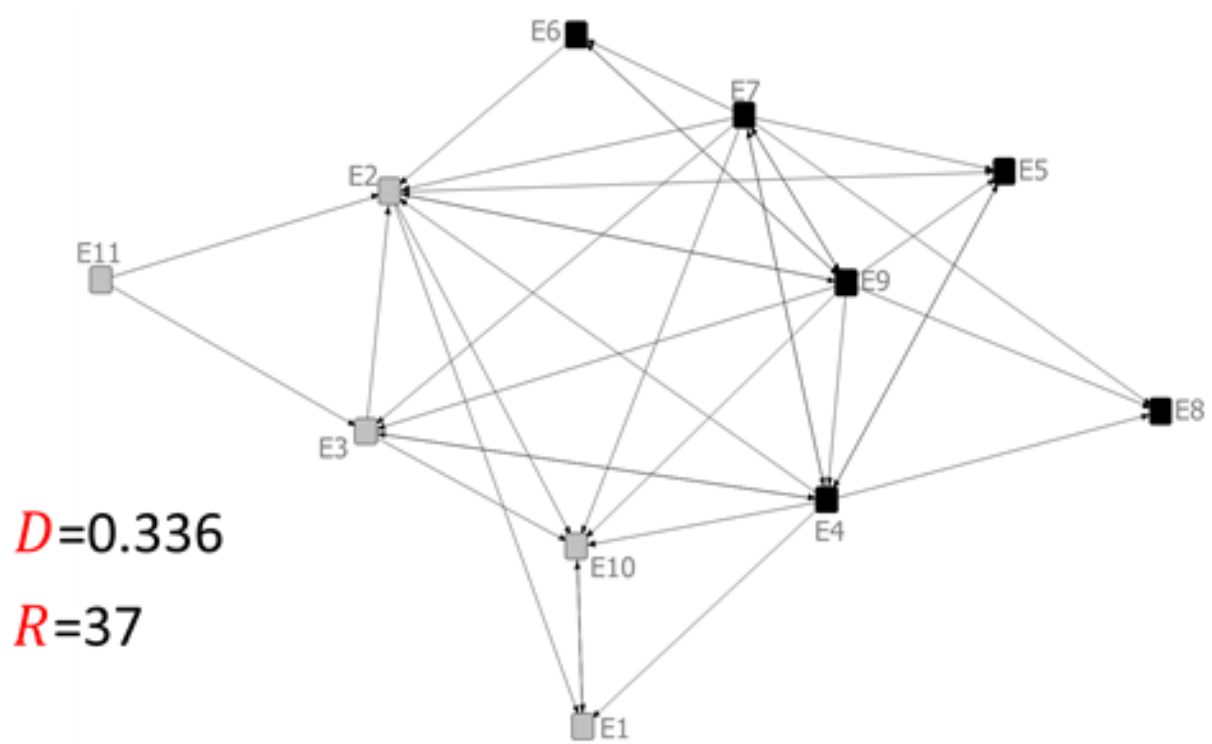
E6

E7

E2

E11

E5

E9

E8

E3

D=0.336

R=37

E4

E10

E1

Note. Network measures (using the dichotomized GT2 adjacency matrix) of density. Black shaded nodes represent educators who have been employed in the school for up to and including 4 years; Grey shaded nodes represent educators who have been employed in the school for 5 or more years. E11 is the school instructional coach scheduled to support the Eagle High School staff 2 to 3 days per month.

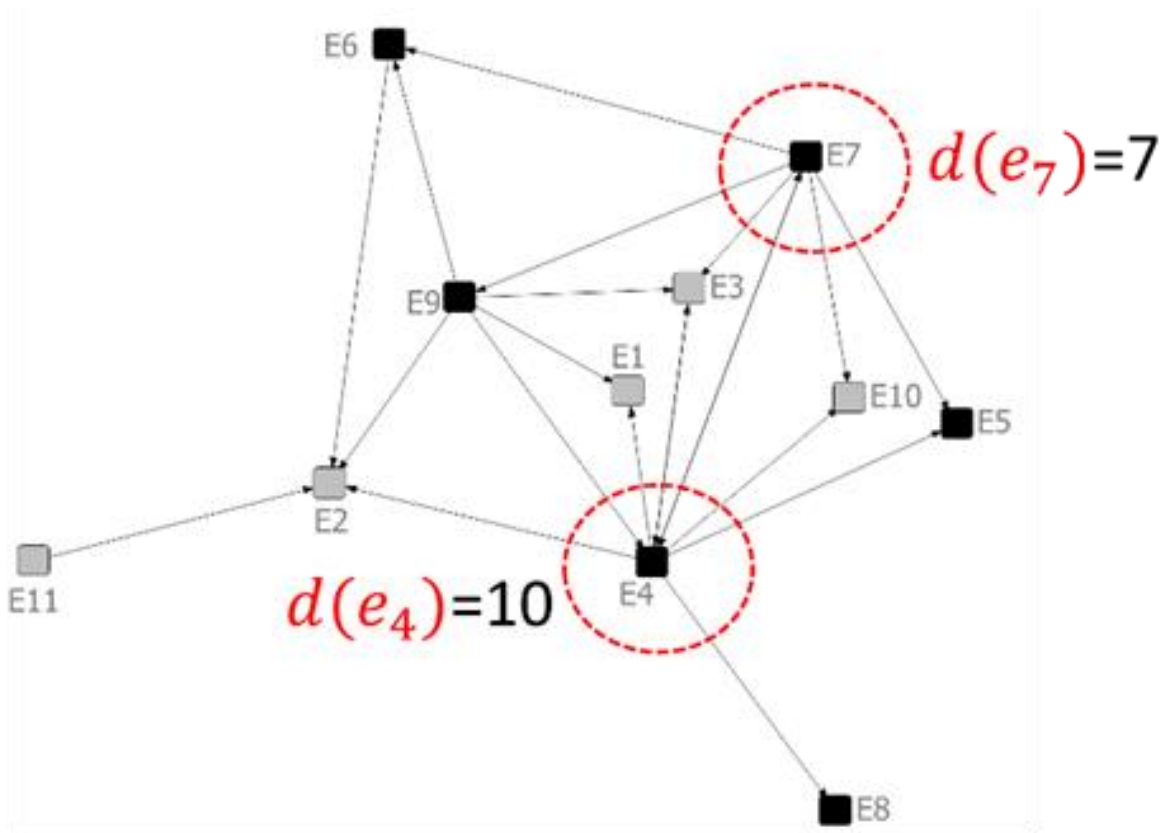*Figure 9.* Q8 Student Learning network graph depicting network density.

Table 15

Node Level Degree Centrality for Q9 Teaching Strategies Social Network

	E1	E2	E3	E4*	E5*	E6*	E7*	E8*	E9*	E10	E11
Q9 Out	0	0	1	7	0	1	6	0	5	0	1
Q9 In	2	4	3	3	2	2	1	1	1	2	0
Q9 Node	2	4	4	10	2	3	7	1	6	2	1

Note. *Indicates educators with up to and including 4 years of employment at Eagle High School.

$d(e_7)=7$

$d(e_4)=10$

Note. Network measures (using the dichotomized GT2 adjacency matrix) of Nondirected nodal degree –highest rank (top graph). Black shaded nodes represent educators who have been employed in the school for up to and including 4 years; Grey shaded nodes represent educators who have been employed in the school for 5 or more years. E11 is the school instructional coach scheduled to support the Eagle High School staff 2 to 3 days per month.

Figure 10. Q9 Teaching Strategies Network depicting high rank nodal degree centrality.

holding the most peripheral positions in the Q9 network with a non-directed nodal degree of 1 as seen in Table 15. Interview data confirmed that the instructional coach is contracted to be at the school to engage teachers in the one-to-one instructional coaching process two or three days per month. This schedule accounts for the low frequency of interaction.

As the social network graph (see Figure 10) shows, there were two educators who had the most overall connections with their colleagues. The most central educator within the Q9 Teaching Strategies network, with a non-directed nodal degree of 10 was E4 (an educator ending their fourth year of employment at the school). The educator ranking second highest for nodal degree in the Q9 Teaching Strategies network, with a non-directed nodal degree of 7, was E7 (an educator employed at the school for between 0 and 4 years).

From these results, I infer that new teachers to the school, those educators reporting being employed for 0 to 4 years at Eagle High School, discuss the common instructional framework (teaching strategies) more frequently, thus outside of the peer coaching processes, than their colleagues who have been employed for 5 or more years. Educators new to the school may not have a solid foundational understanding of the teaching strategies inherent in the common instructional framework, and thus it would be reasonable to assume that they would discuss them more frequently. This premise requires further data to support the claim, and these data will be discussed further as I analyze the indegree, outdegree, and reciprocity measures in the Q9 social network below.

Figure 11 depicts the educators with the highest number of indegree and outdegree connections in the Q9 (GT2) teaching strategies network. A network with high degree centrality is characterized by educators who have access to (indegree) and control over (outdegree) the resources that are flowing through the network. Two educators (E4 and E7) emerge as having the
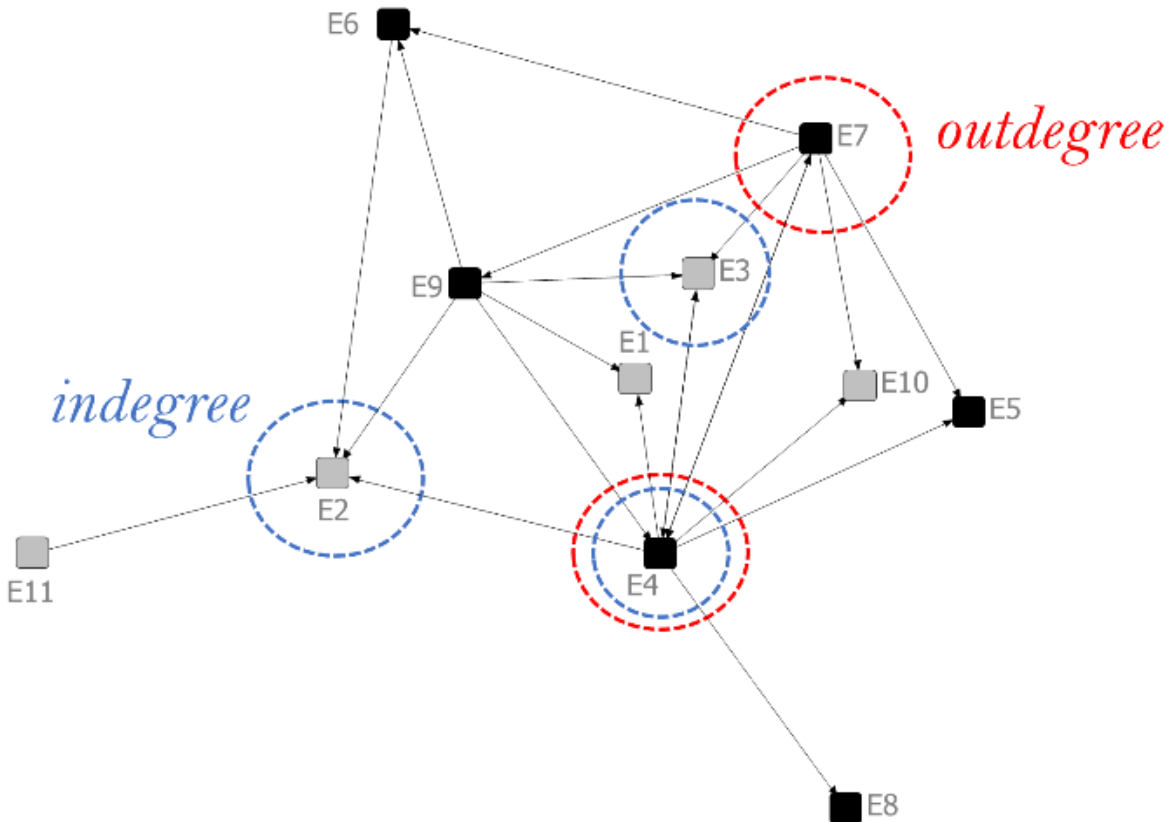
Note. Network measures (using the dichotomized GT2 adjacency matrix) of node-level degree centrality –highest rank indegree and outdegree circled. Black shaded nodes represent educators who have been employed in the school for up to and including 4 years; Grey shaded nodes represent educators who have been employed in the school for 5 or more years. E11 is the school instructional coach scheduled to support the Eagle High School staff 2 to 3 days per month.

Figure 11. Q9 Teaching Strategy network graph depicting high rank degree centrality.

highest number of outgoing connections related to teaching strategies. As seen in Table 15, E4 reported having daily or weekly interactions about teaching strategies with 7 other educators, while E7 reported having daily or weekly interaction discussing teaching strategies with six colleagues. While these two educators serve as brokers controlling a high degree of information about teaching strategies flowing out into the network, neither ranked high in incoming connections. In fact, E7 had few incoming connections with an indegree centrality index of 2 as seen in Table 15. E7 self-reported significant outgoing teaching strategies contact with other educators however they do not have a significant amount of incoming information. This may indicate a constrained flow of information about teaching strategies through this educator.

Again, as can been seen in Table 15, all of the educators who have been employed at the school for 5 or more years (E1, E2, E3, E10, and E11) have a very low outdegree centrality index of either 0 or 1. While this is the case, the indegree centrality of all of these eductors (with the exception of E11) is in the high or moderate range for indegree centrality. Indices for E2 and E3, as seen in Figure 11, are among the highest ranking indegree centrality indices within the Q9 social network, with indegree indices of 4 and 3 respectively.

Conversely, E4, as seen in Figure 11, not only ranks high for outgoing teaching strategies interaction but also ranks high for incoming teaching strategies interaction. As Table 15 shows and as discussed above, E2 (a social studies teacher) has the highest number of incoming connections with an indegree centrality index of 4. E3 (an English language arts (ELA) teacher) and E4 (a social studies teacher) have the second highest number of incoming connections with an indegree centrality index of 3. These three educators have high prestige within the student learning network indicating that others report seeking them out to discuss teaching strategies, thus giving them access to information from multiple educators. The extent to which this

98

information flows through the network can be inferred by comparing these three educators' outdegree centrality index as described above. While E2 and E3 have a high number of incoming connections about teaching strategies, they reported a very low number of outgoing connections suggesting they constrain the flow of teaching strategy information through the network. E4 not only ranks high for overall nodal degree centrality, he/she also ranks high for both outdegree and indegree centrality. It is clear that E4 is very central, brokering the most information flowing through the Q9 (GT2) Teaching Strategies network. These data support my finding that instructional coaching processes expand educator's networks, increasing the likelihood of practices spreading beyond content networks, as revealed in the above analysis of the Q8 student learning network.

Ego reciprocity. Another network measure analyzed in my investigation was ego reciprocity which is visually represented in Figure 12 depicting the social network graph created from the Q9 (GT2) Teaching Strategies network. Empirical ego reciprocity calculated from the GT2 adjacency matrix for the Q9 Teaching Strategies network is summarized in Table 16. Ego-reciprocity is a dyad level index that measures the extent to which educators mutually exchange resources within the network. The measure depicts four patterns of relationships as a proportion of dyads each node is incident in. Recall that ego reciprocity does not account for the total number of connections a node has but instead the proportion of dyads the node is incident in that represent a particular state (either mutual, asymmetric out, or asymmetric in).

As can be seen in the social network graph in Figure 12 and shown empirically in Table 16, in the teaching strategies network all educators were high ranking in proportion of either mutual, asymmetric in, or asymmetric out dyads. A high proportion of the dyads E3 was involved in were asymmetric out dyads (ego reciprocity 1.0) and mutual dyads (ego reciprocity of .333). A
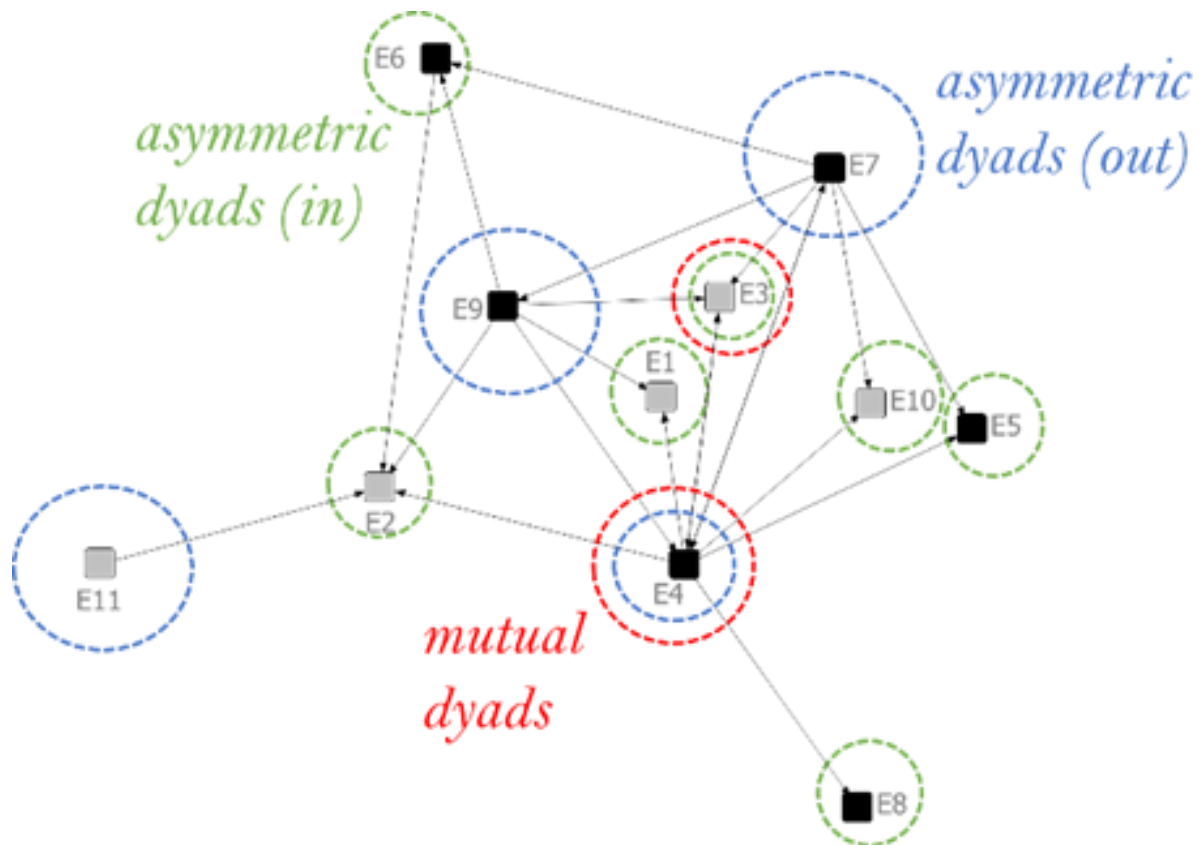
asymmetric dyads (in)

asymmetric dyads (out)

mutual dyads

Note. Network measures (using the dichotomized GT2 adjacency matrix) of dyad reciprocity – highest rank isomorphic classes circled. Black shaded nodes represent educators who have been employed in the school for up to and including 4 years; Grey shaded nodes represent educators who have been employed in the school for 5 or more years. E11 is the school instructional coach scheduled to support the Eagle High School staff 2 to 3 days per month.

Figure 12. Q9 Teaching Strategy network graph depicting high rank ego-reciprocity.

Table 16

Node-Level (Ego) Reciprocity Statistics

	E1	E2	E3	E4*	E5*	E6*	E7*	E8*	E9*	E10	E11
Q9 Mutual	.000	.000	.333	.250	.000	.000	.167	.000	.000	.000	.000
Q9 Out/Asym	.000	.000	.000	.833	.000	.333	1.00	.000	.833	.000	1.00
Q9 In/Asym	1.00	1.00	1.00	.167	1.00	.667	.000	1.00	.167	1.00	.000

Note. All values are Proportions. "Mutual" gives proportion of ego's undirected contacts with whom ego has reciprocated ties. "Out/Asym" gives proportion of ego's non-symmetric ties that are outgoing. "In/Asym" gives proportion of ego's non-symmetric ties that are incoming. *Denotes educators with up to and including 4 years of employment at Eagle High School.

high proportion of the dyads E4 was involved in were asymmetric out dyads (ego reciprocity of .833) and mutual dyads (ego reciprocity of .250).

An ego reciprocity index of 1.0 signifies all arcs incident on a given node are the same isomorphic class. As can be seen in Table 16, all non-mutual arcs incident on E7 (a science teacher ending their fourth year at the school) and E11 (the instructional coach) represented asymmetric out dyads. Similarly, all non-mutual arcs incident on E1, E2, E3, E5, E8, and E10 represented asymmetric in dyads. Asymmetrical dyads represent pairs of nodes with non-mutual ties. These dyads likely represent two nodes which do not share the same resources; therefore they exhibited unidirectional ties that were not reciprocated. As adverted to above, reciprocated ties characterize networks which support organizational learning and are more likely to initiate and sustain change (Daly, 2010), although Wasserman and Faust (1994) contended that a network with a high number of asymmetrical dyads was in an intermediate state with the potential to lead to mutuality if resources related to the change were flowing freely through the network. While a high number of educators were present in asymmetric in dyads in the teaching strategies network, very few educators were incident in a high proportion of mutual or asymmetric out dyads. This implies that resources related to teaching and learning did not flow evenly through the network.

As Figure 12 showed, the Q9 social network has two educators (E3 and E4) who are incident in a high proportion of mutual dyads. While these educators had a high proportion of mutual dyads, a closer examination shows that E3 had one mutual arc out of a total of three arcs yielding the highest ego reciprocity index of 0.333. E4 had the second highest ego reciprocity index of 0.250 with two mutual arcs out of eight total arcs. While at face value the high ranking mutual dyad reciprocity indices appear similar between E3 (an ELA teacher) and E4 (a social

102

studies teacher), a close examination shows that the extent to which E4 leverages social capital in the teaching strategy network is greater due to his/her higher number of total ties. These data support the conclusion that I reached in the Q8 Student Learning analysis.

Density. Figure 13 visually represents the whole Q9 Teaching Strategies network showing this network was characterized by a total of 21 incidents on 11 nodes. The network density (0.191) shows that approximately one fifth of all possible ties were realized within this network. The Q9 Teaching Strategies network is the network that directly connects to the collegial focus embedded in the instructional coaching model at Eagle High School. The collegial focus within the model is a set of teaching strategies (common instructional framework) that educators are expected to utilize to deliver their content to students. The fact that the Q9 Teaching Strategy network has a very low network density when compared to the other three networks is telling. Scott (2012) contends that network density "determines the extent of exposure people have to new ideas and ways of behaving" (p. 57). The infrequent interaction associated with the common instructional framework in the GT2 calculations for the Q9 Teaching Strategies network signifies a segmented exposure to the associated teaching strategies.

It is clear in looking at the Q9 Teaching Strategies network (see Figure 13) that E2, E4, E7, and E9 hold central positions within the network, forming what is essentially a circle of close knit ties, with E1, E5, E8, E10, and E11 occupying peripheral positions with strikingly fewer ties. It is also evident that there are significantly fewer ties overall, as the pattern of connections in the graph are sparse. This network graph and associated reciprocity measures do show differences between the staff who have been at the school for fewer than five years and staff who have been employed at the school for five or more years. The three educators most embedded in the Q9 Teaching Strategies network (E4, E7, and E9) were educators with fewer than 5 years of
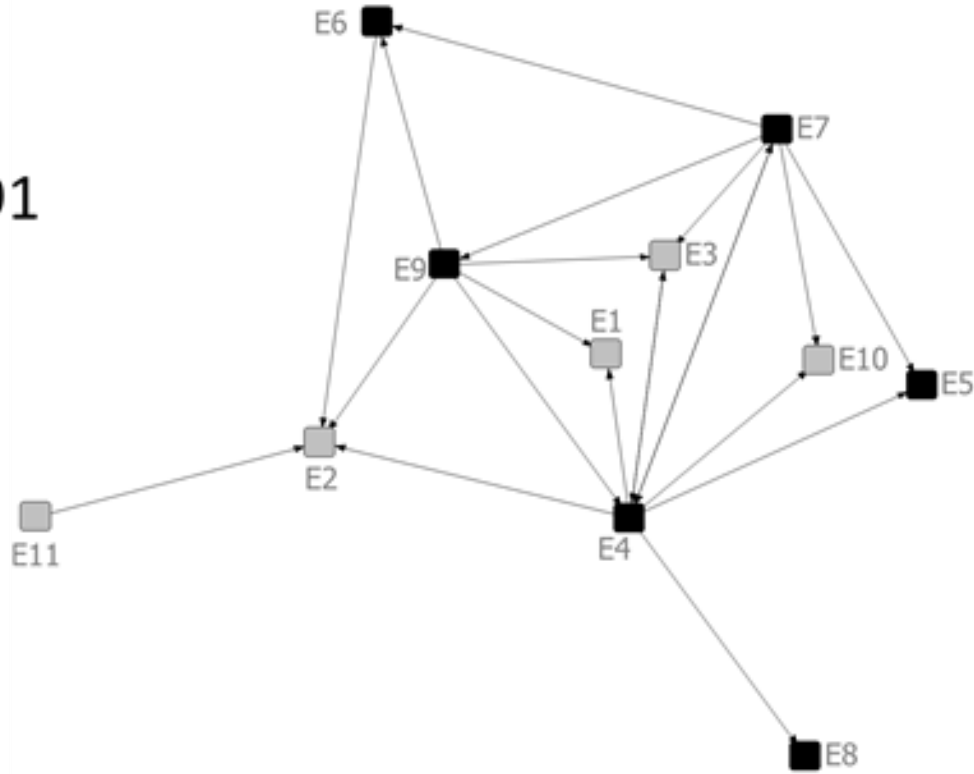
103

$D=0.191$

$R=21$

Note. Network measures (using the dichotomized GT2 adjacency matrix) of density. Black shaded nodes represent educators who have been employed in the school for up to and including 4 years; Grey shaded nodes represent educators who have been employed in the school for 5 or more years. E11 is the school instructional coach scheduled to support the Eagle High School staff 2 to 3 days per month.

Figure 13. Q9 Teaching Strategies network graph depicting network density.

employment. As discussed previously, educators who have been employed at the school for the least number of years (those reporting being employed between 0 and 4 years at Eagle High School) seek others out to discuss the collegial focus (the common instructional framework) much more frequently than educators employed at the school for 5 or more years. This is another key finding in my study and will be discussed further when I return to it below.

**Node Level Analysis of the Q10 Personal Problems Network**

Density. Figure 14 visually represents the GT2 adjacency matrix for the Q10 Personal Problems network showing this network was characterized by a total of 35 incidents on 11 nodes. The network density (0.318) shows that approximately one third of all possible ties were realized within this network.

It is clear in looking at the Q10 Personal Problems network (see Figure 14) that E2, E3, E4, E6, E7, E9, and E10 hold a central position within the network forming essentially a rectangle of close knit ties with E1, E5, E8, and E11 occupying peripheral positions with strikingly fewer ties. This network graph and associated reciprocity measures, which will be discussed below, do not exhibit significant differences between the staff who have been at the school for fewer than five years and staff who have been employed at the school for five or more years.

Degree centrality. Empirical degree centrality measures summarized in Table 17 represent the Q10 Personal Problems network using the GT2 data. As seen in Table 17, there were four educators who had the most overall connections with their colleagues (nodal degree). The two most central educators within the Q10 Personal Problems network, with a non-directed nodal degree of 11 were E2 (the most senior educator in terms of years of employment at the school with 10 to 19 years) and E4 (an educator ending their fourth year of employment at the

D=0.318

R=35
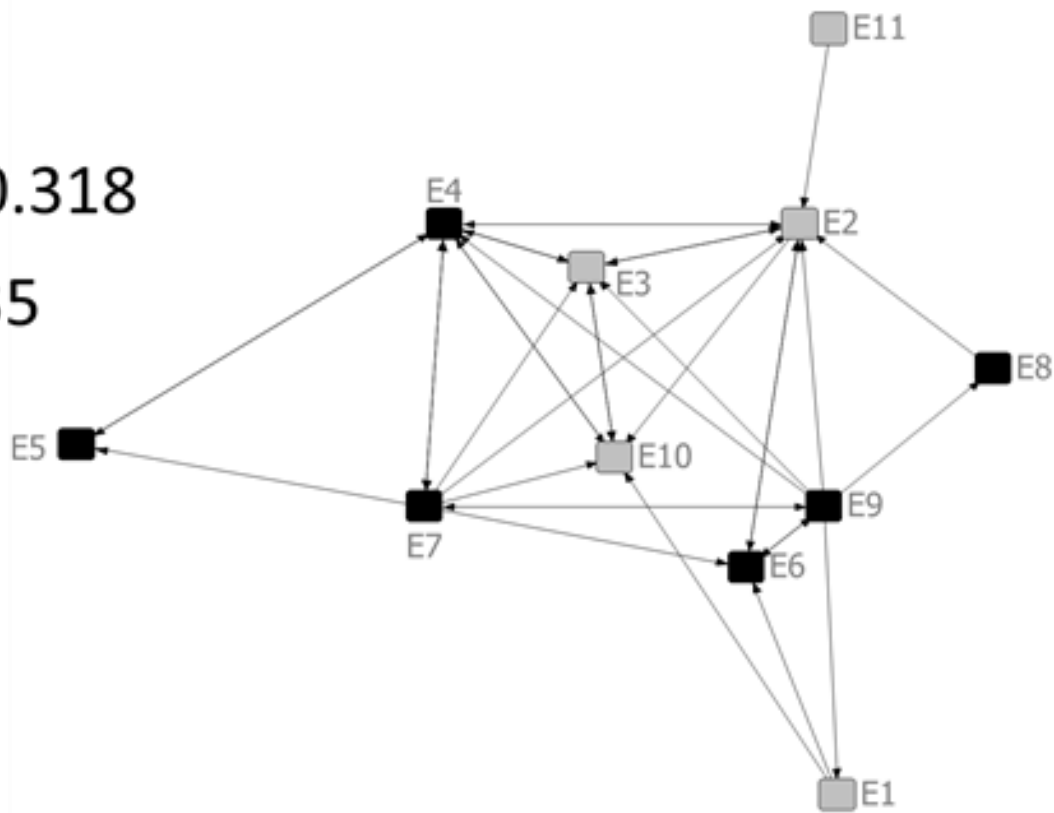
Note. Network measures (using the dichotomized GT2 adjacency matrix) of density. Black shaded nodes represent educators who have been employed in the school for up to and including 4 years; Grey shaded nodes represent educators who have been employed in the school for 5 or more years. E11 is the school instructional coach scheduled to support the Eagle High School staff 2 to 3 days per month.

Figure 14. Q10 Personal Problems network graph depicting network density.

Table 17

Node Level Degree Centrality for Q10 Personal Problems Social Network

	E1	E2	E3	E4*	E5*	E6*	E7*	E8*	E9*	E10	E11
Q10 Out	2	4	3	5	1	2	7	1	7	2	1
Q10 In	1	7	5	6	2	4	2	1	2	5	0
Q10 Node	3	11	8	11	3	6	9	2	9	7	1

Note. *Indicates educators with up to and including 4 years of employment at Eagle High School.

school). The two educators ranking second highest in the Q10 Personal Problems network, with a non-directed nodal degree of 9, were E7 (an educator employed at the school for between 0 and 4 years) and E9 (an educator ending their fourth year of employment at the school).

E11 emerged as the educator holding the most peripheral position in the Q10 personal problems network with a non-directed nodal degree of 1 as seen in Table 17. This educator is the instructional coach. Interview data confirmed that the instructional coach is contracted to be at the school to engage teachers in the one-to-one instructional coaching process two or three days per month. This schedule accounts for the low frequency of interaction.

The bottom network graph in Figure 15 depicts the educators with the highest number of indegree and outdegree connections in the Q10 (GT2) Personal Problems network. A network with high degree centrality is characterized by educators who have access to (indegree) and control over (outdegree) the resources that are flowing through the network. Three educators (E4, E7, and E9) emerge as having the highest number of outgoing connections related to student learning. As seen in Table 17, E7 and E9 both reported having daily or weekly interactions about their personal problems with seven other educators, while E4 reports having daily or weekly interaction discussing their personal problems with five colleagues. While these three educators control a high degree of trust flowing out into the network, these three educators did not all rank high in incoming connections. In fact, E7 and E9 have few incoming connections with an indegree centrality index of 2, as seen in Table 17. These two educators self-reported significant outgoing contact with other educators discussing their personal problems, however they do not have a significant amount of incoming information. This may indicate that these two educators maintain a constrained level of trust.
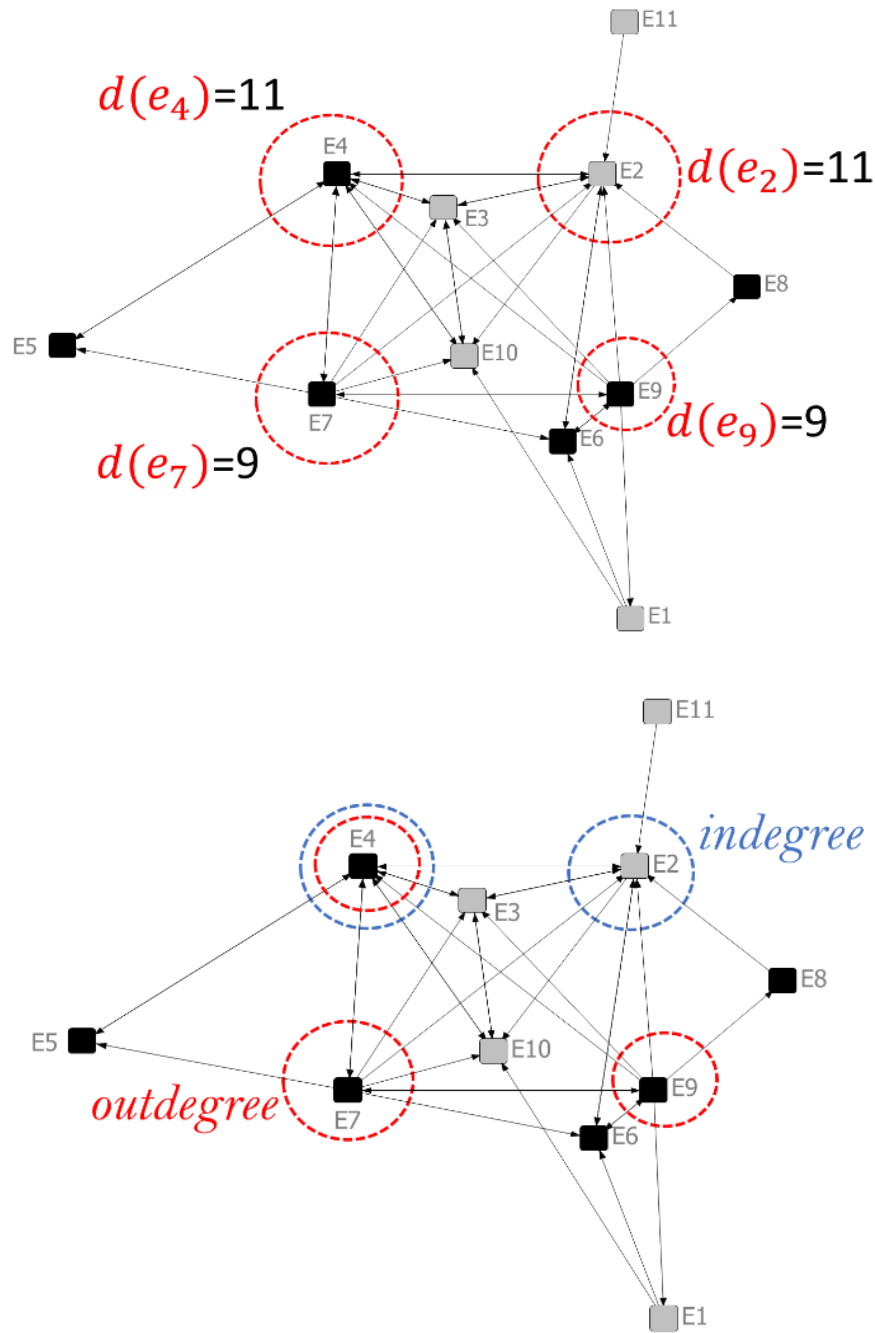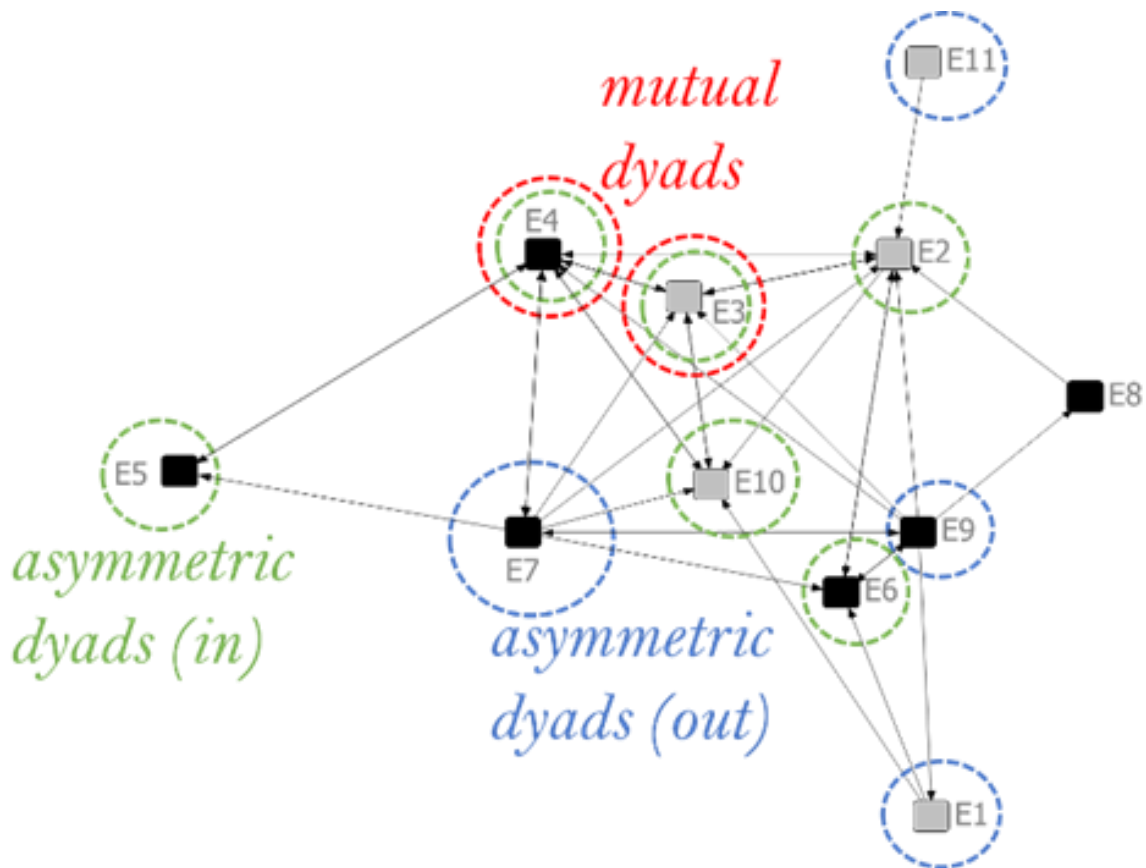
Note. Network measures (using the dichotomized GT2 adjacency matrix) of nondirected nodal degree –highest rank (top graph), node level degree centrality –highest rank indegree and outdegree (bottom graph). Black shaded nodes represent educators who have been employed in the school for up to and including 4 years; grey shaded nodes represent educators who have been employed in the school for 5 or more years. E11 is the school instructional coach scheduled to support the Eagle High School staff 2 to 3 days per month.

Figure 15. Q10 Personal Problems network graphs depicting high ranking degree centrality.

Conversely, E4, as seen in Figure 15, not only ranks high for outgoing contact with educators about their problems, but also ranks moderately high for incoming contact with other educators about their problems. As Table 17 shows, consistent with the Q8 Student Learning network, E2 and E4 have the highest number of incoming connections with an indegree centrality index of 7 and 6 respectively. These two educators have high prestige within the personal problem network as others report seeking them out to discuss their personal problems giving them access to information from multiple educators. The extent to which this information flows through the network can be inferred by comparing the outdegree centrality index as described above for E4, E7, and E9. While E2 and E4 have a high number of incoming connections, they also report a high number of outgoing connections as well. It is clear that both E2 and E4 are very central, brokering the most information flowing through the Q10 (GT2) Personal Problems network. These data support my conclusion that instructional coaching processes expand educator's networks, increasing the likelihood of trusting collegial relationships spreading beyond content networks.

Ego reciprocity. The final network measure analyzed in my investigation was ego reciprocity which is visually represented in Figure 16 the social network graph created from the Q10 (GT2) personal problems network. Empirical ego reciprocity calculated from the GT2 adjacency matrices for the Q10 personal problems network is summarized in Table 18. Recall that ego reciprocity does not account for the total number of connections a node has but instead the proportion of dyads the node is incident in that represent a particular state (either mutual, asymmetric out, or asymmetric in).

Note. Network measures (using the dichotomized GT2 adjacency matrix) of dyad reciprocity – highest rank isomorphic classes circled. Black shaded nodes represent educators who have been employed in the school for up to and including 4 years; Grey shaded nodes represent educators who have been employed in the school for 5 or more years. E11 is the school instructional coach scheduled to support the Eagle High School staff 2 to 3 days per month.

Figure 16. Q10 Personal Problems network graph depicting high ranking ego-reciprocity.

Table 18

Node-Level (Ego) Reciprocity Statistics

	E1	E2	E3	E4*	E5*	E6*	E7*	E8*	E9*	E10	E11
Q10 Mutual	.000	.375	.600	.833	.500	.500	.286	.000	.286	.400	.000
Q10 Out/Asym	.667	.200	.000	.000	.000	.000	1.00	.500	1.00	.000	1.00
Q10 In/Asym	.333	.800	1.00	1.00	1.00	1.00	.000	.500	.000	1.00	.000

Note. All values are Proportions. "Mutual" gives proportion of ego's undirected contacts with whom ego has reciprocated ties. "Out/Asym" gives proportion of ego's non-symmetric ties that are outgoing. "In/Asym" gives proportion of ego's non-symmetric ties that are incoming. *Denotes educators with up to and including 4 years of employment at Eagle High School.

As can be seen in Figure 16 and as shown empirically in Table 18, in the Q10 (GT2) Personal Problems network, all educators (with the exception of E8) were high ranking in their proportion of either mutual, asymmetric in, or asymmetric out dyads. A high proportion of the dyads E3 and E4 were involved in were asymmetric in (ego reciprocity of 1.00 for both educators) and mutual dyads (ego reciprocity of .600 and .833 respectively).

An ego reciprocity index of 1.0 signifies all arcs incident on a given node are the same isomorphic class. As can be seen in Table 18, all non-mutual arcs incident on E7, E9, and E11 represented asymmetric out dyads. Similarly, all non-mutual arcs incident on E3, E4, E5, E6, and E10 represented asymmetric in dyads. Asymmetrical dyads represent pairs of nodes with non-mutual ties. These dyads likely represent two nodes which do not share the same resources therefore they exhibit unidirectional ties that were not reciprocated. To repeat, while reciprocated ties characterize networks which support organizational learning and were more likely to initiate and sustain change (Daly, 2010), Wasserman and Faust (1994) contended that a network with a high number of asymmetrical dyads were in an intermediate state with the potential to lead to mutuality if resources related to the change were flowing freely through the network.

Figure 16 visually represents the GT2 calculations of the Q10 Personal Problems network. As Figure 16 shows, the Q10 (GT2) Personal Problems network has two educators (an ELA teacher, E3, and a social studies teacher, E4) who are involved in a high proportion of mutual dyads. While these two educators had a high proportion of mutual dyads, a closer examination shows that E3 had three mutual arcs out of a total of five arcs yielding the second highest ego reciprocity index of 0.600. E4 had the highest ego reciprocity index of 0.833 with five mutual arcs out of six total arcs. While, at face value, the indices appear similar between the two educators with high ranking ego reciprocity, a close examination shows that the extent to

which E4 leveraged social capital in the personal problem network is greater due to his/her higher number of total ties. This supports my previously discussed conclusion that instructional coaching processes expand educator's networks, increasing the likelihood of trusting collegial relationships spreading beyond content networks.

Node Level Analysis of Q11 Others Problems Network

Density. Figure 17 visually represents the GT2 adjacency matrix for the Q11 Others Problems network, showing this network was characterized by a total of 34 incidents on 11 nodes. The network density (0.309) shows that approximately one third of all possible ties were realized within this network.

It is clear in looking at the Q11 Others Problems network graph in Figure 17 that E2, E4, E7, and E10 hold a central position within the network. E2 is connected to and serves as bridge to E11 as the only tie connected to E11. This network graph and associated reciprocity measure do not exhibit significant differences between the staff who have been at the school for fewer than five years and staff who have been employed at the school for five or more years.
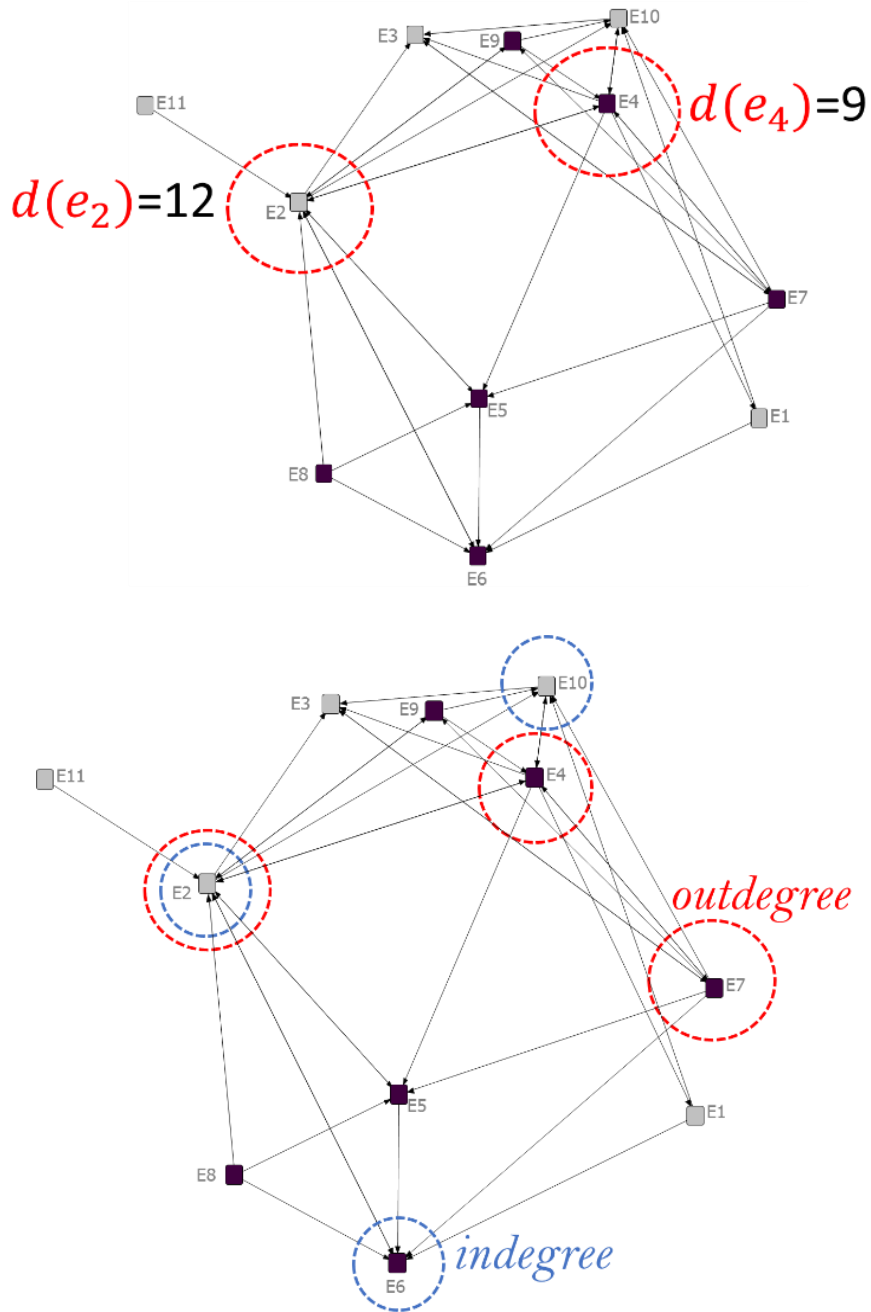
Degree centrality. Empirical degree centrality measures summarized in Table 19 represent the Q11 Others Problems network using the GT2 data. Degree centrality is simply the nodal degree or the number of ties emanating from a given node. Figure 18 visually represents the Q11 others problems network showing the educators with the highest ranking non-directed nodal degree circled. As the social network graph shows, there were two educators who had the most overall connections with their colleagues. The most central educator within the Q11 Others Problems network, with a non-directed nodal degree of 12 was E2 (the most senior educator in terms of years of employment at the school with 10 to 19 years). The educator ranking second
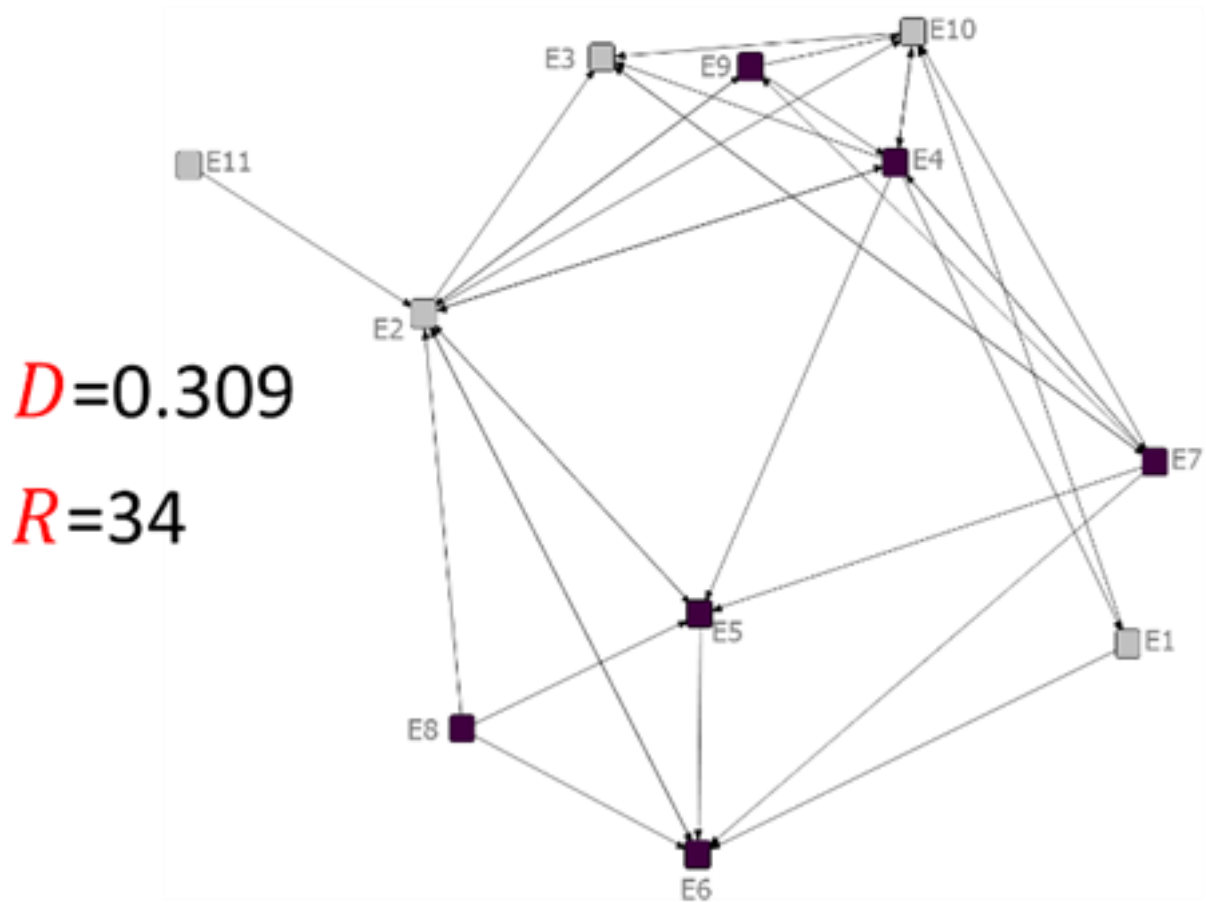
Note. Network measures (using the dichotomized GT2 adjacency matrix) of density. Black shaded nodes represent educators who have been employed in the school for up to and including 4 years; Grey shaded nodes represent educators who have been employed in the school for 5 or more years. E11 is the school instructional coach scheduled to support the Eagle High School staff 2 to 3 days per month.

Figure 17. Q11 Others Problems network graph depicting network density.

Note. Network measures using the dichotomized GT2 adjacency matrix. Circles indicate high ranking ego-reciprocity index. Nondirected nodal degree –highest rank (top graph), Node level degree centrality –highest rank indegree and outdegree (bottom graph). Black shaded nodes represent educators who have been employed in the school for up to and including 4 years; Grey shaded nodes represent educators who have been employed in the school for 5 or more years. E11 is the school instructional coach scheduled to support the Eagle High School staff 2 to 3 days per month.

Figure 18. Q11 Others Problems network graphs depicting high ranked degree centrality.

Table 19

Node Level Degree Centrality for Q11 Others Problems Social Network

	E1	E2	E3	E4*	E5*	E6*	E7*	E8*	E9*	E10	E11
Q11 Out	2	6	3	6	1	1	7	1	3	2	2
Q11 In	1	7	4	4	4	5	2	0	2	5	0
Q11 Node	3	13	7	10	5	6	9	1	5	7	2

Note. *Indicates educators with up to and including 4 years of employment at Eagle High School.

highest in the Q11 Others Problems network, with a non-directed nodal degree of 9, was E4 (who reported being at the end of his fourth year employed at the school).

As in the previous network, E8 (the principal) and E11 (the instructional coach) emerged as the educators holding the most peripheral positions in the Q11 others problems network with a non-directed nodal degree of 2 as seen in Table 19. Interview data confirmed that the instructional coach is contracted to be at the school to engage teachers in the one-to-one instructional coaching process two or three days per month. This schedule accounts for the low frequency of interaction.

The bottom network graph in Figure 18 depicts the educators with the highest number of indegree and outdegree connections in the Q11 (GT2) Others Problems network. A network with high degree centrality is characterized by educators who have access to (indegree) and control over (outdegree) the resources that are flowing through the network. Three educators (E2, E4, and E7) emerge as having the highest number of outgoing connections related to student learning. As seen in Table 19, E2 and E4 both reported having daily or weekly conversations about others problems with six educators, while E7 reports having daily or weekly interaction discussing others problems with seven colleagues. While these three educators control a high degree of information about solving other educator's problems flowing out into the network, these three educators did not all rank high in incoming connections. In fact, E7 had few incoming connections with an indegree centrality index of 2 as seen in Table 19. This educator self-reported significant outgoing contact with other educators about their problems, however he/she does not have a significant amount of incoming information. This may indicate a constrained flow of information about others problems through this educator.

118

Conversely, E2 and E4, as seen in Figure 18, not only rank high for outgoing interaction with other educators about their problems, but they both also have several incoming connections related to others problems. As Table 19 shows, E2 has the highest number of incoming connections with an indegree centrality index of 7. E6 and E10 have the second highest number of incoming connections with an indegree centrality index of 5. These three educators have high prestige within the others problems network, as others report seeking them out to discuss their problems, giving them access to information from multiple educators. The extent to which this information flows through the network can be inferred by comparing these three educators outdegree centrality index as described above for E2, E4, and E7. While E6 and E10 have a high number of incoming connections, they reported a very low number of outgoing connections suggesting they constrain the level of trust associated with discussing others problems within the network.

As seen in the top network graph in Figure 18, E2 and E4 not only rank high overall for nodal degree centrality, they also rank high for indegree centrality. When comparing E2's indegree centrality index (7) with his/her outdegree index (6) and E4's indegree centrality index (4) with his/her outdegree index (6), it is clear that both E2 and E4 are very central, brokering the most information flowing through the Q11 (GT2) Others Problems network.

E2 and E4, both social studies teachers, are experienced staff with four or more years of employment at Eagle High School. The fact that these two individuals emerge as central educators within the Q11 Others Problems network suggests these two educators are trusted by their colleagues and are sought out to help other educators solve their problems. Again, these data support my conclusion that instructional coaching processes expand educator's networks increasing the likelihood of trusting collegial relationships spreading beyond content networks.

Ego reciprocity. The final network measure analyzed in my investigation was ego reciprocity, which is visually represented in Figure 19, depicts the social network graph created from the Q11 (GT2) Others Problems network. Empirical ego reciprocity calculated from the GT2 adjacency matrix for the Q11 Others Problems network is summarized in Table 20.

As can be seen in the social network graph in Figure 19 and shown empirically in Table 20, in the Q11 (GT2) Others Problems network, all educators were high ranking in their proportion of either mutual, asymmetric in, or asymmetric out dyads. A high proportion of the dyads E4 was involved in were asymmetric out (ego reciprocity 1.00) and mutual dyads (ego reciprocity of .667). The high proportion of dyads E3 was involved in were asymmetric in (ego reciprocity of 1.00) and mutual dyads (ego reciprocity of .750).

An ego reciprocity index of 1.0 signifies all arcs incident on a given node are the same isomorphic class. As can be seen in Table 20, all non-mutual arcs incident on E4, E7, E8, and E11 represented asymmetric out dyads. Similarly, all non-mutual arcs incident on E3, E5, E6, and E10 represented asymmetric in dyads. Asymmetrical dyads represent pairs of nodes with non-mutual ties. These dyads likely represent two nodes which do not share the same resources therefore they exhibit unidirectional ties that were not reciprocated. For the last time, while reciprocated ties characterize networks which support organizational learning and are more likely to initiate and sustain change (Daly, 2010), Wasserman and Faust (1994) contended that a network with a high number of asymmetrical dyads were in an intermediate state with the potential to lead to mutuality if resources related to the change were flowing freely through the network. Within the Q11 Others Problems network these resources largely consisted of trust. While a high number of educators were present in asymmetric dyads in the other problems network, this network was not directly linked to my intended organizational change.
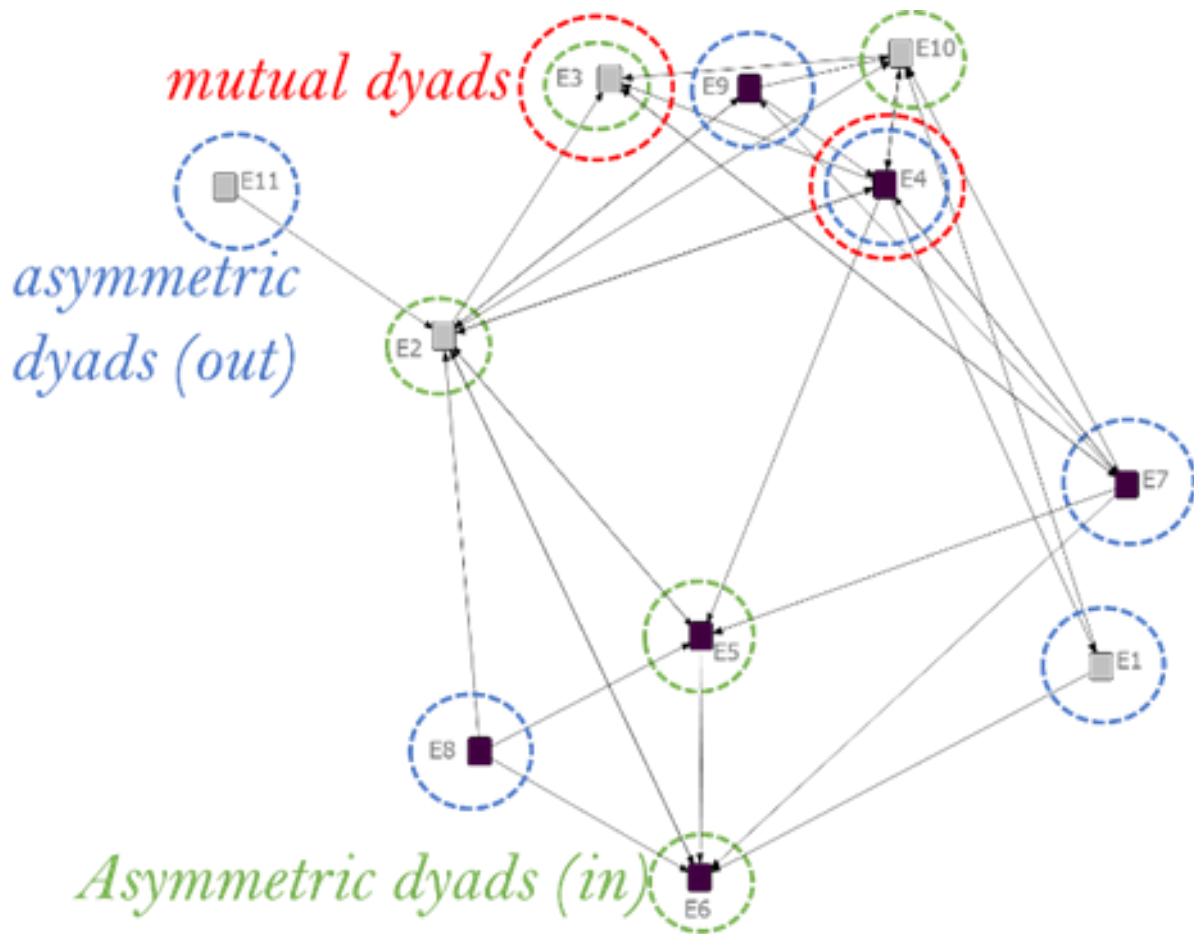
Note. Network measures (using the dichotomized GT2 adjacency matrix) of dyad reciprocity – highest rank isomorphic classes circled. Black shaded nodes represent educators who have been employed in the school for up to and including 4 years; Grey shaded nodes represent educators who have been employed in the school for 5 or more years. E11 is the school instructional coach scheduled to support the Eagle High School staff 2 to 3 days per month.

Figure 19. Q11 Others Problems network graph depicting high ranking ego reciprocity.

Table 20

Node-Level (Ego) Reciprocity Statistics

	E1	E2	E3	E4*	E5*	E6*	E7*	E8*	E9*	E10	E11
Q11 Mutual	.000	.444	.750	.667	.250	.200	.286	.000	.250	.400	.000
Q11 Out/Asym	.667	.400	.000	1.00	.000	.000	1.00	1.00	.667	.000	1.00
Q11 In/Sym	.333	.600	1.00	.000	1.00	1.00	.000	.000	.333	1.00	.000

Note. All values are Proportions. "Mutual" gives proportion of ego's undirected contacts with whom ego has reciprocated ties. "Out/Asym" gives proportion of ego's non-symmetric ties that are outgoing. "In/Asym" gives proportion of ego's non-symmetric ties that are incoming.
*Denotes educators with up to and including 4 years of employment at Eagle High School.

As Figure 19 shows, the Q11 (GT2) Others Problems learning network has two educators (E3 and E4) who are involved in a high proportion of mutual dyads. While these two educators had a high proportion of mutual dyads, a closer examination shows that E1 and E6 had one mutual arc out of a total of three arcs yielding the second highest ego reciprocity index of 0.333. E4 and E9 have the highest ego reciprocity index of 0.375, however a closer examination of these two educators, as seen in Figure 19, shows that E4 and E9 had three mutual arcs out of eight total arcs. While at face value the indices appear similar between the four educators with high ranking ego reciprocity, a close examination shows that the extent to which E4 and E9 leverage social capital in the student network is greater due to their higher number of total ties. Again, these data support the conclusion that instructional coaching processes expand educators' networks, increasing the likelihood of the formation of trusting collegial relationships and the spreading of them beyond content networks.

Summary

In conclusion, the data collected I collected to conduct my social network analysis of all four social networks at Eagle High School warranted seven key findings which I will discuss here before turning to my analysis of my Collective Efficacy and interview data. My finding are:

1. Instructional coaching processes expand educator's networks increasing the likelihood of instructional practices and collegial trusting relationships spreading beyond content networks;

2. Coaching structures ensure that educators quickly (in fewer than four years) learn the collaborative processes and internalize the norms of interaction at Eagle High School;

3. The peer coaching processes, which occur twice monthly, significantly increase interaction about teaching and learning; therefore the extent of exposure to teaching

strategies and student learning discussions increases through the peer coaching processes inherent in the coaching model;

4. Outside of the peer coaching process, teachers relate to each other about student learning much more than they do about the common instructional framework; however, the flow of resources about student learning is hierarchical;

5. Educators employed at the school for 0 to 4 years discuss the common instructional framework (teaching strategies) more frequently, thus outside of the peer coaching processes, than their colleagues who have been employed for 5 or more years;

6. Peer coaching processes do not engender trusting relationships in which staff freely discuss their problems;

7. Outside of the peer coaching processes, the expressive trust networks at Eagle High School are fairly strong.

Collective Efficacy Analysis

A reasonable conclusion from the Collective Efficacy data depicted in Table 21 is that the coaching processes at Eagle High School have a positive impact on Collective Efficacy Scale ratings, as the school yielded a standard collective efficacy score of 615.307 indicating the educators within the school rated themselves above 84% of the Collective Efficacy Scale normative sample from Goddard and Hoy's (2003) Ohio sample.

Comparing the collective efficacy rank to the total non-directed nodal degree (a measure of how many non-directed ties an educator has across all four networks), E2 emerges as not only having the highest collective efficacy standard score, but also having the most number of ties across all four of the social networks constructed in my investigation. While E4 emerged as having the second highest number of ties across the four social networks, this educator ranked in

Table 21

Collective Efficacy Scale- Long Form (Copyright© Goddard & Hoy, 2003) and Nodal Degree

	Total CE-Scale	Standard Score	CE Rank	Total ND (GT2)	ND Rank
E1	101	607.857	4	12	8
E2	110	674.905	1	38	2
E3	97	578.058	6	26	5
E4*	101	607.857	4	41	1
E6*	101	607.857	4	19	7
E7*	105	637.656	3	35	3
E8*	99	592.958	5	7	9
E9*	96	570.608	7	31	4
E10	108	660.006	2	23	6
Eagle High	102	615.307			

Note. *Indicates educators with up to and including 4 years employed at Eagle High School. Remaining educators have 5 or more years of employment at the school.
Total ND (GT2) and ND Rank represent the total number of non-directed ties (Nodal Degree) for each educator across all four social networks calculated from the dichotomized GT2 adjacency matrix.

the moderately high range of collective efficacy standard score, tying with two other educators (E1 and E6) for a rank of 4 with a collective efficacy standard score of 607.857.

The lowest collective efficacy scores were seen in E3, E8, and E9. Both E8 and E9 reported being employed at Eagle High School between 0 and 4 years. While E3 and E9 ranked in the mid-range of total number of non-directed ties across the four social networks, E8 not only ranked low in collective efficacy with a standard score of 592.958, he/she also yielded the least number of ties across the four social networks. While the mirrored low ranks for E8 are notable, his/her collective efficacy standard score still resulted in a slightly above average range falling above 84% of educators in the Goddard and Hoy's (2003) normative sample.

These data support my key finding from my social network analysis that the trust networks were strongly connected. Bandura (1986) identified four types of social experiences that produce information that impacts efficacy beliefs: (1) mastery experience, (2) vicarious experience, (3) social persuasion, and (4) affective states. The coaching structures at Eagle High School directly impact the first two experiences as the one-to-one instructional coaching processes embeds mastery experiences in the feedback cycle led by the instructional coach. As teachers engage in the peer coaching processes, they are producing information that impacts efficacy beliefs through vicarious experiences through their observations of their colleagues' teaching. The school-wide common instructional framework and associated coaching processes constitute social persuasion experiences as educators' thoughts and actions are influenced by their experience with both school phenomena. Finally, the affective state experiences (the experience of feeling and emotion) with which educators at Eagle High School engage are impacted by the strong collegial connections built through the collaborative processes within the school. The notable collaborative process my investigation explored was the peer coaching

process. As discussed above, my analysis of data related to the trust networks warranted the conclusion that these networks were characterized by strong collegial connections, and thus had a direct link to teacher collective efficacy.

My investigation viewed collective efficacy through the conceptual framework of social cognitive theory, casting efficacy as a judgment that impacts action, thought, and attitude; not as a single trait that defines a group (Goddard et al., 2000). These data further clarify that the trust networks at Eagle High School were strong and that collective efficacy was high both impacting and being impacted by the coaching structures at Eagle High School. Further analysis of the interview data will determine to what extent the coaching structures present at the school impacted, and were impacted by, these data.

Interview Analysis

I have chosen to consider my interview data as they bear directly on each of the propositions of my study.

Proposition 1: Instructional Coaching Harnesses Social Capital by Strengthening Ties (Relationships) and Facilitating the Flow of Resources (Peer Expertise) in the Network

Social capital is the transparent flow of information through a social network. Coleman (1988) identified two components of social capital: social structures, and actions of educators (or nodes, as they are referred to in social network analysis) within the structures. My study focused on two structures to benchmark the intervention at Eagle High School: peer coaching (a social structure), and one to one coaching (a human capital structure). I analyzed the actions of educators through a thorough investigation of the social network at Eagle High School as well as through data gathered from the collective efficacy scale and through interviews.

127

Of the nine interviews I conducted for my study, the second level of coding in *NVivo* focused specifically on the flow of resources across the educator network. Interviewees talked about other social structures within the school, outside of the peer coaching process, which facilitated or prohibited the flow of resources across the network. These structures included critical friend professional learning communities, affiliate networks (such as grade level), content networks, and proximity networks. Table 22 contains my summary of my second level coding data. My analysis indicated that 38% of the coded statements related to the flow of resources across the network as a result of peer coaching and were about student learning, and that 31% of the coded statements related to the flow of resources across the network were about teaching strategies. The remaining coded statements were either about general (overall) information about teaching and learning (6%), about problems or difficulties teachers faced within the school environment (6%), or explicitly spoke to the absence of ties (19% of statements overall) and teaching strategies that would facilitate the flow of resources across the network.

As previously discussed, one key finding that emerged during the social network and collective efficacy analysis was that peer coaching processes expanded educator networks beyond traditional boundaries. In my interview with E3, he/she shared that "the benefit of observing a class outside your (own) content area is that sometimes being ignorant of the content allows you to focus just on strategies." Similarly, E10 expressed appreciation that the collaborative structures at Eagle High School forced teachers to open their doors so they were "not isolated in departments."

A trend that I detected in my coding of each interview focused on the benefit that accrued to observers through both the one-to-one and peer coaching process when they were able to see their students in a different context—outside of their own classroom. This trend mimics the data

Table 22

NVivo Codes: Flow of Resources Across the Network

	Presence Overall	Absence Overall	Presence Student Learning	Absence Student Learning	Presence Teaching Strategies	Absence Teaching Strategies	Presence Others Problems	Absence Others Problems
E2			1					
E3			2		1			
E4*		1			1		1	
E6*		1				1		
E7*	1		1					
E8*					2			
E9*					1			
E10			2					
Total	6%	13%	38%	0%	31%	6%	6%	0%

Note. *Indicates educators with up to and including 4 years employed at Eagle High School. Remaining educators have 5 or more years of employment at the school. Data represents the number of codes related to each node. Own problems did not emerge as a theme in the interview data.

I uncovered during my analysis of the collective efficacy scores at Eagle High School. As stated previously, when teachers engage in the peer coaching process, they produce information that impacts efficacy beliefs through vicarious experiences accrued as they observe their colleagues teach (Bandura, 1986). In comparing his/her experience at a school without any peer coaching process, one educator, E7, who had been employed at Eagle High School for 4 or fewer years, stated:

> If you are curious about something and want to go observe it, I was always reluctant to ask at other schools. Here, I am not, and it happens outside of peer rounds actually. I wanted to go see how it was going, something I was personally, professionally interested in. I could go knock on the door and say, "you know, I want to be here when you do this."

Another educator, E10, reported being employed at the school for 5 or more years and shared his/her experience with peer coaching saying:

> I think it just brings us closer together because it is an experience that we share. We watch each other teach. We go, "oh, so that is how they do it," and it gets us to know each other better. I think it is a commonality we can use in supporting the students.

Interview data pointed to the one-to-one coaching relationship having far greater impact on educator practice, while the peer coaching process allowed educators to look closely at students in another context. Statements such as "when you participate in peer rounds it . . . gives you the opportunity to see how students interact differently in a classroom outside of my own" (E3, an educator with between 5 and 9 years employed at the school), "with peers they tend to focus on similar students . . . so feedback is focused on the students you share" (E3, an educator with between 5 and 9 years employed at the school), and "you can see things happening and relate to your own way of teaching and see the students reactions to different teachers" (E7)

support the finding that the coaching processes did not adequately leverage social capital related to the collegial focus.

As discussed previously, the collegial focus consisted of a set of strategies that teachers at Eagle High School utilized to deliver instruction. The coaching processes were intended to support teachers in refining these common instructional framework strategies. The interview data above clearly demonstrate that teachers see the peer coaching process not as an opportunity to improve their own practice relative to the common instructional framework, but instead see the processes as a way to discuss student learning. In this way, teachers do not view the peer coaching process as a reflective structure to look at how they deliver instruction, but instead as a vehicle to observe how students engage in the learning. While there is a definite connection between student learning and pedagogy, it is not apparent that teachers view the process as encompassing both.

The low frequency of interaction for E11—seen in the nodal degree centrality Tables 13, 15, 17, and 19—the instructional coach, is a clear result of the fact that the instructional coach is not employed full-time at Eagle High School. She serves the school only 2 to 3 days per month for 8 months out of the school year, however her prestige among the network is significant, as illustrated in the interview data. The strength of the instructional coach is inherent not in the frequency of interaction but in the kind of information she brokers and the level of trust present in her relationships.

One educator, E7, who had been employed at the school for fewer than 5 years, shared his/her most recent peer coaching experience, stating:

> I got some very valuable feedback from my colleagues and I like that everybody
>
> would . . . interact not directly with the kids but they were interested in what was going

on and why it was going on so they talked to some kids. They pointed me to things I could do to make my life easier and at the same time enrich the student experience. I think I could not have seen this by myself.

While discussing student learning is a valuable outcome of peer coaching, the ultimate aim of the peer coaching processes at Eagle High School was to extend this discussion of student learning beyond the students themselves to a discussion of teaching strategies employed by educators more broadly, with the aim of improving student achievement. E7's statement above, and others like it, warrant the conclusion that the purpose of the peer coaching structures (to refine teaching strategies related to the collegial focus) was not explicit. This is a key finding and will be returned to below in an analysis of interview data related to proposition 2.

Proposition 2: Intentional Coaching Structure is Purposefully Designed to Strengthen the Ties and Flow of Resources within the School's Existing Social Network

I conducted a third round of coding in *NVivo* (as seen in Table 23) to identify the intentional structures present within the school that strengthened ties and the flow of information through the network. The process yielded 94 total codes that I subsumed under six different themes: overall intentional structure, lack of intentional structure, peer coaching structure, one-to-one coaching structure, feedback cycle, and lack of feedback cycle. Recall, the phenomenon that I studied through the lens of proposition two was specifically the feedback cycle that was operationalized by both the instructional coach and the peer coaching processes in existence at the school. The highly structured process of holding a pre-conference to discuss what the observers would be looking for when they observed a colleague, the data collection phase that drove the feedback loop, and the culminating debrief session to discuss the data constituted an intentional structure. The intentional coaching structure theme was prominent, with 11% of the

Table 23

NVivo Codes: Intentional Coaching Structures

	Overall Intentional Structure	Peer coaching Structure	One to one Coaching Structure	Lack of Intentional Structure	Feedback Cycle	Lack of Feedback Cycle
E2	3			4		
E3	1			2		
E4*	3		2	9	2	1
E6*	5	2	3	7	7	1
E7*	4	6	4		1	
E8*	2	4	10			
E9*	4			2		
E10	2		2			
Total	26%	13%	17%	37%	11%	2%

Note. Data represents the number of codes related to each node. The intentional structures including processes for one to one coaching, peer coaching, and a feedback cycle. Note: *Indicates educators with up to and including 4 years employed at Eagle High School. Remaining educators have 5 or more years of employment at the school.

codes indicating a presence of a feedback cycle in the coaching processes, and 26% of the codes indicating an intentionally constructed overall structure to the coaching processes used at the school.

As seen in Table 23, 37% of the codes relate to the theme of lack of intentional structure, which supports the fifth key finding mentioned above, namely, that the purpose of peer coaching structures (to change educator practice by refining teaching strategies related to the collegial focus) was not explicit. While all the educators I interviewed could describe the steps in the coaching cycle used for the peer coaching and one-to-one coaching processes, the statements related to the lack of structure theme really feel into two sub-categories. The first being educators experienced with the processes expressed frustration with the lack of buy-in from the newer staff members. The second being the vague understanding of the intent of the coaching processes outside of just complying with the steps within them.

Illustrating both of these subcategories, E4 expressed his/her concern that the new educators at the school "are not used to the commitment" of opening-up to feedback through the coaching processes. E6 shared that "some people were reluctant to hurt someone's feeling" and therefore did not give authentic feedback during the peer coaching processes. In this way, these seemingly uncommitted educators were complying with the process of peer coaching but not truly buying into the premise that peer coaching is intended to provide feedback to support colleagues in refining their teaching practice.

E6 went on to share forthrightly his/her experience with feedback during the debrief portion of the peer instructional coaching process as follows:

There are some people who you could tell that their feedback is extremely valuable and

you can take it and use it, but some of the feedback that I got you could tell it was just

crap. It becomes meaningless.

These data support two key findings discussed above, namely that the peer coaching

processes do not engender trusting relationships in which staff freely discuss their problems, and

that the purpose of coaching structures (to refine teaching strategies related to the collegial focus)

was not explicit.

Interview data indicated the presence of constraints as educators new to the school shared

the difficulties they faced in adapting to the school and in coping with the perception voiced by

veteran teachers—of which they were aware—that new teachers were not committed to the

school processes. While the traditional network boundaries were eliminated, as described above,

there is evidence in the interview analysis of my Proposition 2 that another type of silo has been

erected around years of employment at Eagle High School.

My interview data add insight into the finding I noted previously, that educators who

have been employed at the school for between 0 and 4 years seek others out to discuss the

collegial focus more frequently than educators who have been employed at the school for 5 or

more years, and into my first key finding that the coaching process expands educator networks

beyond traditional network boundaries. There is evidence that the coaching structures and

common instructional framework are ingrained in educators before the end of their fourth year of

employment at the school. However, the data collected from educators in their first year at the

school points to the lack of resources adequately flowing to very new educators who are

completely unfamiliar with the processes and collegial focus. Thus, a teacher in his/her first year

at Eagle High School, E6, speaking of the peer coaching structure and common instructional

framework, shared "I felt like there was the pressure on me and on the new people who I worked with who were all in the same team who kind of felt isolated from everybody else to just know this." Mirroring this comment, an educator in his/her fourth year of employment at Eagle High School conjectured that the established teachers "think the new staff now are not that comfortable with it (the peer coaching processes)." These statements also support my conclusion that the peer coaching processes do not engender trusting relationships in which staff freely discuss their problems.

Proposition 3: The Coaching Model Has, at Its Foundation, a Clearly Articulated, Transparent Collegial Focus Designed to Strengthen Ties and Focus the Flow of Resources in the Network

A fourth round of coding was conducted in *NVivo* identifying themes related to a clear collegial focus. The coding resulted in a total of 52 codes organized into seven themes: reading, writing, thinking (questioning or inquiry), talking (discourse), collaboration (groupwork), explicit collegial focus, and not explicit collegial focus. The final two of these themes are particularly pertinent to my study. As Table 24 shows, 23% of the codes indicated that the collegial focus was explicit to the interviewees, or clarified within the coaching processes, 17% of the codes indicated the opposite—that the collegial focus was not explicit and hindered the peer coaching processes as a result. Collegial focus strategies related to writing, thinking (in the form of questioning and inquiry), and collaboration (or group work) emerged as the most referenced collegial focus strategies throughout the interviews.

While the collegial focus at Eagle High School was centered around a common set of strategies that teachers utilized to deliver instruction, the school's relentless focus on student learning tended to blur the lines between teacher practice and student learning, in some

136

Table 24

NVivo Codes: Collegial Focus (Common Instructional Framework Strategies)

	Reading	Writing	Thinking	Talking	Collaboration	Explicit	Not Explicit
E2	1	1	1	2	1	1	
E3	1	1				1	
E4*	2	4	1		1	4	4
E6*		1	1			2	3
E7*					1		
E8*		1	1		1	1	2
E9*		2			1	1	
E10	1		2	2	1	2	
Total	10%	19%	12%	8%	12%	23%	17%

Note. *Indicates educators with up to and including 4 years employed at Eagle High School. Remaining educators have 5 or more years of employment at the school. Data represents the number of codes related to each node. The schools common instructional framework serves as their collegial focus and includes strategies to engage students in reading, writing, thinking, talking, and collaboration.

cases causing reflective practice to be less about how their instructional design and delivery impacted student learning and more about how students were receiving the instruction. It is clear that some discussion on the instructional core is necessary to explicitly draw the connections between how a teacher's instructional design and delivery impacts the interaction between the content, the student, and the teacher. Several quotes illustrate this loose understanding. E3, an educator who has worked at Eagle High School for 5 or more years shared his/her understanding that, in peer coaching, the focus was on "noticing what particular teaching strategies work for which students." Along similar lines, E8 asserted that peer coaching was "like a support. Like a community support for [the observed teachers] as opposed to changing practice. They use it to plan, or as a vetting of ideas and less of an 'I need to fix this'."

For veteran teachers, removing student learning from the discussion was almost counterintuitive because the two were so ingrained in their professional practice. As one educator put it,

> [the common instructional framework] is so embedded in what we do, so for me it comes back to the consistency and stability the kids experience in our classrooms, because they get that structure and the expectations that you are going to read, you're going to write, you're going to do that in all of your classrooms.

It seems to me that the disconnect comes in when the link to the common instructional framework (or collegial focus) is not explicit. These data support the finding that coaching processes did not adequately leverage social capital related to the collegial focus, and the fifth key finding that the purpose of coaching structures (to refine teaching strategies related to the collegial focus) were not explicit.

This disconnect is seen not only in the social network data, but in several statements educators made during the interviews. As one educator shared "when I came to this school the different teaching strategies, which I didn't get there [at the previous school…were] a learning experience." This teacher went on to share

> I enjoyed the closeness and talking about teaching strategies instead of talking about behaviors. When I came here I hit the ground running with the common instructional framework because it was constantly being pushed on you. I thought it was a great idea because I did not come from an environment where teaching strategies were discussed.

It is clear from these statements that onboarding new staff members is important. Additionally, a constant focus on the common instructional framework and its link to the instructional core is vital and only when this relentless focus is present can the peer coaching process take on meaning. This was supported as E6 shared her experience as a new staff member at the school who was not provided the same level of onboarding described by her colleague. She shared, "you could just feel that we weren't up to a set of standards but we weren't even sure what those standards were." She went on to say, "The one-to-one instructional coach was a godsend. She was the one who actually sat me down and walked me through the common instructional framework." Another educator, E9 shared,

> I think one of the biggest things that helped me as a new teacher was coming in and learning the methods. Seeing those things that we talked about in critical friends meetings or in PD (professional development) that we could do. Seeing them in practice as opposed to just doing them in the PD. It kind of came across in the PD as "well this would fit in English or history but not in science".

Interestingly, all of the educators who felt as though the collegial focus was not explicit were within their first four years at Eagle High School. While student learning specific to assessments and standard mastery data emerged as a primary focus for the flow of resources across the Eagle High School network, this was very rarely mentioned during the interviews.

Conclusion

In conclusion, data collected through the social network analysis of all four social networks at Eagle High School, my analysis of the collective efficacy data, and a detailed investigation of the interview data warrant expanding my original eight conclusions to now encompass nine key findings. The overall research question for this case study was: What aspects of instructional coaching are likely to result in improved student achievement across schools? This inquiry was explored further with the following question: How does embedding social capital theory into an instructional coaching model impact teacher practice and collective teacher efficacy? These findings emerged from four categories in order to inform what aspects of instructional coaching at Eagle High School impacted teacher practice and collective teacher efficacy to inform the answers to the research questions and case study propositions. These categories and key findings are:

Multi-Tiered Instructional Coaching Model

These processes include both the one-to-one instructional coaching process and the peer instructional coaching process. The two key findings related to both processes are listed below.

1. Instructional coaching processes expand educator's networks increasing the likelihood of practices and collegial trusting relationships spreading beyond content networks;

140

2. Coaching structures ensure that educators quickly (in less than four years) learn the collaborative processes and internalize the norms of interaction at Eagle High School.

One-to-One Instructional Coaching Process

There was one key finding related solely to the one-to-one instructional coaching process at Eagle High School:

1. The one to one instructional coach, while not as structurally embedded in the network, was more instrumental in changes in educator practice.

Peer Instructional Coaching Process

The four key findings related specifically to the peer coaching process at Eagle High School are:

1. The peer coaching processes, which occur twice monthly, significantly increase interaction about teaching and learning therefore the extent of exposure to teaching strategies and student learning discussions increases through the peer coaching processes inherent in the coaching model;

2. Outside of the peer coaching process, teachers relate to each other about student learning much more than they do about the common instructional framework however the flow of resources about student learning is hierarchical;

3. Peer coaching processes do not engender trusting relationships in which staff freely discuss their problems; and

4. Outside of the peer coaching processes, the expressive trust networks at Eagle High School were fairly strong.

Collegial Focus

The two key findings related to the collegial focus (common instructional framework) at Eagle High School are:

1. Educators employed at the school for 0 to 4 years discuss the common instructional framework (teaching strategies) more frequently, thus outside of the peer coaching processes, than their colleagues who have been employed for 5 or more years; and

2. The purpose of peer coaching structures (to refine teaching strategies related to the collegial focus) were not explicit.

It is clear that the coaching model at Eagle High School is distinctive. Educators are opening their classroom doors and inviting their colleagues in to see their practice. In looking at Proposition 1, instructional coaching harnesses social capital by strengthening ties (relationships) and facilitating the flow of resources (peer expertise) evidence uncovered in the investigation warrants the conclusion that Eagle High School is characterized by strong collegial ties. This investigation uncovered that while there is some benefit to the processes within the multi-tiered instructional coaching model, they could use some refinement.

These processes, notably the peer instructional coaching process, are increasing social capital. There are a lot of ties present at Eagle High School that fall outside of the traditional silos that typically characterize secondary schools and teachers speak to the fact that the multi-tiered coaching processes have made them much more comfortable going into colleague's classrooms. One science teacher spoke to the fact that while she always felt comfortable talking to other science teachers, it never would have occurred to her to take it beyond just discussing strategies with other teachers and to ask to go into their classroom and see the strategy in action.

When it comes to the processes facilitating the flow of resources or peer expertise through the network, the evidence uncovered during this investigation revealed that student learning pervades everything at Eagle High School. There was not a strong flow of resources related to pedagogy through the network at Eagle High School. The flow of resources were more nuanced. While there existed a common instructional framework, the fact that teachers were going into classrooms to essentially view student learning clouded the intended outcome of both coaching processes, namely improving teacher practice through the refinement of the common instructional framework strategies.

This investigation uncovered the fact that the focus of peer instructional rounds at Eagle High School became, whether intentional or unintentional, focused on how to better serve the students. While improving student learning is a worthy endeavor, it serves to shift the focus away from teacher practice, thus losing the impact the processes could potentially have on refining teacher practice. This warrants a refined collegial focus that will be discussed further below.

Proposition 2, intentional coaching structure is purposefully designed to strengthen the ties and flow of resources within the school's existing social network. The coaching structures themselves, namely the feedback cycle is clearly embedded in how the school does business. Every educator interviewed was able to articulate how the feedback cycle worked. They shared what the structure of the multi-tiered coaching model was, including how the instructional coach engaged them in one-to-one coaching through the same process used in peer instructional rounds.

The extent to which the collegial focus and debrief process were embedded in the feedback cycle was problematic. Teachers spoke of the lack of authenticity in feedback provided during the instructional rounds process. This disconnect was partially due to the strong collegial atmosphere that characterized Eagle High School. This atmosphere constrained teachers'

willingness to share their honest feedback. Teachers were going through the steps of the feedback cycle in the peer coaching process without leveraging them to the fullest extent due to the ineffective feedback.

There was a pervasive misconception that the peer instructional rounds process was intended to build culture and to break down the walls hindering the flow of resources in order to build a strong collegial family. While this emphasis on relationships is worthy, the true intent of peer instructional rounds at Eagle High School was to refine professional practice. That goal was not realized to its fullest extent. I will talk about how the intentional coaching structure could be further enhanced in the next section.

Moving on to Proposition 3, the coaching model has, at its foundation, a clearly articulated, transparent, collegial focus designed to strengthen ties and focus the flow of resources. Evidence uncovered during this investigation pointed to the fact that teachers were familiar with the collegial focus. They were familiar with the strategies involved in the common instructional framework, just as they were familiar with the structure of the coaching processes. This investigation uncovered a disconnect in understanding that the collegial focus was the "why" behind the coaching processes. Teachers were clear about the one-to-one coaching process goal being to refine practice related to the common instructional framework, however it was less evident that they understood that the collegial focus was the intent of the peer coaching process as well. This speaks to the need for some additional supports and processes that again, I will discuss subsequently.

CHAPTER 5: SUMMARY, IMPLICATIONS, AND CONCLUSIONS

The purpose of my investigation was to study how embedding constructs of social capital into the coaching model at Eagle High School impacted changes in teacher practice, and yielded high levels of collective teacher efficacy. My results serve as a benchmark to inform revisions to the Riverside School Districts coaching model. The overall research question for this case study was: What aspects of instructional coaching are likely to result in improved student achievement across schools? This inquiry was explored further with the following question: How does embedding social capital theory into an instructional coaching model impact teacher practice and collective teacher efficacy?

Data collected through the social network analysis of four social networks at Eagle High School, my analysis of the collective efficacy data, and a detailed consideration of the interview data warrant nine key findings which align with four main categories (Multi-tiered Instructional Coaching Model, One-to-One Instructional Coaching Process, Peer Instructional Coaching Process, and Collegial Focus). A multi-tiered instructional coaching theory emerged from the nine key findings uncovered during my investigation, and will serve to inform revisions to the Riverside Public School District's coaching model. I will discuss these nine key findings relative to each category in the following sections as I describe my coaching theory.

Multi-Tiered Instructional Coaching Theory

Figure 20 represents the schema of the theory that I have formulated to account for my findings. Surrounding the model is the school's social network, within which lies all the processes and procedures within a school. Through my study, it became clear that in order to be successful at leveraging social capital to change teacher practice, a coaching model must be aligned to all other processes within a school. My original assumption was that this alignment
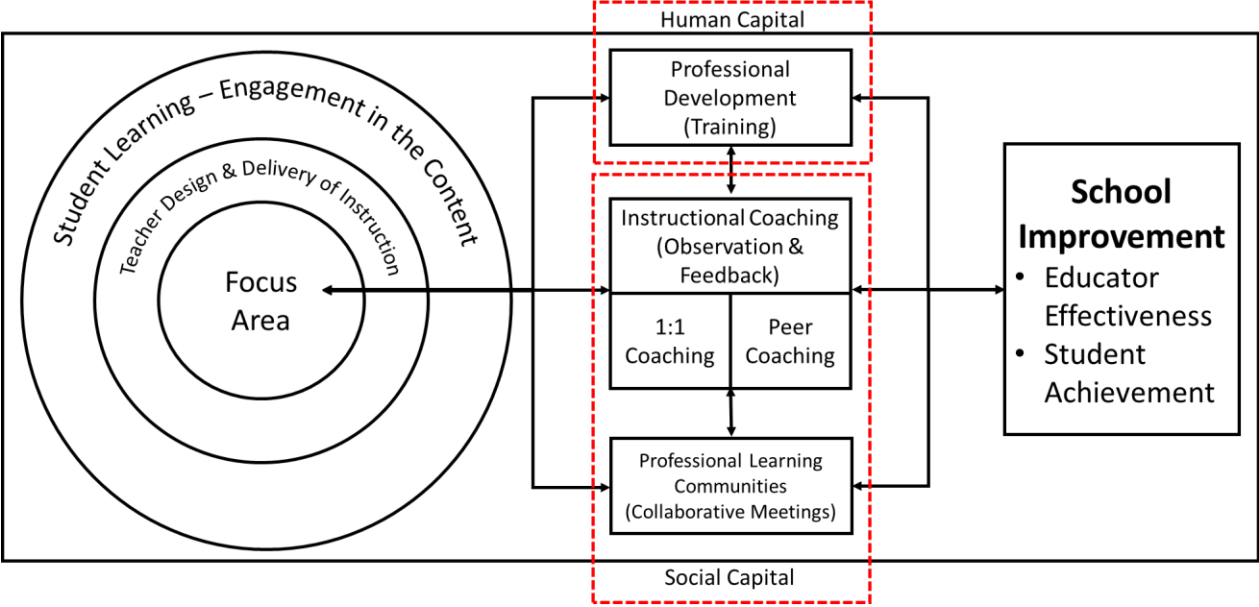
Figure 20. Multi-Tiered Instructional Coaching Theory.

was through a common set of strategies—which the coaching process supported. However, it became clear to me through this investigation that strategies for delivering instruction alone do not adequately serve to focus feedback in a coaching cycle with any level of consistency. In this way, the multi-tiered coaching model in place at Eagle High School can be enhanced through a more detailed alignment of the collegial focus with all other structures within the school. Many longitudinal studies of coaching implementation document the rise and fall of effective coaching structures directly linked to the fact that the coaching model was not intentionally built to integrate with the existing social network of a school (Atteberry & Bryk, 2011; Bidwell & Yasumoto, 1999; Coburn et al., 2013; Gross, 2012).

Refined Collegial Focus

Focus can be described in social network theory as the degree to which individuals expend time and energy toward a joint activity associated with a given topic (Feld, 1981). The three concentric circles in Figure 20 represent a revised collegial focus component of the instructional coaching theory. This begins with a narrow focus area at the center serving to explicitly state the focus of all processes within the school. Inside the revised collegial focus component of my theory, this narrow focus area is further clarified moving out from the center circle to explicitly state how teachers will design and deliver instruction relative to the focus area. Finally, moving out from the center of the circle a second time, the focus area is further refined to explicitly state what students will be doing to engage in the content relative to the focus area.

Two key findings related to the collegial focus (common instructional framework) at Eagle High School emerged from the social network analysis and interview data warranting this refined collegial focus. Data analyzed during my investigation merited the conclusion that

147

educators employed at the school for 0 to 4 years discuss the common instructional framework (teaching strategies) more frequently—thus outside of the peer coaching processes—than their colleagues who have been employed for 5 or more years at the school. The fact that educators with fewer than 5 years of employment at Eagle High School were more likely to have frequent interactions about teaching strategies—thus leveraging social capital within the network—is an expected phenomenon. These more recently hired educators are likely unfamiliar with the strategies in the common instructional framework, and would be expected to seek out information related to the collegial focus.

Social capital is comprised of two distinct dimensions; (1) the *structural dimension* (Moolenaar & Sleegers, 2010) which describes the pattern of ties within a social network, and (2) *collegial focus* (Bidwell & Yasumoto, 1999) which includes the specific content exchanged in a social network. Strong structural dimensions form dense ties which, in turn, facilitate the dissemination of knowledge and information, and can, when intentionally focused on specific outcomes, result in positive change.

Of concern to me is my finding that the purpose of the peer coaching structures (to refine teaching strategies related to the collegial focus) was not explicit. Educators reported understanding the steps of both the one-to-one coaching process and the peer coaching process. They overwhelmingly pointed to the value of each. Nevertheless, my study revealed an inconsistent understanding of the purpose for each process. This inconsistent understanding constrained the potential impact of the coaching model at Eagle High School.

The evidence I collected and analyzed during my study warrants an expanded collegial focus not only to encompass teaching strategies as specified in Eagle High School's common instructional framework but also to integrate these strategies for instructional design and delivery

within a more comprehensive collegial focus. New educators at Eagle High School reported feeling overwhelmed with the peer coaching process—partially due to an unclear understanding of the common instructional framework. Educators also attributed minimal value to the peer coaching process as it sometimes did not yield valuable feedback due to an ambiguous collegial focus and a tenuous link to how the process could result in changes in practice.

The revised collegial focus—displayed in Figure 20—combined with the expanded social and human capital components within the coaching theory, support Bidwell and Yasumoto's (1999) finding that the likelihood of resources related to a particular collegial focus extending beyond departmental social networks depends on how strongly institutionalized the practices related to the collegial focus are.

Human Capital

The expansion of the original coaching structures to include both human capital and the addition of collaborative meetings with the one-to-one and peer coaching processes mimics the human and social capital framework used by Daly et al. (2014) in their exploration of the extent to which teacher social interaction and student achievement are related.

The multi-tiered instructional coaching model at Eagle High School encompassed two distinct coaching processes that were linked together through a similar feedback cycle inherent in the steps of each process. Thus the multi-tiered instructional coaching model included the process and structures inherent in the one-to-one instructional coaching process, as well as the process and structures inherent in the peer instructional coaching process. In this section, I will explore findings that address both the one-to-one and peer instructional coaching processes, reserving my exploration of one specific process for later comment.

A large amount of data uncovered during my investigation warrants the conclusion that instructional coaching processes expand educator's networks, thereby increasing the likelihood of practices and collegial trusting relationships spreading beyond content networks (Proposition 1). The most embedded educators across networks within the GT2 calculations were social studies educators (E2 and E4). These two teachers had a significant number of connections spanning every content area within Eagle High School. These two educators not only had access to a large amount of instrumental information flowing through the network in relation to teaching and learning (Q8 and Q9 networks) they also had a large number of expressive connections signaling high degree of collegiality and trust amongst their colleagues. While this conclusion is likely due, in part, to the network of connections engendered from the peer instructional processes at the school, interview data also point to other collaborative processes within the school, such as critical friends meetings (a type of professional learning community), grade span professional learning community meetings, and professional development which contribute to this expanded network.

A second key finding related to the multi-tiered coaching model is that coaching structures ensure that educators quickly (in fewer than four years) learn the collaborative processes and internalize the norms of interaction at Eagle High School (Propositions 1 & 2). Two educators (E4 and E9) drew a distinction between themselves and the newer staff members. They both indicated they had been at the school for several years, and asserted that they had a solid understanding of the unique processes for collaboration within the school. When recounting their experience at the school in relation to their colleagues, it was clear to me that they considered themselves among the "experienced" staff. Both of these educators pointed not to the peer rounds process, but to professional development opportunities and one-to-one instructional

150

coaching as the activities that served to embed the collaborative processes as well as the collegial focus (common instructional framework) within their professional practice. This evidence warrants the simultaneous inclusion of not only social capital constructs within the coaching model, but also human capital constructs to both onboard new staff members and support veteran staff in implementing the common instructional framework and in engaging effectively to leverage the social capital inherent in the peer instructional coaching process.

The inclusion of human capital and social capital supports Coleman's (1988) distinction between social capital that results in changes in relations (enabling action among people within a social network) and human capital that results in changes in people as they work to build the skills and capabilities that enable people act in a certain way. Coleman explained that both are necessary to maximize resource exchange within a social network. Putnam (2000) supported this distinction between human and social capital, adding that both can increase productivity through refining actions.

All the interviews I conducted pointed to the fact that each educator was at least familiar with the common instructional framework strategies. While interview and social network data point to the fact that discussion of these strategies seemed not to permeate outside of the coaching processes, it is clear that, when required through a structured reflection process such as that inherent in the coaching feedback cycle that served as the foundation of both coaching processes, educators fluidly discussed these strategies. This conclusion leads to the one key finding uncovered specific to the one-to-one coaching process.

In summary, I have found that leveraging human capital through training and professional development is a vital component of a vibrant teaching and learning environment which must not only be aligned to the collegial focus, but also precede any coaching support.

151

My study points to the fact that professional development is not only necessary to provide staff with the foundational knowledge about the common instructional strategies but also crucial in enabling staff to how these strategies align to all processes within the building. Additionally, the professional development must include specific and detailed discussion of each process from the one–to-one coaching process, to the peer coaching process, and professional learning communities. The evidence I gleaned from my investigation warrants my finding that without a consistent understanding of why each of the coaching processes is important and how each process links to the other processes, the impact of coaching on teacher practice was minimal. Oftentimes, school districts make the fundamental error of providing professional development to one–to-one instructional coaches on the process and assuming that teachers will understand the purpose of the coaching processes intuitively. Adding a layer of support for teachers who are engaging with the one–to-one coach so that they fully understand the process, the intended outcome, and, most importantly, why they are engaged in the coaching process is vital. The analogous additional layer of support should extend to all other processes from the peer coaching process to professional learning community collaboration.

Expanded Social Capital

Thurlings et al. (2012) investigated the feedback process inherent in a reciprocal peer coaching model. Their findings indicated that a skilled facilitator is the key to ensuring that feedback is positive, goal directed, and repeated. A study by Rivera-McCutchen and Panero (2014) pointed to the use of evidence-based data and a clear collaborative process to facilitate the kinds of interactions that produce lasting changes in practice.

There was one key finding related solely to the one-to-one instructional coaching process at Eagle High School. The one-to-one instructional coach, while not as structurally embedded in

the network, was highly instrumental in prompting changes in educator practice (Proposition 2). Though all educators were familiar with the steps of the coaching processes (e.g., the feedback cycle), the evidence I gathered warranted the conclusion that understanding the steps was not sufficient to leverage the type of authentic peer feedback that consistently leads to changes in teacher practice. One exception to this may be the one–to-one coaching feedback. Many educators reported that the instructional coach relentlessly focused an abundance of feedback on concrete evidence that the common instructional framework had been implemented with fidelity, and in such a way that student learning was maximized. Because the instructional coach had a solid understanding that the coaching process was intended to refine teaching strategies related to the collegial focus, interactions with the one–to-one coach were much more focused than the interactions associated with the peer instructional rounds.

Four key findings related specifically to the peer coaching process at Eagle High School. The peer coaching processes, which occur twice monthly, significantly increase interaction about teaching and learning and, as a consequence, the extent of exposure to teaching strategies and student learning discussions increases through the peer coaching processes inherent in the coaching model (Propositions 2 & 3). The evidence I collected during my study warrants the conclusion that, while peer coaching may not directly lead to changes in educator practice, its processes set the stage for this as educators reported feeling comfortable to observe their colleagues even outside of the peer coaching processes. My study uncovered clear evidence that the peer coaching processes expanded participants' natural network tendencies across content- and grade-span networks, thus increasing the likelihood of practices spreading beyond these natural education demarcations. Interview data clearly pointed to the benefits educators found in visiting one another's classrooms. Further, the comfort such practices engendered created a

153

collegial atmosphere in which teachers felt safe to ask a colleague if they could come into his/her classroom to observe something they were interested in. However, group-level social network measures pointed to a constraining quality related to the nature of information flowing through the network. These data warrant the conclusion that, outside of the peer coaching process, teachers relate to each other about student learning much more than they do about the common instructional framework, however the flow of resources about student learning is hierarchical (Proposition 3).

The fact that educators were comfortable observing one another even outside of the peer rounds process warrants the conclusion that the expressive trust networks at Eagle High School were fairly strong (Propositions 1 & 2). Though this level of comfort is present outside of the peer coaching process, a teacher in his/her first year and several other educators shared during their interviews that they were hesitant (or they felt colleagues were hesitant) to share honest feedback during the peer instructional rounds process. This warrants the conclusion that peer coaching processes do not engender trusting relationships in which staff freely discuss their problems (Propositions 1 & 2). While Eagle High School exhibited elevated levels of collective teacher efficacy, evidence of changes in teacher practice as a result of both the one–to-one coaching process and the peer coaching process were less conclusive. New educators reported finding more value in the one-to-one coaching process as they felt more comfortable trying new strategies and reflecting on their own practice with the instructional coach. Nevertheless, all educators found value in the peer coaching processes and specifically in seeing their colleagues teach.

My theory, as encapsulated in Figure 20, includes a final phase seen on the right side of the theory diagram that aligns all processes so as to lead to total school improvement. My theory

ensures that the expanded collegial focus flows through the human capital and social capital structures within the school to result, ultimately, in increased educator effectiveness through changes in practice oriented to the maximization of student learning.

Implications for Schools and School Districts

My investigation warrants the inclusion of four main concepts into any instructional coaching model—whether it is a small-scale implementation in an individual school or large-scale implementation across a district. The first of these concepts is to maximize the impact of instructional coaching through the inclusion of some form of peer instructional coaching processes within the framework. While results from my study pointed to the fact that the one-to-one instructional coaching process had a greater impact on improving teacher practice when compared to the peer instructional coaching process, in a large school or a whole school district, the cost of including enough instructional coaches to provide the level of feedback through the coaching cycle that Eagle High School's instructional coach provided may be prohibitive. One way to achieve a similar aim would be to include and support a refined peer coaching process in the coaching model.

The second concept warranted through my investigation is to ensure that the overall goal of the coaching model (including both the one-to-one coaching process and the peer coaching process) is not only aligned but clearly articulated to all educators participating in the coaching model. The instructional coaching model must explicitly describe the collegial focus and deliberately link this focus to the goals and structures of the coaching model. This can be achieved by selecting a very narrow focus area and describing how the teacher will design and deliver instruction around that focus as well as what students will do to engage in the focus area

during instruction. This will not only focus the feedback cycle in the coaching processes but also will ensure that the goals of the coaching model are met.

The third concept my study warrants considering is linking the other processes and structures present within the school to the coaching model. This can be achieved by aligning the goals of all structures and processes within the school to the explicit focus area. In this way, all information flowing through the network—not just information flowing in the coaching processes—will be aligned. This will serve to optimize social capital involvement in such a way that the flow of information harnesses the expertise of peers within the building related to the collegial focus.

Finally, my study validates the inclusion within the instructional coaching model of a detailed plan for building human capital related to the steps involved in each coaching model as well as the collegial focus. Providing professional development for educators, including the instructional coach and educational leaders, on the steps in the coaching model and how the collegial focus links to these steps will ensure that the foundation is set to maximize the potential for the instructional coaching model to result in lasting pedagogical changes in educator practice.

Implications for Research

Two elements emerged from the concepts discussed above that merit further exploration. My first recommendation for further exploration derives from the finding that the collegial focus was not explicit. A more detailed look at how the collegial focus is developed and articulated to educators is warranted.

Collegial focus is comprised of anything that organizes joint activity (Bidwell & Yasumoto, 1999; Feld, 1981; Lofthouse & Leat, 2013; Yasumoto, Uekawa, & Bidwell, 2001). Recalling the earlier definition of the term "focus," the collegial focus at Eagle High School was

the common instructional framework that served to organize joint activity around educators' pedagogical affinity. Evidence in my study showed that the common instructional framework encompassed broad pedagogical application across departments. My study did not provide evidence that the collegial focus was sufficiently aligned with departmental content to engender shared activity through a coherent response to similar problems of practice. An investigation into how incorporating a theory of action into the coaching process may enhance the collegial focus by assisting educators in collectively discerning a problem of practice that compels collaborative investigation, through the peer instructional coaching and one-to-one coaching processes.

A close look at human capital development and the role it plays in impacting social capital is warranted. It is clear that a more direct link is necessary to align the collegial focus more coherently with the peer instructional coaching processes. This assertion, again, is derived from the premise that, for educators at Eagle High School, the purpose of peer coaching structures (to refine teaching strategies related to the collegial focus) was not explicit.

Conclusion

Researchers have found that coaching models that heavily rely on human capital development through professional development or certification and models that focus on physical capital such as technology, textbooks, or programs will not lead to strongly institutionalized changes in practice if they fail to address the social network within a school (Coburn et al., 2013; Coleman, 1988; Daly, 2010; Daly et al., 2014; Dika & Singh, 2002; Hite et al., 2010; Putnam, 2000). My study found that, while instructional coaching processes are vital for sustaining a change effort, providing professional development to educators on the processes and resources involved in the change effort are crucially important. My study of Eagle High School has highlighted many of the interactional threads of the instructional fabric of that small

157

high school, and has enabled me to develop a viable model that accounts for the complexity that I observed. I anticipate that the understanding of the role of social networks in high schools that gave rise to my model will facilitate the enhancement of the instructional endeavor in other schools in the Eagle High School district, as building leaders more effectively leverage both human and social capital within an instructional coaching model.

REFERENCES

Adams, C. M., & Forsyth, P. B. (2006). Proximate sources of collective teacher efficacy. *Journal of Educational Administration, 44*(6), 625-642. doi:10.1108/09578230610704828

Atteberry, A., & Bryk, A. S. (2011). Analyzing teacher participation in literacy coaching activities. *The Elementary School Journal*, *112*(2), 356-382. doi:10.1086/661994

Bachkirova, T., Sibley, J., & Myers, A. C. (2015). Developing and applying a new instrument for microanalysis of the coaching process: The coaching process Q-set. *Human Resource Development Quarterly*, *26*(4), 431-462. doi:10.1002/hrdq.21215

Baker-Doyle, K. J., & Yoon, S. A. (2010). Making expertise transparent: Using technology to strengthen social networks in teacher professional development. In A. Daly (Ed.), *Social network theory and educational change* (pp. 115-126). Cambridge, MA: Harvard Education Press.

Bandura, A. (1986). The explanatory and predictive scope of self-efficacy theory. *Journal of Social and Clinical Psychology, 4*(3), 359-373. doi:10.1521/jscp.1986.4.3.359

Bandura, A. (1993). Perceived self-efficacy in cognitive development and functioning. *Educational Psychologist, 28*(2), 117-148. doi:10.1207/s15326985

Bidwell, C. E., & Yasumoto, J. Y. (1999). The collegial focus: Teaching fields, collegial relationships, and instructional practice in American high schools. *Sociology of Education, 72*(4), 234-256. doi:10.2307/2673155

Borgatti, S. P., Everett, M., & Johnson, J. C. (2013). *Analyzing social networks*. Thousand Oaks, CA: Sage.

Borgatti, S. P., & Ofem, B. (2010). Overview: Social network theory and analysis. In A. Daly

    (Ed.), *Social network theory and educational change* (pp. 17-29). Cambridge, MA:

    Harvard Education Press.

Calloway, M., Morrissey, J. P., & Paulson, R. I. (1993). Accuracy and reliability of self-reported

    data in interorganizational networks. *Social Networks, 15*(4), 377-398. doi:

    10.1016/0378-8733(93)90013-B

Coburn, C. E., Mata, W. S., & Choi, L. (2013). The embeddedness of teachers' social networks:

    Evidence from a study of mathematics reform. *Sociology of Education*, *86*(4), 311-342.

    doi:10.1177/0038040713501147

Cole, R. P., & Weinbaum, E. H. (2010). Changes in attitude: Peer influences in high school

    reform. In A. Daly (Ed.), *Social network theory and educational change* (pp. 77-95).

    Cambridge, MA: Harvard Education Press.

Coleman, J. S. (1988). Social capital in the creation of human capital. *American Journal of*

    Sociology, 94, S95-S120. doi:10.1086/228943

Corbin, J. M., & Strauss, A. L. (2015). *Basics of qualitative research: Techniques and procedures*

    for developing grounded theory (4th ed.). Los Angeles, CA: Sage.

Cox, E., Bachkirova, T., & Clutterbuck, D. (2014). Theoretical traditions and coaching genres:

    Mapping the territory. *Advances in Developing Human Resources*, *16*(2), 139-160.

    doi:10.1177/1523422313520194

Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods*

    approaches (4th ed.). Thousand Oaks, CA: Sage.

Daly, A. J. (2010). Mapping the terrain: Social network theory and educational change. In A. Daly (Ed.), *Social network theory and educational change* (pp. 1-16). Cambridge, MA: Harvard Education Press.

Daly, A. J., Moolenaar, N. M., Der-Martirosian, C., & Liou, Y. (2014). Accessing capital resources: Investigating the effects of teacher human and social capital on student achievement. *Teachers College Record*, *116*(7), 1-42.

Dika, S. L., & Singh, K. (2002). Applications of social capital in educational literature: A critical synthesis. *Review of Educational Research*, *72*(1), 31-60. doi:10.3102/00346543072001031

Denton, C. A., & Hasbrouck, J. (2009). A description of instructional coaching and its relationship to consultation. *Journal of Educational and Psychological Consultation, 19*(2), 150-175. doi:10.1080/10474410802463296

Deussen, T., Coskie, T., Robinson, L., & Autio, E. (2007). *"Coach" can mean many things: Five categories of literacy coaches in reading first*. Washington, DC: National Center for Educational Evaluation and Regional Assistance, Institute of Education Sciences, U.S. Dept. of Education, 2007(005).

Feld, S. L. (1981). The focused organization of social ties. *American Journal of Sociology*, *86*(5), 1015-1035. doi:10.1086/227352

Gallant, A., & Gilham, V. (2014). Differentiated coaching: Developmental needs of coachees. *International Journal of Mentoring and Coaching in Education*, *3*(3), 237-254. doi:10.1108/IJMCE-12-2013-0059

Goddard, R., Goddard, Y., Kim, E. S., & Miller, R. (2015). A theoretical and empirical analysis

    of the roles of instructional leadership, teacher collaboration, and collective efficacy

    beliefs in support of student learning. *American Journal of Education, 121*(4), 501-530.

    doi:10.1086/681925

Goddard, R. D., Hoy, W. K., & Woolfolk, A. (2000). Collective teacher efficacy: Its meaning,

    measure, and effect on student achievement. *American Education Research Journal,*

    37(2), 479-507.

Goddard, R. D. & Hoy, W. K. (2003). *Collective Efficacy Scale, Form L.* Reviewed from

    http://www.waynekhoy.com/collective_efficacy.html

Granovetter, M. S. (1973). The strength of weak ties. *American Journal of Sociology*, *78*(6),

    1360-1380. doi:10.1086/225469

Gross, P. A. (2012). Challenges of literacy coaching in high school. *The Educational Forum*,

    76(2), 201-215. doi:10.1080/00131725.2011.652292

Gündüz-Ogüdücü, S., & Etaner-Uyar, A. Ş. (2014). *Social networks: Analysis and case studies*

    (1; 2014 ed.). Vienna, Austria: Springer-Verlag. doi:10.1007/978-3-7091-1797-2

Hattie, J. (2012). *Visible learning for teachers: Maximizing impact on learning*. New York, NY:

    Routledge.

Hattie, J., & Timperley, H. (2007). The power of feedback. *Review of Educational*

    Research, 77(1), 81-112. doi:10.3102/003465430298487

Hite, J. M., Hite, S. J., Mugimu, C. B., & Nsubuga, Y. K. (2010). Strategic "Co-opetition":

    Headteacher networking in Uganda's secondary schools. In A. Daly (Ed.), *Social network*

    theory and educational change (pp. 197-220). Cambridge, MA: Harvard Education Press.

Knoke, D., & Yang, S. (2008). *Social network analysis. Series: Quantitative applications in social science*s (2nd ed.). Thousand Oaks: CA: Sage.

Knight, D. S. (2012). Assessing the cost of instructional coaching. *Journal of Education Finance*, *38*(1), 52-80.

Ladyshewsky, R. K. (2002). A quasi-experimental study of the differences in performance and clinical reasoning using individual learning versus reciprocal peer coaching. *Physiotherapy Theory and Practice*, *18*(1), 17-31. doi:10.1080/0959398027535570666

Lofthouse, R., & Leat, D. (2013). An activity theory perspective on peer coaching. *International Journal of Mentoring and Coaching in Education*, *2*(1), 8-20. doi:10.1108/20466851311323050

Lofthouse, R., Leat, D., & Towler, C. (2010). *Coaching for teaching and learning: A practical guide for schools* (Guidance Report). Newcastle University, UK: CfBT Education Trust.

Moolenaar, N. M., & Sleegers, P. J. C. (2010). Social networks, trust, and innovation: The role of relationships in supporting an innovative climate in Dutch schools. In A. Daly (Ed.), *Social network theory and educational change* (pp. 97-114). Cambridge, MA: Harvard Education Press.

Nahapiet, J., & Ghoshal, S. (1998). Social capital, intellectual capital, and the organizational advantage. *The Academy of Management Review*, *23*(2), 242-266. doi: 10.5465/AMR.1998.533225

Neufeld, B., & Roper, D. (2003). *Coaching: A strategy for developing instructional capacity-- promises and practicalities.* Washington, DC: The Aspen Institute Program on Education, The Annenberg Institute for School Reform. Retrieved from http://annenberginstitute.org/sites/default/files/product/268/files/Coaching.pdf

North Carolina Department of Public Instruction, Accountability and Service Division. (2016). *2015-16 State, District and School Level Summary Data.* Retrieved from http://www.ncpublicschools.org/accountability/reporting/

Parker, P., Wasserman, I., Kram, K. E., & Hall, D. T. (2015). A relational communication approach to peer coaching. *The Journal of Applied Behavioral Science*, *51*(2), 231-252. doi:10.1177/0021886315573270

Penuel, W. R., Frank, K. A., & Krause, A. (2010). Between leaders and teachers: Using social network analysis to examine the effects of distributed leadership. In A. Daly (Ed.), *Social network theory and educational change* (pp. 159-178). Cambridge, MA: Harvard Education Press.

Penuel, W., Riel, M., Krause, A., & Frank, K. (2009). Analyzing teachers' professional interactions in a school as social capital: A social network approach. *Teachers College Record*, *111*(1), 124-163.

Poglinco, S. M., Bach, A. J., Hovde, K., Rosenblum, S., Saunders, M., & Supovitz, J. A. (2003) *The heart of the matter: The coaching model in America's choice schools.* Consortium for Policy Research in Education, University of Pennsylvania. Retrieved from http://www.cpre.org/images/stories/cpre_pdfs/AC-06.pdf

Putnam, R. D. (2000). *Bowling alone: The collapse and revival of American community*. New York, NY: Simon & Schuster.

Rivera-McCutchen, R., & Panero, N. (2014). Low-inference transcripts in peer coaching: A promising tool for school improvement. *International Journal of Mentoring and Coaching in Education*, *3*(1), 86-101. doi:10.1108/IJMCE-05-2013-0032

Ross, J. A., Hogaboam-Gray, A., & Gray, P. (2004). Prior student achievement, collaborative

    school processes, and collective teacher efficacy. *Leadership and Policy in Schools*, *3*(3),

    163-188. doi:10.1080/15700760490503689

SAS Institute Inc. (2016). *SAS® EVAAS® for K-12 Statistical Models.* Retrieved from SAS

    Institute Inc. website https://ncdpi.sas.com/support/EVAASStatisticalModels.pdf

Scott, J. (2012). *What is social network analysis?* (The 'What is?' Research Methods Series).

    London: Bloomsbury Academic. Retrieved from

    http://dx.doi.org/10.5040/9781849668187

Spillane, J. P., Hopkins, M., & Sweet, T. M. (2015). Intra- and interschool interactions about

    instruction: Exploring the conditions for social capital development. *American Journal of

    Education*, *122*(1), 71-110. doi:10.1086/683292

Thurlings, M., Vermeulen, M., Kreijns, K., Bastiaens, T., & Stijnen, S. (2012). Development of

    the teacher feedback observation scheme: Evaluating the quality of feedback in peer

    groups. *Journal of Education for Teaching*, *38*(2), 193-208.

    doi:10.1080/02607476.2012.656444

United States Congress, House Committee on Education and the Work Force. (2001). *No Child

    Left Behind Act.* Retrieved from http://www2.ed.gov/policy/elsec/leg/esea02/index.html

Wasserman, S., & Faust, K. (2009). *Social network analysis: Methods and applications*.

    Cambridge; NY: Cambridge University Press.

Yasumoto, J. Y., Uekawa, K., & Bidwell, C. E. (2001). The collegial focus and high school

    students' achievement. *Sociology of Education*, *74*(3), 181-209. doi: 10.2307/2673274

Yin, R. K. (2014). *Case study research: Design and methods* (5th ed.). Los Angeles, CA: Sage.

Zwart, R. C., Wubbels, T., Bergen, T., & Bolhuis, S. (2009). Which characteristics of a reciprocal

    peer coaching context affect teacher learning as perceived by teachers and their students?

    Journal of Teacher Education, *60*(3), 243-257. doi:10.1177/0022487109336968

APPENDIX A: INSTITUTIONAL REVIEW BOARD APPROVAL

EAST CAROLINA UNIVERSITY
University & Medical Center Institutional Review Board Office
4N-70 Brody Medical Sciences Building· Mail Stop 682
600 Moye Boulevard · Greenville, NC 27834
Office 252-744-2914 · Fax 252-744-2284 · www.ecu.edu/irb

Notification of Initial Approval: Expedited

From:	Social/Behavioral IRB
To:	Christine Catalano
CC:	
	Robert Reardon
Date:	3/9/2017
Re:	UMCIRB 16-002164
	Opening doors with instructional coaching

I am pleased to inform you that your Expedited Application was approved. Approval of the study and any consent form(s) is for the period of 3/8/2017 to 3/7/2018. The research study is eligible for review under expedited category #6, 7. The Chairperson (or designee) deemed this study no more than minimal risk.

Changes to this approved research may not be initiated without UMCIRB review except when necessary to eliminate an apparent immediate hazard to the participant. All unanticipated problems involving risks to participants and others must be promptly reported to the UMCIRB. The investigator must submit a continuing review/closure application to the UMCIRB prior to the date of study expiration. The Investigator must adhere to all reporting requirements for this study.

Approved consent documents with the IRB approval date stamped on the document should be used to consent participants (consent documents with the IRB approval date stamp are found under the Documents tab in the study workspace).

The approval includes the following items:

Name	Description
Interview Script Catalano	Interview/Focus Group Scripts/Questions
Opening Doors Consent 1.doc	Consent Forms
Opening Doors Proposal Catalano Final 4.docx	Study Protocol or Grant Application
Social Network & Collective Efficacy Survey Catalano	Surveys and Questionnaires

The Chairperson (or designee) does not have a potential for conflict of interest on this study.

IRB00000705 East Carolina U IRB #1 (Biomedical) IORG0000418
IRB00003781 East Carolina U IRB #2 (Behavioral/SS) IORG0000418

APPENDIX B: INFORMED CONSENT LETTER

East Carolina University

Informed Consent to Participate in Research
Information to consider before taking part in research that has no more than minimal risk.

Title of Research Study: Opening doors: Exploring how social capital theory enhances an instructional coaching model

Principal Investigator: Christine Catalano
Institution, Department or Division: East Carolina University, College of Educational Leadership
Address: 3973 Kimberly Jo Dr., Rocky Mount, NC 27804
Telephone #: (252)937-7332

Researchers at East Carolina University (ECU) study issues related to society, health problems, environmental problems, behavior problems and the human condition. To do this, we need the help of volunteers who are willing to take part in research.

Why am I being invited to take part in this research?
The purpose of this research is to explore an existing instructional coaching model in order to identify key components that positively impact teacher practice. It is hoped that the results of this research will lead to an instructional coaching model that can be replicated at other schools. You are being invited to take part in this research because you are an employee at a school that has implemented instructional coaching processes for several years. You have likely participated in the instructional coaching processes. The decision to take part in this research is yours to make. By doing this research, I hope to learn why instructional coaching does not always positively impact students. This will be further explored by investigating how instructional coaching processes impact a teachers perception that their colleagues, and the school as a whole, positively impact students.

If you volunteer to take part in this research, you will be one of about 20 people to do so.

Are there reasons I should not take part in this research?
You should not participate in this research if you are under the age of 18.

What other choices do I have if I do not take part in this research?
You may choose not to participate in this research study.

Where is the research going to take place and how long will it last?
The research will be conducted through both an online survey sent to your email address as well through interviews conducted at your school site. You will need to complete the online survey and you may, if randomly selected participate in an interview. Interviews will be conducted on site at Nash-Rocky Mount Early College High School. The total amount of time you will be asked to volunteer for this study is one to two hours over the next twelve months.

What will I be asked to do?
You will be asked to do the following:
- Complete an online survey.
- Submit coaching notes and documents for analysis.

Title of Study: Opening doors: Exploring how social capital theory enhances an instructional coaching model

You may be asked to do the following
- Participate in an interview to share your experience with instructional coaching during your time at your current school.
- Interviews will be audio taped. Recordings will be digitally archived on a secure, encrypted online platform at East Carolina University.

What might I experience if I take part in the research?
There are no known risks (the chance of harm) associated with this research. Any risks that may occur with this research are no more than what you would experience in everyday life. We don't know if you will benefit from taking part in this study. There may not be any personal benefit to you however the information gained by doing this research may help others in the future.

Will I be paid for taking part in this research?
You will not be paid for the time you volunteer while participating in this study however participants will be entered into a drawing for a $50.00 gift card upon completing the survey.

Will it cost me to take part in this research?
It will not cost you any money to be part of the research.

Who will know that I took part in this research and learn personal information about me?
ECU and the people and organizations listed below may know that you took part in this research and may see information about you that is normally kept private. With your permission, these people may use your private information to do this research:
- Any agency of the federal, state, or local government that regulates human research. This includes the Department of Health and Human Services (DHHS), the North Carolina Department of Health, and the Office for Human Research Protections.
- The University & Medical Center Institutional Review Board (UMCIRB) and its staff have responsibility for overseeing your welfare during this research and may need to see research records that identify you.
- People designated by ECU.

How will you keep the information you collect about me secure? How long will you keep it?
All data including survey responses, audio taped interviews, and instructional coaching documents will be digitally stored on a secure, encrypted platform at ECU and will be used solely for the purpose of this research study. All data will be recoded to remove participant names, replacing them with a unique number identifier prior to storage. Data will be kept for no more than 3 years following publication of the research findings.

What if I decide I don't want to continue in this research?
You may stop at any time after it has already started. There will be no consequences if you stop and you will not be criticized. You will not lose any benefits that you normally receive.

Who should I contact if I have questions?
The people conducting this study will be able to answer any questions concerning this research, now or in the future. You may contact the Principal Investigator at 252-937-7332 (Monday through Saturday, between 5:00 and 8:00 pm).

If you have questions about your rights as someone taking part in research, you may call the Office of Research Integrity & Compliance (ORIC) at phone number 252-744-2914 (days, 8:00 am-5:00 pm). If you would like to report a complaint or concern about this research study, you may call the Director of the ORIC, at 252-744-1971.

Consent Version 1

Title of Study: Opening doors: Exploring how social capital theory enhances an instructional coaching model

Are there any Conflicts of Interest I should know about?
The Principal Investigator (or the sub-investigator, research staff member, or family member) has no potential conflicts of interest.

I have decided I want to take part in this research. What should I do now?
The person obtaining informed consent will ask you to read the following and if you agree, you should sign this form:

- I have read (or had read to me) all of the above information.
- I have had an opportunity to ask questions about things in this research I did not understand and have received satisfactory answers.
- I know that I can stop taking part in this study at any time.
- By signing this informed consent form, I am not giving up any of my rights.
- I have been given a copy of this consent document, and it is mine to keep.

_____

Participant's Name (PRINT)   **Signature**   **Date**

Person Obtaining Informed Consent: I have conducted the initial informed consent process. I have orally reviewed the contents of the consent document with the person who has signed above, and answered all of the person's questions about the research.

_____

Person Obtaining Consent (PRINT)   **Signature**   **Date**

Page 3 of 3

Consent Version 1

APPENDIX C: QUALTRICS SOCIAL NETWORK SURVEY

ECU East Carolina University.   Student Project

Informed Consent

Welcome to the research study!

We are interested in understanding how instructional coaching (1:1 and peer coaching) contribute to improving teaching and learning. You will be presented with information relevant to instructional coaching and teacher collaboration and asked to answer some questions about it topics. Please be assured that your responses will be kept completely confidential.

The study should take you between 10 and 15 minutes to complete, and upon completion of the survey your name will be entered into a drawing for a $50.00 gift card for your participation. Your participation in this research is voluntary. You have the right to withdraw at any point during the study, for any reason, and without any prejudice. If you would like to contact the Principal Investigator in the study to discuss this research, please e-mail Chris Catalano, chcatalano@nrms.k12.nc.us.

By clicking the button below, you acknowledge that your participation in the study is voluntary, you are 18 years of age, and that you are aware that you may choose to terminate your participation in the study at any time and for any reason.

○ I consent, begin the study

○ I do not consent, I do not wish to participate

Individual & Contextual Factors

Your name

○ E1

○ E2

○ E3

○ E4

○ E5

○ E6

○ E7

○ E8

○ E9

○ E10

○ E11

○ E12

○ E13

○ E14

○ E15

What is your age?

○ 21 to 24 years

○ 25 to 34 years

○ 35 to 44 years

○ 45 to 54 years

○ 55 to 64 years

○ over 65 years

What is your gender?

○ Male

○ Female

How many years have you worked in education?

○ 0 to 4 years

○ 5 to 9 years

○ 10 to 19 years

○ 20 to 29 years

○ over 30 years

How many years have you worked at your current school?

- O 0 to 4 years
- O 5 to 9 years
- O 10 to 19 years
- O 20 to 29 years
- O over 30 years

What department do you work in?

- ☐ English Language Arts
- ☐ Mathematics
- ☐ Science
- ☐ Social Studies
- ☐ Foreign Language
- ☐ Support Staff (Counselor, etc)
- ☐ Instructional Coach
- ☐ Administration (Principal, Assistant Principal)

Whole Network

In the grid below, please check off how often you speak to each individual about student learning (assessments, feedback, mastery of standards, etc.).

	Once a year or less	Every few months	Every few weeks	Once a week	Every day	Never	This person is me
E1	O	O	O	O	O	O	O
E2	O	O	O	O	O	O	O
E3	O	O	O	O	O	O	O
E4	O	O	O	O	O	O	O
E5	O	O	O	O	O	O	O

	Once a year or less	Every few months	Every few weeks	Once a week	Every day	Never	This person is me
E6	O	O	O	O	O	O	O
E7	O	O	O	O	O	O	O
E8	O	O	O	O	O	O	O
E9	O	O	O	O	O	O	O
E10	O	O	O	O	O	O	O

	Once a year or less	Every few months	Every few weeks	Once a week	Every day	Never	This person is me
E11	O	O	O	O	O	O	O
E12	O	O	O	O	O	O	O
E13	O	O	O	O	O	O	O
E14	O	O	O	O	O	O	O
E15	O	O	O	O	O	O	O

In the grid below, please check off how often you speak to each individual about teaching strategies (Collaborative Groupwork, Critical Reading, Writing, Questioning, Discourse, etc.).

	Once a year or less	Every few months	Every few weeks	Once a week	Every day	Never	This person is me
E1	O	O	O	O	O	O	O
E2	O	O	O	O	O	O	O
E3	O	O	O	O	O	O	O
E4	O	O	O	O	O	O	O
E5	O	O	O	O	O	O	O

	Once a year or less	Every few months	Every few weeks	Once a week	Every day	Never	This person is me
E6	O	O	O	O	O	O	O
E7	O	O	O	O	O	O	O
E8	O	O	O	O	O	O	O

	Once a year or less	Every few months	Every few weeks	Once a week	Every day	Never	This person is me
E9	O	O	O	O	O	O	O
E10	O	O	O	O	O	O	O

	Once a year or less	Every few months	Every few weeks	Once a week	Every day	Never	This person is me
E11	O	O	O	O	O	O	O
E12	O	O	O	O	O	O	O
E13	O	O	O	O	O	O	O
E14	O	O	O	O	O	O	O
E15	O	O	O	O	O	O	O

In the grid below, please check off how often each individual listens to you about a problem you are facing?

	Once a year or less	Every few months	Every few weeks	Once a week	Every day	Never	This person is me
E1	O	O	O	O	O	O	O
E2	O	O	O	O	O	O	O
E3	O	O	O	O	O	O	O
E4	O	O	O	O	O	O	O
E5	O	O	O	O	O	O	O

	Once a year or less	Every few months	Every few weeks	Once a week	Every day	Never	This person is me
E6	O	O	O	O	O	O	O
E7	O	O	O	O	O	O	O
E8	O	O	O	O	O	O	O
E9	O	O	O	O	O	O	O
E10	O	O	O	O	O	O	O

	Once a year or less	Every few months	Every few weeks	Once a week	Every day	Never	This person is me
E11	O	O	O	O	O	O	O
E12	O	O	O	O	O	O	O

	Once a year or less	Every few months	Every few weeks	Once a week	Every day	Never	This person is me
E13	O	O	O	O	O	O	O
E14	O	O	O	O	O	O	O
E15	O	O	O	O	O	O	O

In the grid below, please check off how often you speak to each individual about a problem they are facing.

	Once a year or less	Every few months	Every few weeks	Once a week	Every day	Never	This person is me
E1	O	O	O	O	O	O	O
E2	O	O	O	O	O	O	O
E3	O	O	O	O	O	O	O
E4	O	O	O	O	O	O	O
E5	O	O	O	O	O	O	O

	Once a year or less	Every few months	Every few weeks	Once a week	Every day	Never	This person is me
E6	O	O	O	O	O	O	O
E7	O	O	O	O	O	O	O
E8	O	O	O	O	O	O	O
E9	O	O	O	O	O	O	O
E10	O	O	O	O	O	O	O

	Once a year or less	Every few months	Every few weeks	Once a week	Every day	Never	This person is me
E11	O	O	O	O	O	O	O
E12	O	O	O	O	O	O	O
E13	O	O	O	O	O	O	O
E14	O	O	O	O	O	O	O
E15	O	O	O	O	O	O	O

APPENDIX D: CHARACTERISTICS OF NON-RESPONDENTS

Study Phase	Number of Non-respondents	Description of Non-respondents
Social Network Survey & Informed Consent	4	(2) math teachers*, (1) social studies teacher*, (1) guidance counselor*
Collective Efficacy Survey	6	(2) math teachers*, (1) social studies teacher*, (1) guidance counselor* (1) instructional coach, (1)foreign language teacher
Staff not interviewed	7	(2) math teachers*, (1) social studies teacher*, (1) guidance counselor* (1) instructional coach, (1)foreign language teacher, (1) english teacher

Note. *Information obtained from school website as these individuals did not provide informed consent.

APPENDIX E: ADJACENCY MATRICES FOR Q8 STUDENT LEARNING NETWORK CALCULATIONS

Q8 Student Learning Network Valued Adjacency Matrix:

ID	E1	E2	E3	E4	E5	E6	E7	E8	E9	E10	E11
E1		2	2	2	2	2	2	2	2	3	1
E2	3		2	2	3	2	2	2	3	3	2
E3	2	3		4	2	2	2	2	1	3	2
E4	3	3	4		3	2	3	3	2	3	2
E5	1	2	1	3		1	1	2	2	1	1
E6	2	3	2	2	2		2	2	3	2	2
E7	2	3	4	4	4	3		3	3	4	2
E8	2	2	2	2	2	2	2		2	2	2
E9	2	4	3	3	3	4	4	3		3	2
E10	3	1	2	2	1	0	2	1	0		0
E11	2	4	3	2	2	2	2	2	2	2	

Q8 Student Learning Network GT2 Dichotomized Adjacency Matrix:

ID	E1	E2	E3	E4	E5	E6	E7	E8	E9	E10	E11
E1		0	0	0	0	0	0	0	0	1	0
E2	1		0	0	1	0	0	0	1	1	0
E3	0	1		1	0	0	0	0	0	1	0
E4	1	1	1		1	0	1	1	0	1	0
E5	0	0	0	1		0	0	0	0	0	0
E6	0	1	0	0	0		0	0	1	0	0
E7	0	1	1	1	1	1		1	1	1	0
E8	0	0	0	0	0	0	0		0	0	0
E9	0	1	1	1	1	1	1	1		1	0
E10	1	0	0	0	0	0	0	0	0		0
E11	0	1	1	0	0	0	0	0	0	0	

Q8 Student Learning GT1 Dichotomized Adjacency Matrix

ID	E1	E2	E3	E4	E5	E6	E7	E8	E9	E10	E11
E1		1	1	1	1	1	1	1	1	1	0
E2	1		1	1	1	1	1	1	1	1	1
E3	1	1		1	1	1	1	1	0	1	1
E4	1	1	1		1	1	1	1	1	1	1
E5	0	1	0	1		0	0	1	1	0	0
E6	1	1	1	1	1		1	1	1	1	1
E7	1	1	1	1	1	1		1	1	1	1
E8	1	1	1	1	1	1	1		1	1	1
E9	1	1	1	1	1	1	1	1		1	1
E10	1	0	1	1	0	0	1	0	0		0
E11	1	1	1	1	1	1	1	1	1	1	