School culture and leadership of professional learning communities

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Abstract

Purpose – The purpose of this paper is to explore supportive and shared leadership structures at schools as a function of school culture policies and procedures.

Design/methodology/approach – A qualitative study was conducted at three secondary schools in the Midwestern USA. Administrators and teachers were interviewed, professional learning communities observed and artifacts collected to explore school culture policies, procedures and leadership in the implementation of professional learning community practice.

Findings – This study concludes that school leaders must provide supportive and shared leadership structures for teachers in order to ensure a positive school culture and effective professional learning communities that impact school improvement. Leaders in schools must work directly with teachers to create policies and procedures that provide teachers the leadership structure to directly impact school improvement through professional learning community collaborative efforts.

Originality/value – This study builds on the school culture and professional learning communities literature by exploring existent policies and practices in schools as unique cases. Much of the literature calls for specific case studies to identify issues in the implementation of effective practice. This study is important to the community as specific cases that may inform educational leaders on mechanisms that may be leveraged to ensure successful implementation of policies and procedures outline in school culture and professional learning community literature.

Keywords Leadership, School culture, Professional learning communities

Paper type Case study

Introduction

School reform efforts over the last 30 years have focussed on teacher networks, school culture and school improvement (Hofman and Dijsktra, 2010; Schechter, 2008). The investigation of teacher collaborative network success has been important to the structure of the school community, the culture and a shared focus on achievement (Hofman and Dijsktra, 2010). School cultures are complex webs of traditions and rituals that have been built up over time as teachers, students, parents and administrators work together on establishing a culture of collaboration focussed on student achievement (Schein, 1985; Deal and Peterson, 1990 in Deal and Peterson, 1999).

School culture is determined by the values, shared beliefs, and behavior of the various stakeholders within the school's community and reflects the school's social norms (Groseschl and Doherty, 2000). Factors that affect school culture include policies, procedures and expectations for teaching, learning and student achievement (Giles and Hargreaves, 2006; Kohm and Nance, 2009).

School improvement and student achievement have been positively connected to teacher professional learning communities (Hofman and Dijsktra, 2010; Schechter, 2008). Researchers have described essential elements and common features of school culture policies, procedures and professional learning communities: shared purpose,

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shared values, shared leadership, a collaborative culture, collective inquiry, and a focus on continuous improvement (Brendefur *et al.*, 2014; Deal and Peterson, 2009; DuFour, 2008; Louis and Marks, 1998). A positive school culture ensures a positive focus on each of these characteristics while also ensuring supportive and shared leadership in the implementation of them (Deal and Peterson, 2009; DuFour and Eaker, 1998).

DuFour *et al.* (2008) defined a professional learning community as educators committed to working collaboratively in an ongoing process of collective inquiry and action research to achieve better results for the students they serve. PLCs operate under the assumption that the key to improve learning for students is continuous, job-embedded learning and professional development for educators (DuFour *et al.*, 2008). Feger and Arruda (2008) and Bolam *et al.* (2005) state the characteristics of effective professional learning communities includes supportive and shared leadership, shared purpose and values, a collaborative culture, problem solving and collective inquiry on teaching and learning and continuous improvement of the school.

The research question guiding this study was:

RQ1. To what extent was supportive and shared leadership structures provided at schools? (Deal and Peterson, 2009; DuFour *et al.*, 2008; Reichstetter, 2006).

The purpose of this investigation was to explore supportive and shared leadership structures at schools as a function of school culture policies and procedures. At each school, shared and supportive leadership was a component of the implementation of professional learning community practice involved in this research study. The primary objective of this study was to investigate the current state of school culture and professional learning community practice and determine characteristics of shared and supportive leadership found at each school in the investigation.

Three secondary schools in one community were selected to be part of the study. Three administrators and 12 science teachers were purposefully selected to provide qualitative data on existent, well-established professional learning communities. Qualitative data were collected from and about each participant to investigate perception and practice of professional learning communities as part of the culture at the schools. Each participant was interviewed and provided information on the structure, leadership and implementation of professional learning communities at each school. Professional learning communities were observed and physical artifacts were collected.

Empirical studies have connected teacher interaction in professional communities with a focus on student achievement (Jackson and Temperley, 2006; Lam, 2005; Louis and Marks, 1998; Newman *et al.*, 1996; Phillips, 2003; Strahan, 2003). Several studies have produced a framework for effective professional learning community structure (Supovitz, 2002). Empirical studies have provided the overlap between a positive school culture and common characteristics for effective professional learning communities as described herein. To this end, shared purpose and values, a collaborative culture, problem solving and collective inquiry, and a focus on continuous improvement are all components of a positive school culture, school improvement and an effective professional learning community (Hofman and Dijkstra, 2010; Little, 2002; Schechter, 2008). A summary of the effective characteristics of school culture and effective professional learning communities are provided.

(1) Shared purpose and values

A shared understanding of mission (purpose) and vision includes indicators, timelines and targets focussed on student learning. Vision provides clear direction, whereas

mission provides the statement for how business is done in terms of teaching and learning. The shared understanding of common value placed on the learning community with a focus on increasing student achievement is central to an effective school culture. Common values include beliefs teachers and administrator has about student's ability to learn, student's ability to achieve at high levels, a collaborative and collective shared practice and reflective practice and its impact on the need for instruction innovations and adaptions.

(2) Collaborative culture

A collaborative culture is the way teachers and administrators think and behave about sharing information about their practice. A collaboration culture is the systematic process teachers and administrators use to work together, interdependently, to analyze and impact their professional practice in order to improve student achievement. The collaborative culture must be interactive, whereby teachers and administrators utilize their expertise to share what they do in hopes of helping to improve the practice of others. For collaboration to be effective, people must perceive their skills, knowledge and experience will be respected and their contributions will be valued.

(3) Problem solving and collective inquiry

Problems in schools today largely center on student achievement. Teachers solve problems to increase student achievement results. Teachers and administrators focus on collective inquiry regarding teaching, learning and implications from achievement results. Collaborative collective inquiry of teaching and learning must ensure an increase in student achievement. Teachers must challenge how teaching and learning has taken place based on student achievement and use that information to shape collective teaching methods. A collaborative collective inquiry focus serves as a catalyst for teaching and learning innovations for the professional learning community. This process ensures that teachers build shared knowledge by looking at achievement data, reflecting on past teaching and learning practice and find avenues for teaching and learning innovations to increase student achievement.

(4) Continuous improvement

A positive school culture is focussed on improving teaching and learning to ensure all students achieve at high levels. The improvement of teaching and learning requires teachers and administrators to systematically engage in an ongoing cycle of gathering data of current student performance levels, reflecting on past teaching and learning, developing strategies and innovative practice to ensure all students achieve, implement the innovations, analyze the impact of the innovations, and apply the new knowledge gained from the cycle to the next cycle of continuous improvement. The goal of a culture of continuous improvement is to create an environment for perpetual learning for students, teachers and administrators.

Leaders in schools provide the culture for shared purpose and values as they relate to the collaborative culture, collective inquiry and continuous improvement required for a positive school culture. Essential to school culture and effective professional learning communities is the concept of shared leadership in the development of shared purpose and values (Allen, 2003; Feger and Arruda, 2008; Reichstetter, 2006). Hord (1997) said school leaders are equal learners in the professional learning community culture who facilitate shared leadership, power and authority by providing staff

opportunities for input in the purpose and values of the culture. Supportive and shared leadership should be a priority characteristic of a positive school culture and an effective professional learning community (Chapman and Harris, 2004; Reichstetter, 2006).

School leaders share power and must facilitate a school development process that harnesses the potential of teachers (Maslowski, 2006). Effective transformational leaders build professional learning community teams. The teams become motivated in the continuous improvement cycle to problem solve in the collaborative culture, under the shared values of the school, to increase student achievement and impact their practice (Chapman and Harris, 2004). Honesty, trust and openness are important modeling activities for administrators to provide teachers real responsibilities to lead in school improvement efforts as a function of the continuous improvement cycle.

School leaders provide structure for professional learning communities while also providing openness for teachers to problem solve within that structure (DuFour *et al.*, 2008). This sense of shared leadership requires administrators at schools to provide consistent professional development on effective professional learning community practice (Chapman and Harris, 2004; DuFour *et al.*, 2008). Professional learning community practice and methodology focus on teacher action research and reflective practice with a focus on student achievement (Hofman and Dijkstra, 2010).

In conclusion, most studies over the last thirty years discuss how professional community may serve a positive school culture and therefore provide a positive culture for the learning environment (Allen, 2003; Kohm and Nance, 2009). Embedded in the concept of school culture are the components of effective professional learning communities. An effective school culture must focus on continuous improvement, while empowering teachers to be active participants in school improvement as a function of student achievement.

Methods

(1) Sampling and data collection

Schools were selected because each had well established professional learning communities (Bolam *et al.*, 2005). Administrators and teachers at each school were interviewed to obtain information about their training for and implementation of professional learning community practice. Professional learning communities were observed; documents, archival records and physical artifacts were collected. Follow up interviews were conducted for teachers to verify observations and obtain information on their practice in professional learning communities.

(2) Data analysis

Data analysis and data collection were simultaneous activities in this study (Merriam, 1998). Interviews were audio recorded and transcribed verbatim using qualitative techniques (Creswell, 2013; Creswell and Miller, 2000; McMillan and Schumacher, 2009; Stake, 2010). First, the interviews were transcribed, coded, and then developed into themes. Interview transcripts, codes and themes were checked for validity through member checks (Creswell and Miller, 2000; Miles and Huberman, 1994). Initially, the themes were found based on the literature and reading: shared purpose and values, collaborative culture, collective inquiry, continuous improvement and shared leadership. Follow up reading from member checks provided sub-themes within themes. Themes and sub-themes were then provided in follow up member checks based on transcripts, codes and themes.

Second, the observations and field notes from professional learning communities provided documents and physical artifacts for data, categories within each theme using elements of professional learning communities for validity measures of sub-themes.

Third, follow up interviews went through the same set of verbatim transcription, coding, theme, member checking and sub-theme development. Transcripts, codes, themes and sub-themes were provided to participants for follow up member checking to ensure authenticity and validity of data.

Results

Roosevelt High School (pseudonym) had a student enrollment of over 1,800, grades 9-12. The building was relatively new compared to other schools in the district. The school was located on the edge of the city and was built in an expanding part of the community. The Science Department had 12 science teachers appointed to teach the core science curriculum and electives.

Washington High School (pseudonym) had a student enrollment of over 2,000, grades 9-12. The school was situated in the middle of the city and had served the community as a school for over 55 years. The school grounds and prior school building that it was built on dated back to the early 1900s. The school was rich in academic tradition and was considered by several participants to be the most tradition-rich school in the district. The Science Department had 14 science teachers appointed to teach the core science curriculum and electives.

Jefferson High School (pseudonym) had a student enrollment of over 1,400, grades 9-12. The school was located in the northern part of the city. The school was over 70 years old and had a rich tradition as a working-class type of school. The Science Department had ten science teachers appointed to teach the core science curriculum and electives.

The leadership structure at each school was the same. Each school had a head principal and four associate principals that were assigned departments (art, English, mathematics, science, etc.). The associate principals served as supervisors and evaluators of teachers.

(1) Shared purpose and values

DuFour *et al.* (2008) said that shared purpose is a collective and mutual agreement on how educators will work to improve the school. Values are the intrinsic qualities the school stands for, what it considers good and provides a foundation for why the purpose is important (Deal and Peterson, 2009). The administrators and teachers had mutual agreement that the purpose of professional learning communities was to provide a pathway for student achievement and student improvement. Teachers stated that the purpose of professional learning community was to provide time for teachers to reflect on their practice and use student achievement data to support what they were doing.

The administrators placed great value on the time to meet for professional learning communities, increasing student achievement and promoting high quality teaching. Teachers placed greater value on the time to meet in professional learning communities and reflect on their practice and did not value the use of student achievement data.

At Roosevelt, the administrator placed value on the professional learning community process (Allison *et al.*, 2010) to help leverage student achievement data to improve instruction. Teachers on the other hand placed greater value on the time to meet and

reflect on their practice without consideration to student data. Washington and Jefferson did not have a set professional learning community process and were not trained on how to go about professional learning communities. As a result, teachers did not value professional learning community time and did not see the value in meeting. Teachers at these two schools relegated their time to leadership imposed filling out forms to ensure teacher accountability for meeting time rather than reflecting on teacher practice and student achievement data. What is most profound is that teachers at all of the schools valued improving their instruction but did not use student achievement data to so as suggested in the literature (Allison *et al.*, 2010).

(2) Collaborative culture

The collaborative culture at Roosevelt was collegial and teachers were well trained on how to go about professional learning communities, while also having the time and flexibility to deviate from this process to reflect on their practice. Even though there was no training on what collaboration was or how to go about it, teachers said that they felt confident that collaboration was mutual and collegial, meaning all teachers had the opportunity and professional obligation to share ideas. The administrator had high expectations for the collaborative culture and teachers knew the expectations.

At Washington and Jefferson, teachers did not receive training on collaboration and there were no expectations for participation or collaboration. Teachers at these schools expressed great degrees of frustration at the lack of guidance and appreciation for the time teachers needed to share their practice. There were several teachers that chose to not participate in professional learning communities. Teachers at these schools chose instead to meet, but work on their own material, defying the administrative proposed collaborative culture. Over half of the teachers expressed that professional learning community training provided no guidance on collaboration, professional learning community process and there was no follow up by the administrator to ensure teachers were provided the resources to be successful. Teachers at both schools expressed frustration in the lack of opportunities to collaborate on teaching and learning, expressing that professional learning community time was committed mostly to structured data reporting and the misapplication of professional learning community practice.

(3) Problem solving and collective inquiry

The training provided at the beginning of the school year at each school, was structured to provide teachers with the tools needed for collective inquiry. Teachers at Roosevelt were provided structured data team inquiry and problem solving skills training. Follow up training was also provided. Teachers at Washington and Roosevelt were provided training at the start of the school year, but were given no follow up. The administrators did not provide expectations for collective inquiry related to mutual practice, reflective practice, problem solving into student achievement data. Administrators at Washington and Roosevelt were not present in professional learning communities. The administrators did not provide guidance on the inquiry process and had no consistent expectations for teachers.

Teachers expressed frustration at Washington and Jefferson regarding the lack of time provided for collective inquiry and problem solving as it related to reflective practice. Teachers at Washington were expected to fill out forms to "hold teacher accountable for professional learning community time," which resulted in teacher

isolation and a lack of collaboration on collective inquiry. Teachers at both schools felt that they were being watched "from afar" by administrators, but not provided the freedom and flexibility to share their practice. The lack of trust and respect for teacher professionalism resulted in a lack of collective inquiry and a severely stunted the collaborative culture at these two schools.

A consistent paradigm at each school persisted in that teachers were not provided consistency in training and follow up on how to use student data to drive instructional collective inquiry. The administrator at Roosevelt and Jefferson expressed concern at this phenomenon and had plans on how to address it, but had not undertaken that endeavor yet.

(4) Continuous improvement

The continuous improvement cycle required a shared purpose, shared values, an active collaborative culture, and a well-trained collective inquiry process (Allison *et al.*, 2010; DuFour *et al.*, 2008). The continuous improvement cycle of teaching and learning requires teachers and administrators to systematically engage in an ongoing cycle of gathering data of current student performance levels, reflecting on past teaching and learning, developing strategies and innovative practice to ensure all students achieve, implement the innovations, analyze the impact of the innovations, and apply the new knowledge gained from the cycle to the next cycle of continuous improvement. (DuFour *et al.*, 2008).

Roosevelt had a well-defined continuous improvement process. At Roosevelt, teachers and administrators worked together to develop the continuous improvement process through training and follow up work with teachers in professional learning communities. Teachers and administrators worked together to provide follow up for teachers working in professional learning communities to ensure common beliefs and values regarding teaching and learning improvement. The shared and supportive leadership structure provided a culture of high expectations for the improvement process.

Washington and Roosevelt did not provide a well-defined continuous improvement process. Administrators provided a top down management structure, requiring teachers to fill out forms to ensure their accountability for work in professional learning communities. Teachers and administrators did not work together to provide follow up for teachers working in professional learning communities. The lack of shared and supportive leadership for the improvement process created a hostile environment where teacher isolation persisted and there was no expectation for continuous improvement.

None of the schools effectively used student data to shape instruction. A review of training and follow up revealed a lack of data training provided to teachers and this resulted in poor data literacy. Roosevelt had taken training and follow up opportunities with teachers to increase data literacy so that teachers were using data for instructional decision making, but data literacy was still a new concept for teachers. At Washington and Jefferson, there were no expectations for the use of data, only for reporting of it. This process was supposed to reflect the need for teacher accountability in the continuous improvement process, but teachers were not provided training on data and how to use it to shape their instruction in the collective inquiry process, little less provided the opportunity to engage in reflective practice in the continuous improvement cycle. The lack of leadership on data literacy provided a culture of distrust in all schools that reflected the biggest gap for a true continuous improvement cycle.

(5) Shared leadership

The school leader is also a learner attending professional development, is friendly and facilitative in sharing leadership, power and authority through giving staff decision-making input (Hord, 1997). The school leader can share responsibility for improvement with teachers by providing a structure where collaboration is well-defined. Roschelle (1992) framed collaboration as an exercise in convergence or construction of shared meanings and notes that research on conversational analysis has identified features of interactions that enable participants to reach convergence through the construction, monitoring and repairing of shared knowledge.

Roosevelt had a shared leadership structure. The school leaders enrolled and entrusted a group of teachers to study the professional learning community process and help the staff learn this process through job embedded training. The administrator and select group of teachers formed a data-team (Allison *et al.*, 2010) to provide research-based professional learning community best practices. The results of the practice were then disseminated to teachers working in professional learning communities. Teachers were empowered through data collection and collective job-embedded inquiry on student achievement and pedagogical improvement. The convergence and construction of shared student data focussed on teaching and learning improvement created a quality structure where innovative practice was accepted collectively.

Jefferson and Washington had no shared leadership structure, policies or procedures. Washington had a culture of distrust, a lack of openness to improvement and a focus on teacher accountability. There were no opportunity for teachers to influence professional learning community structure and there was no job-embedded inquiry on student achievement. Even though each school used the same professional learning community model as Roosevelt, the lack of teacher focus on collective inquiry on student achievement was a visible characteristic at each school.

Conclusions

Shared leadership is a central component of effective professional learning in collaborative groups such as professional learning communities. Shared leadership provides the venue for continuous improvement and therefore shared values and vision. Ensuring each member of a group of collaborators focusses on common outcomes of the continuous improvement cycle requires commonality in what and how the group functions. Through defined purpose and values the collaborative group may solve problems associated with instructional effectiveness and further help with the growth of their students and thus the improvement of the school at reaching goals.

Discussion

It was found that the manner in which teachers engaged in the collaborative culture was greatly shaped by shared and supportive leadership trust and respect for teachers as professionals. Hord (1997) said the authority and power position held by administrators (principals) as "omni-competent" leaders has been internalized and reinforced in education. When this structure is present, the school leader views themself as the all-guiding, all-knowing force in the school that cannot participate in professional activities at the same level of their teachers, thereby removing themselves from the continuous improvement cycle. Leaders that removed themselves from the cycle further created boundaries where it was difficult for teachers to propose divergent views or ideas about the improvement cycle. As a product of the administrator removal from the

improvement cycle, teachers withdrew from effective collaboration. Perhaps the most profound finding of this study was that a positive school culture and an effective professional learning community required effective collaboration, yet none of the administrators or teachers had received training on effective collaboration and therefore the improvement cycle fell short in the each school setting of reaching a positive and effective learning culture.

Effective collaboration requires voluntary participation from teachers and administrators equally, thus ensure parity in goals, responsibility, accountability and resources. Additionally, professional learning community are to provide emergent authentic products that are aimed at stimulating and innovative teaching and learning. However, there is no evidence of structure or training currently being provided. Also, effective collaboration requires dedicated leaders to distribute tasks in the professional learning structure to recognize and honor teacher knowledge and expertise (Dillenbourg, 1999; Gosselin *et al.*, 2003).

Stoll *et al.* (2006) stated that distributed leadership ensures leaders work side by side with teachers to provide opportunities for mutual leadership roles in the continuous improvement cycle. Sharing leadership opportunities with teachers ensures distributed power and trust in professionals to solve problems about the things that need to be addressed in teaching and learning systems.

At Roosevelt, the administration used a group of teachers to investigate best practice for professional learning community process in the continuous improvement cycle, thereby providing trust in their professionalism. The group of teachers provided administrators credibility in the professional learning community process as teachers provided mentorship to other teachers that needed help in the collective inquiry and continuous improvement cycle. Unique to this school was the use of the group of teachers as a data team to teach and inform the rest of the teachers in the school on the professional learning community process as a year-long continuous professional development cycle. The infusion of a group of teachers as a data team provided this school with an intrinsic structure for school improvement that had a sustained focus on building specific goals for student achievement. The data team further extended shared leadership by entrusting teachers in professional learning communities to conduct their work, improve teacher pedagogy and further increase student achievement, thereby directly impacting school improvement goals. The mutual trust and respect from distributed leadership created a positive school culture as a learning place for teachers, administrators and students.

At Washington, there was no distributed or shared leadership structure. The culture of the school was largely toxic in nature as teachers were relegated to an accountability system where they were expected to fill out forms that pointed to their relative level of work in professional learning communities. The requirement for this process were provided from a top down management that promoted a lack of trust and further exacerbated the single leader domain in the purpose, vision and values of professional learning communities as a process. The lack of shared leadership created what Deal and Peterson (2009) called a toxic culture. A toxic culture promoted teacher isolation, decreased staff morale and decreased job satisfaction (Maslowski, 2006). Even though Washington was a school steeping in tradition and academic excellence, the lack of shared and supportive leadership promoted a toxic culture with the staff. The lack of shared, supportive and distributed leadership decreased the effectiveness of the collaborative culture, promoted a lack of collective inquiry and did not leverage a continuous improvement cycle for school improvement.

At Jefferson and Roosevelt, the administrators knew and accepted the need for distributive, supportive and shared leadership. At Roosevelt, the distributed, supportive and shared leadership was a daily practice and the results could be seen in how teachers performed their work within and outside of professional learning communities.

Professional learning communities have multiple purposes in schools. Professional learning communities are a school improvement mechanism (Hofman and Dijkstra, 2010; Schechter, 2008; Stoll *et al.*, 2006). They are several ways for teachers to improve their practice while reflecting on student achievement data (DuFour *et al.*, 2008; Hord, 1997; Supovitz, 2002). The ways teachers improve their practice provide pathways for job-embedded professional development (Hord, 1997). School culture is shaped by the way professional learning communities are executed.

In order for professional learning communities to be effective and meet the purposes described by schools, leaders must ensure they provide supportive and shared leadership structures that promote effective collaboration and therefore teacher doing real work in schools. Real teacher work must directly impact student achievement (DuFour *et al.*, 2008). Given the demands on schools to increase student achievement, this researcher proposes to school leaders to promote teachers as leaders in buildings by providing year-long training and follow-up professional learning community process structure and function. Promoting teachers as leaders in this process will help leaders focus on increasing student achievement scores in the high stakes environment, while also supplying a quality workplace where teachers will be highly motivated to do the work needed to ensure all students meet school assessment expectations. Supportive and shared leadership, consistent year-long training and follow up will provide common purpose and values, help promote a collaborative culture, provide the tools teachers need for collective inquiry about their practice while also promoting continuous improvement of the school at meeting the needs of the students they serve.

The findings from this study are applicable in theory and practice for shaping a positive school culture, professional learning and organizational improvement. Schools and school leaders should consider the applications of shared leadership structures with teachers to ensure an effective collaborative environment. An effective collaborative environment will lead to continuous organizational improvement by empowering teachers, most closely linked student achievement. Student achievement improvement over time is the one-most and central aspect of organizational improvement and as such increases in student achievement over time through teacher effective problem solving will lead to increases in the continuous improvement cycle, which will in turn lead to an effective, positive school culture.

This paper focussed on the nature and potential implications of a shared leadership structure and how that structure contributes to the improvement of teachers at their work through the continuous improvement cycle. Continuous improvement has many subcomponents that need further discussion and development in the literature. The conceptualization of the continuous improvement cycle as well as a functional shared leadership structure is greatly influenced by an effective collaborative system where administrators and teachers work together through the problem solving process toward shared values and vision for improvement. In future papers, this author will further examine the continuous improvement cycle and how schools, administrators and teachers practice continuous improvement, what it looks like and how it is accomplished. Further, this author plans to further examine the concept and application of effective collaboration and it is contribution to the functionality of effective professional learning communities. As stated previously, continuous improvement and effective collaboration are essential components of a positive school culture.

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Further reading

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About the author

Dr Daniel Carpenter is an Assistant Professor of Education in Science Education at the Texas Tech University. Dr Carpenter served for almost 20 years as a high school Science Teacher. Dr Carpenter also served as an Albert Einstein Distinguished Educator Fellow in Washington, DC where he advised the National Science Foundation. Dr Carpenter has served as a Program Evaluator and a Panel Advisor for the National Science Foundation, the National Oceanic and Atmospheric Administration, NASA, the US Department of Energy and many other federal agencies. His specific focus at the Texas Tech University is on instructional improvement models and the impact on school improvement. He has specialization in assessment and evaluation systems and has served on several funded projects as a Program Evaluator. Dr Carpenter's research efforts are influenced by inquiry instructional models, school improvement processes, the next generation science standards applications in instructional settings and the development of twenty-first century skills in K-16 settings. To that end, he has been involved in national collaborations that explore funding opportunities for instructional improvement mechanisms and the impact on teachers, students, teaching and learning systems in K-16 settings. His work has greatly been shaped by interactions and collaborations with agencies in Washington, DC such as NSF, DOE and non-for-profit organizations such as the Triangle Coalition, where national policy drives local efforts in research and funding to support his pragmatic research. Dr Daniel Carpenter can be contacted at: daniel.carpenter@ttu.edu