Examining Teacher Leadership as a Model for Improvement in Science Education

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Abstract

The current mixed method study examined a Teacher Leadership Program (TLP) to determine to what extent participating teachers had changes in content knowledge (CK), practices, leadership skills, and leadership knowledge. The purpose was to determine if this program could be utilized to suggest a sustainable model for improving science education by utilizing teacher leaders to influence changes in their classrooms and at the school level. Participants included 65 K-8 participating teachers and 70 K-8 comparison teachers. Surveys, CK assessments, lessons, observations, and artifacts were analyzed using a-priori coding and descriptive statistics. Participating teachers had statistically significant gains over comparison groups in CK, practices, and teacher leadership skills and knowledge. The findings from this study contribute to the understanding of professional development (PD) for teacher leadership and the under-examined field of teacher leadership literature.

Examining Teacher Leadership as a Model for Improvement in Science Education

There is a dire need to improve science education in our nation (PCAST, 2010). One potential strategy to improve science education is to enhance teacher professional development (PD) opportunities by cultivating teacher leaders—those who can serve as facilitators, mentors, ambassadors, lifelong learners, and conduits of change to their teacher counterparts (Lumpkin, Claxton, & Wilson, 2016). In the current study, we developed a Teacher Leadership Program (TLP) to implement with 65 K-8 inservice teachers. Our main goal was to implement this program to enhance science teacher practices and school improvement (i.e., student achievement and student interest in STEM) by developing a cohort of teacher leaders who would be integral to enhancing the science curriculum in their school. We hoped to suggest a sustainable model for improving science education by utilizing teacher leaders to effect changes in their classrooms and at the school level. In the current paper, we focus on identifying how, if at all, the teachers participating in the TLP we developed improve in their teacher content knowledge, practices, and leadership skills as a first step to achieving this goal. Figure 1 depicts the model that informed the program and identifies the aspects that the current paper investigated. The research questions guiding this study were:

1. Do TLP participating teachers exhibit greater science content knowledge (CK) than comparison group teachers?
2. Do TLP participating teachers exhibit improved teacher practices when compared to comparison group teachers?
3. Do TLP participating teachers' exhibit marked differences in teacher leadership skills and knowledge over comparison group teachers?

Theoretical Framework

In designing the TLP, situated learning theory aligned well with our approach. Situated learning theory suggests knowledge is created as individuals interact with their environment to achieve a goal (McLellan, 1996). It recognizes learning is continually occurring and is a situated and contextualized process. The individual and the context are not separate, but influence and change (or construct) one another (McLellan,1996). Situated learning asserts that the understanding an individual has of a concept is constantly under construction and influenced by every experience that s/he encounters. Furthermore, the context is not just physical, but also includes the social, ethical,

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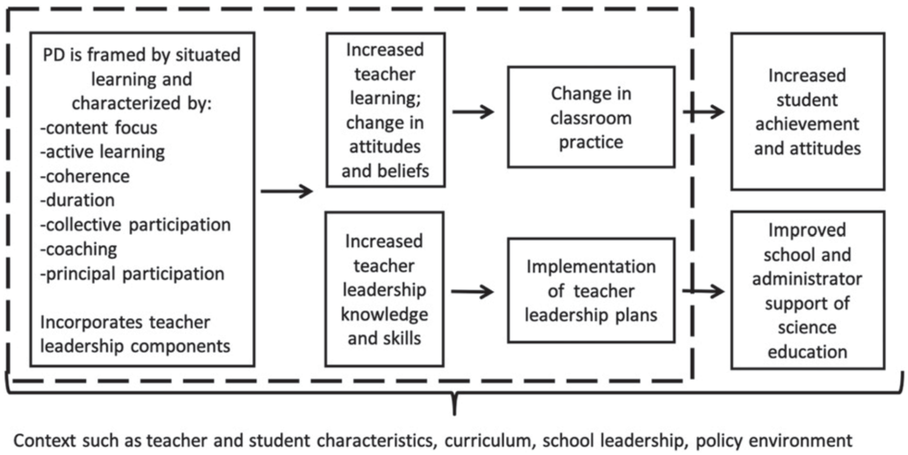

Figure 1. Model for TLP and aspects investigated in the current study.

and historical norms affecting how people interact with the objects in their environment and with each other. McLellan (1996) identified key components of a situated learning model as: reflection, cognitive apprenticeship, collaboration, coaching, opportunities for multiple practice, and the articulation of learning skills (TLP). The TLP incorporated all of these elements into the design of the PD.

Components of Effective Professional Development

Teachers have a variety of PD opportunities they are able to choose from including coaching, mentoring, conferences, research opportunities, content-specific courses, summer institutes, and school-based opportunities provided by schools or districts (Whitworth & Chiu, 2015; Pianta, 2011; Wilson, 2013). One would think with the multitude of opportunities, teachers have sufficient resources to continue being lifelong learners; however, few opportunities focus on teacher leadership. In addition, few PD studies are actually linked to student outcomes or result in teacher change (Yoon, Duncan, Lee, Scarloss, & Shapley, 2007). With an estimated cost of $1 billion–$4 billion per year spent on PD (Wilson, 2013), it is imperative PD incorporate components of effective PD and we develop ways to make PD more efficient (Whitworth & Chiu, 2015).

In general, PD focuses on improving teacher learning and practices to increase student learning (Fishman, Marx, Best, & Tal, 2003; Loucks-Horsley, Stiles, Mundry, Love, & Hewson, 2010). The components most researchers generally agree on as effective design elements and conditions of PD include: active learning, content focus, coherency, duration, and collective participation (Whitworth & Chiu, 2015; Birman, Desimone, Porter, & Garet, 2000; Desimone, 2009; Garet, Porter, Desimone, Birman, & Yoon, 2001; Luft & Hewson, 2014). In addition, PD should provide frequent opportunities for feedback, examination, and reflection on practice (NRC, 1996). In terms of active participation specific to science teachers, it is also recommended they be actively investigating phenomena, interpreting results, and engaged in sense-making practices during PD (e.g., Jeanpierre, Oberhauser, & Freeman, 2005; Luft, 2001). These components of PD are well aligned with situated learning and were utilized in the development and design of the TLP.

Developing Teachers Content Knowledge

There is a variety of knowledge teachers depend on for teaching. These types of knowledge are typically described in five different ways: 1) general educational context knowledge, 2) specific educational context knowledge, 3) general pedagogical knowledge, 4) pedagogical content knowledge (PCK), and 5) subject matter knowledge (Carlsen, 1999). Subject matter knowledge or science CK is essential for teachers to successfully convey material to students. Unfortunately, there is significant evidence that teachers often enter their

Table 1. Situated Learning Components and Strategies for Implementation

Component	Definition	Strategies
Reflection	Students consider what they have learned and integrate it with their own experiences.	Process time, Think-Share-Pair, Written reflections
Cognitive Apprenticeship	Students participate in authentic practices in authentic contexts.	Work with and shadow experts in the field
Collaboration	Students construct their knowledge through social interactions.	Collective problem-solving, Opportunity to take on multiple roles, Developing group skills
Coaching	Instructor guides student learning rather than providing direct instruction.	Active learning opportunities, Hands-on activities
Opportunities for multiple practice	Students receive repeated opportunities to practice and develop skills.	Repeated practice of skills when learning new content in authentic context
Articulation of learning skills	Students articulate their thinking, knowledge, reasoning, and problem-solving processes.	Discussions, Journal writing, Teaching what they've learned

field lacking science CK (e.g., Lakshmanan, Heath, Perlmutter, & Elder, 2011; Loucks-Horsley et al., 2010; Sandholtz & Ringstaff, 2014). One of the major reasons cited for teachers avoiding teaching science in the elementary grades is this lack of CK (e.g. Lakshmanan et al., 2011). If teachers do not have strong CK, they are likely to believe they will not effectively teach science and thus avoid teaching it (Pendergast, Garvis, & Keogh, 2011).

Teacher CK has a significant role to play in both the quality of instruction and student performance (e.g., Darling-Hammond, 1999; Shulman, 1986). A content focused PD program leads to increased teacher knowledge and can also lead to changes in teacher practices (Birman et al., 2000; Desimone, 2009; Desimone, Porter, Garet, Yoon, & Birman, 2002; Garet et al., 2001; Kennedy, 1999). However, PD without a strong content focus component has been found to be ineffective in changing teacher practices (Cohen & Hill, 2000; Kennedy, 1998). For these reasons, the TLP was built around helping teachers improve their science CK while also pushing them to think more deeply about their pedagogy and leadership.

Changes in Teachers Practices

Effective PD can change teacher practices by enhancing teacher learning and changing attitudes and beliefs. This is not an easy task as every teacher who enters PD is unique. Teachers often have different experience levels, motiviations, self-efficacy, and school culture (Whitworth & Chiu, 2015). For example, beginning teachers tend to change their beliefs more than their practices (Luft, 2001) and often participate more in PD (Livneh & Livneh, 1999). The different characteristics of teachers can greatly influence whether or not they persist in changing their practices.

Researchers found CK focused PD resulted in increased self-efficacy, and teachers with high self-efficacy often change their practices despite years of experience (Guskey, 1988; Smylie, 1988). PD can influence teacher change and ultimately increase student achievement (Whitworth & Chiu, 2015; Desmione, 2009). Yoon et al. (2007) suggested that when PD is intense and sustained, it is directly related to student achievement across subjects. Furthermore, Lee, Deaktor, Enders and Lambert (2008) concluded through a 3-year science PD program that student achievement increased yearly especially for ELL students, low-achieving, and low socioeconomic status. While the current study does not focus on the improvement of student achievement, supporting teachers in developing CK through PD shows promise as a means of changing their practices and improving student achievement as a secondary outcome.

Teacher Leadership Development

In addition to teacher leaders being those who contribute to instructional leadership, reform efforts, and the practices of their profession (Printy & Marks, 2006), teacher leaders can lead to improving teacher quality and sustainable school improvement efforts (Hunzicker, 2017). The development of science teacher leadership is important, and a focus on it has increased dramatically in recent years (Beachum & Denith, 2004; Wenner & Campbell, 2017). However, science education still needs teacher leaders who enhance the classroom setting and support the implementation of new standards through peer-to-peer learning (Criswell, Rushton, Mcdonald, & Gul, 2017). In addition, when teacher leaders are successful, they tend to support a more inclusive and collaborative school culture (Beachum & Dentith, 2004).

For teachers to be successful leaders, they need the tools and respect from their administration (e.g., principals and district leaders), as well as a reduction in barriers and opportunities to expand their own learning (Printy & Marks, 2006; Silva, Gimbert, & Nolan, 2000). In order for teacher leaders to be successful, the culture and structure of the school must be willing to accept change (Silva et al., 2000). Luft, DuBois, Kaufmann, and Plank (2016) conducted the National Science Leadership Program (NSLP), a three-year teacher leadership program for science educators and concluded that science teachers have an interest in leadership development and their participation increased annually. Furthermore, these teacher leaders were more likely to connect with a national organization. The present study sought to effect change in districts by implementing the TLP for 65 K-8 teachers by taking into account the factors identified throughout the literature review.

Methods

This exploratory project addressed the research questions using a mixed methods approach. The mixed methods approach is appropriate because just one data source is insufficient, and both methods provide insights into an explanation of project outcomes (Creswell & Plano Clark, 2011). Within mixed methods, we enacted a convergent-parallel mixed methods approach (Creswell & Plano Clark, 2011). This design entails quantitative instruments that explore how teachers changed in their CK and practices. The qualitative component of the study included interviews, artifacts, open-ended survey questions, and observations. These data were collected simultaneously and combined during the analysis phase of the project.

Participants

Participants in the study included 65 K-8 participating teachers and 70 K-8 comparison teachers who were recruited for comparison purposes. Participants were selected through an application process and purposefully assigned to participating or comparison groups based on teachers' availability to attend training dates. Examination of the characteristics of the participating and comparison groups suggested there were no significant differences as examined through paired t-tests in the groups based on the following criteria: grade level taught, teaching experience, number of college coursework hours in science, pre-DTAMS baseline scores, participation in PD outside of school, and involvement in a school leadership role (Table 2).

Context

The TLP included 120 hours of face-to-face instructional time: an 8-hour PD

Table 2. Demographics of Participants

Characteristic		Comparison (n = 70)	Participating (n = 65)
Gender	Female	57	47
	Male	11	16
	Not Identified	2	2
Grade Level Taught	First grade	8	9
	Second grade	10	5
	Third grade	0	0
	Fourth grade	27	26
	Fifth grade	19	22
	Middle School (6-8)	6	3
Average Years Teaching Experience		12.10 years	13.64 years
Average Hours of Science College Coursework		24.3 hours	25.6 hours
Participation in PD Outside of School		39%	39%
Involved in School Leadership Role		41%	57%

in the initial spring semester, ten 8-hour days over the summer through a summer institute, and 4 8-hour days over the course of the next academic year. PD focused on developing teachers' CK and developing their leadership skills and practices. As part of the PD, teachers created a Unit Plan during the summer to teach over the course of the next academic year and developed a Leadership Plan to be implemented at their school or within their district.

Data Collection

Multiple instruments were used to gather data to answer the research questions. Each is described below by the components assessed.

CK. The Diagnostic Teacher Assessment in Mathematics and Science (DTAMS) (Saderholm, Ronau, Brown, & Collins, 2010) was used to assess changes in teacher's CK. The DTAMS Physical Science Assessment was designed and developed for assessing the CK of middle school teachers by Saderholm, Ronau, Brown, and Collins (2010). This instrument was selected among many because it is validated and a widely used instrument in professional learning and development for inservice teachers. The DTAMS was given to all participating and comparison teachers prior to the TLP starting (pre) and at the end of the TLP (post).

Practices. The Reformed Teaching Observation Protocol (RTOP) (Sawada and Pilburn, 2000) is a classroom observation protocol designed to measure development of reformed teaching practices and was utilized to assess changes in teacher's practices. The RTOP consists of 25 measures with 5 sub-scales: Lesson Design and Implementation, Content-Propositional Knowledge, Content-Procedural Knowledge, Classroom Culture-Communicative Interactions, and Classroom Culture-Student Teacher Relationships. On each measure, an observer rates the teacher on a 0 to 4 scale with 0 indicating no evidence and a 4 indicative of evidence of all elements for that characteristic. The total possible points is 100 with 20 points for each sub-scale. Two observers were trained on scoring the RTOP and conducted all observations live in teacher's classrooms within a three week window before (pre) and a three week window after the TLP (post).

Teachers also submitted self-report data through questionnaires at various times throughout the TLP that served to help triangulate and support the data collected through the RTOP. Questionnaires included questions on the content and practices teachers learned about through the TLP and asked teachers to reflect on the changes they made in their practices and the subsequent impact on students. Face and content validity for the questionnaires was established by sending the questionnaires to a panel of experts in science education and measurement for review. Two rounds of review occurred with revisions made as suggested and appropriate until no additional revisions were needed.

Teacher Leadership Skills & Practices. A Leadership survey was completed by teachers at the beginning of the project, end of the summer institute, and end of the project. Two instruments were modified and combined to measure changes in teacher leadership knowledge and skills: the Teacher Leadership Skills Framework (TLSF) (CSTP, 2009) and the Empowering Teacher Leaders (ETL) (Germuth, 2012). These instruments are validated and provided insight into changes in teachers leadership knowledge and skills. In addition, data from the questionnaires described previously provided additional insight and triangulation.

Artifacts. Finally, artifacts were collected throughout the PD and used to triangulate and support findings from other sources of data. Artifacts included unit plans, leadership plans, charts from sessions, teacher reflections, and feedback forms following PD.

Data Analysis

Our data analysis was driven by our research questions and the rich data sources. Quantitative and qualitative data were combined during the interpretation phase (Teddlie & Tashakkori, 2009). Qualitative data was analyzed using a priori codes focusing on teachers' knowledge, understanding, and situated learning (Saldaña, 2011). Quantitative data was analyzed using descriptive statistics and paired t-tests. Triangulation of the data occurred through the involvement of several researchers on the project team, the use of multiple data sources, and longitudinal data collection. The resulting qualitative and quantitative data were combined into two groups: participating and comparison. The two groups were contrasted and compared in order to understand potential similarities and differences between the groups. The final analysis provides insight into the impact of the TLP on the development of teachers' knowledge and practices.

Validity and Reliability

Potential threats to the validity of the design were addressed throughout the study (Creswell & Plano Clark, 2011). During data collection, qualitative and quantitative data were collected from the same population and contradictory results explored. Multiple methods were utilized in the study including: surveys, observations, interviews, and artifacts. Data was analyzed by multiple researchers and any disagreements in coding were resolved through discussion to increase the reliability of the findings. Furthermore, unobtrusive data collection procedures were utilized and the analysis was consistently framed by guiding questions and the recognition of the researcher as an instrument for conducting the research.

Findings

The purpose of the study was twofold. First, we examined whether participation in the TLP enhanced participating teachers' overall CK, practices, and leadership skills and knowledge. Second, we investigated how implementation of the TLP could inspire K-8 science teachers to become teacher leaders in their classrooms and schools. We present our findings by comparing how comparison teachers differ from participating teachers based on the research questions. We also examined how participating teachers perceived changes in students after incorporating the knowledge, practice, and leadership skills into their classrooms.

Content Knowledge

Teacher CK, as measured by the DTAMS, was significantly different from pre to post (p = .004, $t(64)$ = 2.78) for the participating group with no statistically significant differences for the comparison group (p = .000, $t(69)$ = -3.76). Thirty-three percent of the participating group perceived CK as their second highest learning area while participating in the project. For example, one teacher said, "My greatest area of learning and growth was in the content. Concepts I thought to be true, were investigated and I learned that what I always thought to be correct was incorrect" (Nicole, Delayed-post survey). Through participation in the project, many teachers were able to clear up their own misconceptions about science content. Like the teacher above, many found the science investigations with coaching and collaboration to be most effective in helping them change their thinking.

In addition, 22% of the participating group found CK gained from the PD as the most useful and valuable to use during instruction: "I felt overall by increasing my own content knowledge. I am able to help my students with common misconceptions as well as well thought out questions to deepen their understanding and discourse with each other" (Laura, Delayed-post survey). By developing their own CK, teachers felt more prepared to support their students in learning the content. Another teacher stated, "I really appreciate the combination of content experts with experts in the art of science teaching - it is extremely powerful. It is amazing to watch experts demonstrate effective instruction" (Sheree, Delayed-post survey). The experiences of many teachers suggest that through active learning and collaboratively participating they were able to expand their CK and aid students in understanding the material better.

Teacher Practices

Overall RTOP mean scores for the participating teachers increased from 28.3 to 33.0 (p = 0.000, $t(64)$ =1.997) from the beginning to the end of the project. The comparison teachers mean scores decreased slightly from 28.2 to 27.6 (p = 0.045, $t(69)$= 1.995) with a statistically significant negative change. In terms of practices, participating teachers showed statistically significant increases in the use of discourse, argumentation, and modeling practices used in the classroom. The comparison group did not present evidence for these same differences.

The participating group found they used instructional models/strategies 40% more in the classroom than they did prior to participating in the TLP. They also incorporated discourse and investigation 30% more in their teaching practice. For example, many teachers identified that they used more discourse and hands-on lessons to allow students to make their discoveries and avoided reading and matching vocabulary with definitions (n = 34, Delayed-post survey).

Participating teachers found instructional strategies (48%), discourse (25%), and summary tables (22%) the most useful and valuable to their instruction. For example Lauren said, "Every part of the program was very useful and valuable. From sunshines and blues, to summary tables, to hands on activities, to implementing discourse" (Delayed-post survey). Through coaching, many teachers were able to enhance their teaching practices for effective instruction.

When compared to the comparison group, the participating group showed an 11% increase in analyzing data for decision making to improve teaching and learning. Many teachers "met with colleagues and peers to analyze the data and make decisions on best practices to ensure understanding of concepts" (Ann, Delayed-post survey). Specifically, teachers would collaborate with fellow teachers to analyze assessment data to adjust instruction (n = 21, Delayed-post survey). Through collaboration and reflection, teachers were able to adjust instruction through data analysis in order to meet the needs of their students.

Teachers Perception of Student Changes

Twenty-eight percent of teachers reported a perceived increase in their students' conceptual understanding. For example, Chris said "Students have a deeper understanding on many concepts" (Delayed-post survey). Caroline commented, "Students made connections and guided discussions more completely" (Delayed-post survey). Teachers often observed students being more thoughtful with their answers (n = 11). The students questioned more and made connections (n = 14). Moreover, teachers explained that students guided the instruction and discussion to understand the content (n = 14).

Twenty-seven percent of teachers perceived that their students increased their skill set in solving problems. Carly observed students applying several strategies for solving a problem using the scientific processes (Delayed-post survey). Courtney stated, "My students have shown greater problem identifying and solving skills, an enhanced ability to articulate with each other and adults their individual understanding of concepts, and an improvement in written expression." When teachers allow students to take control of their own instruction, students often develop the problem solving skills to work through problems to make discoveries.

Overall, teachers perceived there was a 49% increase in students having higher engagement with the material. Kirsti stated, "The students LOVE science" while Linsey said "Students are now more motivated to learn science" (Delayed-post survey). Teachers often mentioned the students were engaged with limited behavior issues (n = 11). Moreover, students often behaved and acted like scientists. When students are engaged with scientific concepts, teachers observe limited behavior issues because students are enjoying learning the material and tend to stay on task.

Teacher Leadership

When compared to the comparison group, the participating group were equally engaged in professional development (39%). The participating group (57%) had more teachers who were involved in school leadership than the comparison group (41%); however, these differences were not statistically different from the comparison group ($p= 0.668$, $t(121) = 1.979$). In addition, 75% of both groups had not completed any type of professional development since the start of the school year. Participants were also asked whether they were planning to participate in leadership activities. When compared to the comparison group, the participating group had increases ranging from 3%-27% in planning to participate in different activities. The most significant gains were conducting classroom research (27%), participation in professional development (23%), presenting at a regional, state, or national conference (21%), writing a grant (21%), and publishing an article in a professional or academic journal (20%).

Both groups said lack of experience, lack of confidence, and lack of opportunity or time were barriers to why they did not see themselves to be a teacher leader. Nicole stated, "Through the leadership component of this project, I have felt more prepared to be a teacher leader. However, I am new to my campus this year and haven't had the opportunity to lead yet" (Delayed-post survey). The idea that teachers feel more confident to take on a leadership role at their school suggests the articulation of learning skills helped teachers build confidence.

In addition, 33% of the participating group and 21% of the comparison group considered themselves to be an informal mentor or leader. However, when compared to the comparison group, the participating group showed a 17% increase in formal or informal leadership activities. Participants were asked to identify whether they felt more prepared to engage in a variety of leadership-related actions, whether they were engaging in them more frequently, and whether they were more successful in doing so, or any combination thereof. When compared to the comparison group, the participating group had increases ranging from 12%-40% in preparation for leadership activities. Respondents stated their greatest gains were feeling prepared to promote discourse and questioning (40%), design and implement professional development (40%), create an environment for change (34%), conduct and engage in research (33%), advocate for school improvements (31%), and apply adult learning theories (31%). Justin stated, this project "offered strategies that enabled me to understand effective teacher instruction that led to my growth. I have had an opportunity to start discussing these strategies with others and working on implementing them on my school campus" (Delayed-post survey). The increased participation of many teachers suggests reflection and collaboration within the PD program allowed participants to feel more willing to accept a range of leadership activities. Overall, participating teachers showed an increase in their teacher leadership skills and practices after attending the PD. We hypothesize that designing PD in this manner and incorporating teacher leadership components into the PD may lend itself to providing a model that leads to sustained change in schools.

Discussion

This study investigated whether teachers' CK, practices, and leadership changed following their participation in the TLP. Teachers' knowledge and the targeted practices changed following participation in the PD, and these changes were maintained a year after their participation in the TLP. There were clear connections between the situated learning model and the incorporation of the characteristics of effective PD in the TLP. The results of this study suggest PD aligned with McLellan's (1996) model for situated learning may encourage the transfer of learning from PD to the practices of teachers.

Content Knowledge

When teachers have a poor understanding of the CK, they often lack the skills to teach science (Pendergast et al., 2011). In an attempt to increase teacher's CK, the TLP implemented coaching, collaboration, and opportunities for multiple practice into the design of the PD. In addition, the content focus component allowed the TLP to include one of the design elements and conditions of effective PD most researchers agree on (Birman et al., 2000; Desimone, 2009; Garet,et al., 2001; Luft & Hewson, 2014; NRC, 1996; Whitworth & Chiu, 2015).

In an effective PD program, teacher knowledge is often increased when there is focus on CK (Birman et al., 2000; Desimone, 2009; Desimone et al,, 2002; Garet et al., 2001; Kennedy, 1999). Many teachers in the TLP found through coaching and collaboration, CK was their second highest learning area. Moreover, teachers noticed many of their misconceptions were clarified. As a result, teachers were able to identify and clear students' misconceptions during discourse or instruction through questioning. The increase in CK seemed to support teachers in making changes in their teaching practices.

Teacher Practices

There are several factors influencing why teachers change their practices (Whitworth & Chiu, 2015). Teachers' practices are changed when they have a strong motivation for continuing their learning through PD (Smith et al., 2003) and feel school culture is of great importance (Bianchini & Cavazos, 2007; McGinnis et al., 2004). The TLP implemented cognitive apprenticeship, coaching, and reflection components to promote an understanding of how teacher practices may need to change and to allow teachers to grow professionally.

Ross (1998) and Stein & Wang (1988) state self-efficacy increases when teachers implement new practices and see the practices work. Through the cognitive apprenticeship component, teachers were able to view how instructional strategies were implemented and worked in a classroom. The teachers were also able to participate in learning opportunities to practice instructional strategies allowing them to have a clear understanding of how the practices work in the classroom.

When teachers change their practices as a result of PD, student achievement can also increase (Desimone, 2009; Whitworth & Chiu, 2015). Because of the TLP, many teachers incorporated discourse and problem solving in the classroom and allowed students to have an active role in the classroom. Teachers mentioned students were acting and thinking like scientists by asking questions, being thoughtful, and applying skills. Overall, teachers mention behavior decreased and students begin to enjoy science class. These qualitative results seem to indicate that there may have been some impact on students.

Teacher Leadership

Prior to the TLP, most teachers were not involved in PD or teacher leadership roles. A majority of the teachers identified a lack of experience, lack of confidence, and lack of opportunity or time as barriers that prevented them from becoming a teacher leader. Teachers need reduction in barriers and more opportunities in order to become successful teacher leaders (Printy & Marks, 2006; Silva et al., 2000). The TLP was uniquely designed using the situated learning theory to align with the knowledge and skills teachers need to develop as leaders. To reduce some of the barriers, the TLP allowed teachers to have a variety of collaborative experiences. This gave teachers opportunities to take on multiple roles. Teachers were also able to utilize their skills through repeated practice and build their confidence by developing group skills and reflecting upon their own experiences.

The last barrier teachers mentioned that impacted their ability to become a teacher leader was a lack of opportunity or time. Administration must offer teachers the tools and respect needed to support teachers in becoming leaders. By garnering administrative support for the PD as part of the TLP, teachers appeared to be more successful in becoming teacher leaders.

Similar to Luft and colleagues' program (2016), the TLP observed that confidence and leadership activities increased when teachers learned skills and were encouraged to acquire new roles. Several teachers even stated the TLP increased their confidence about being a teacher leader which led to the teachers taking on more leadership roles. The findings reported regarding their leadership roles suggests many teachers created an environment for change and advocated for improvements in their schools which Beachum and Dentith (2004) state are important aspects successful teacher leaders often contribute.

Implications

Results of this study suggest PD programs aligned with situated learning can be utilized to help teachers develop as teacher leaders. As PD designers consider how to leverage design components to support teachers in leadership development, results from this exploratory study suggest collaboration, reflection, and the articulation of learning skills might be important aspects to incorporate into PD design for teacher leaders (Figure 2). In addition, our research suggests that helping teachers develop both their content knowledge and teacher practices may also help teachers develop

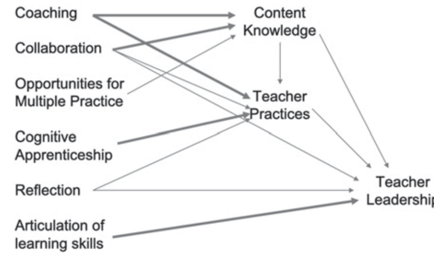

Figure 2. Impact of situated learning components on teacher outcomes.

their confidence and willingness to take on leadership roles. Additional research is needed to understand if these findings will hold true in other settings and contexts.

Future Research

There are several areas where future research needs to be conducted. We need a deeper understanding about how a TLP can impact not only teachers, but also students. In addition, future research should examine how teacher leaders support mentees and fellow teachers after attending PD to lead to systematic change in a school or district. Finally, it may be important to investigate ways administrators can support teacher leaders within their schools and districts to effect more change within the system.

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