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10. SUPPORTING TEACHERS IN (RE)CONSTRUCTING IDENTITIES AS LEADERS

The Role of Professional Development

INTRODUCTION

There have been a number of recent reform efforts in science education in the U.S., most notably the Next Generation Science Standards (NGSS) (NGSS Lead States, 2013). At the same time, there has been increasing recognition that teacher leadership is an essential ingredient in the success of reforms. Teacher leaders work with colleagues within their schools, districts, and professional organizations, serving a variety of functions that support change (e.g., collaboration, introducing new ideas, supporting the growth of others, etc.) and help ensure that reforms have their intended effect—improving student learning (York-Barr & Duke, 2004). In line with this there is growing interest in supporting teachers' professional development as teacher leaders.

It is widely recognized that becoming a leader involves much more than acquiring knowledge and skills; rather, it involves "the way a person broadly constructs, evolves, and enacts his or her values, relationships, memberships, and responsibilities" (Palus & Drath, 1995, p. 25) as well as the way in a person recognizes his/herself and is recognized by others as a leader. That is, we argue that the process of *becoming* a teacher leader involves *developing an identity* as a teacher leader.

'Identity' refers to the way in which an individual perceives of themselves and is perceived by others (Gee, 2003). While identity theory has been used as a lens to understand leadership growth and how an individual's identity as a leader is formed (Komives et al., 2006), designing professional development that facilitates this process for teachers is a quite different matter. The main goal of this chapter is to discuss how professional developers can draw on identity theory to inform the design of programs to support science teachers in becoming teacher leaders. As a first step in this direction, we highlight relevant literature at the intersections of leadership, identity, and professional development. We then draw attention to the areas of overlap in the implications of this work to suggest a set of design considerations for professional development. For illustrative purposes, we share examples from our own work in the U.S. implementing a professional development program for science teacher leaders, including narrative vignettes by a teacher-leader participant

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(3rd author) regarding his personal transformation and identity through his involvement in the program.

TEACHER LEADERSHIP

In the last century, education in North America was dominated by positional and hierarchal views of leadership in which research focused on the roles of principals, superintendents, head teachers, master teachers, administrators, and department chairs, rather than on teachers (Darling-Hammond, Bullmaster, & Cobb, 1995). The main pathway for teachers to become leaders was considered to be through entering school administration, which involved a significant shift in professional roles and responsibilities (Task Force on Teacher Leadership, 2001).

In contrast, contemporary views of *teacher leadership* envision teachers remaining in their classroom positions, while serving as advocates, innovators, and stewards of their profession (Lieberman & Miller, 2004). As an element of reform strategy, teacher leadership has been defined as

> …the process by which teachers, individually or collectively; influence their colleagues, principals, and other members of school communities to improve teaching and learning practices with the aim of increased student learning and achievement. (York-Barr & Duke, 2004, p. 287)

While this perspective focuses attention on the actions of teachers and the *practices* involved in teacher leadership, an alternative line of research focuses attention on teachers as individuals, and how teachers develop or become teacher leaders.

According to Katzenmeyer and Moller (2009), becoming a teacher leader involves (a) establishing one's own credibility as a leader, (b) developing and clarifying a personal vision for leadership, (c) identifying roles and opportunities for leadership, (d) taking risks and challenging existing norms, and (e) developing the necessary skills and dispositions to effectively collaborate with others. This process will necessarily take time and can be enhanced by support and collaboration with others as teachers begin to challenge professional and institutional norms and redefine their roles within and beyond their classrooms. Teachers progress towards complex ways of 'being' a leader through various personal experiences, new roles, feedback from others (Renn & Bilodeau, 2005). In recent years, leadership has been viewed as a dynamic process of growth of an individual identity (Komives et al., 2006). Similarly, we view becoming a teacher leader as the process of (re)constructing one's identity as a teacher.

Teacher Leadership as Identity

While teacher 'professional identity' is a fairly broad concept, researchers have recently taken interest in particular kinds of science teacher identities, including 'reform-minded' identities (e.g., Luehmann, 2007) and identities as teachers of the

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nature of science (Akerson, Pongsanon, Weiland, & Nargund-Joshi, 2014). Similarly, we have interest in a particular genre of teacher identity—that of 'teacher leader'. Given that identity is complex and multifaceted, we view teachers' identities as leaders as one of many interrelated professional sub-identities—that is, teachers may both have an identity as 'reform-minded' and view themselves as teacher leaders.

We view a teachers' identity as 'teacher leader' as being open to continuous redefinition, rather than consisting of a set of essential characteristics are common to all leaders. This identity is influenced by teachers' *competence*, the knowledge and skills they possess as both teachers and leaders; their *leadership practices*, or how they enact their roles as leaders; as well as the *perceptions* they have of themselves and others have of them as being a 'leader'. Consistent with notions of identity more broadly, we view the construction of teachers' identities as occurring through the interpretation, narration, and recognition of their participation in the professional community by themselves and others (Gee, 2001).

As individuals define and redefine their identities, they draw on a variety of *identity resources*. Synthesized by Luehmann (2007), these include (a) multiple ways in which to display competence, (b) opportunities to exercise agency, (c) access to feedback from others, (d) the opportunity to be held accountable, (e) central positioning as the lead "actor," (f) a high degree of support, and (g) flexible scaffolding that adapts to meet changing needs over time. Drawing on these resources, individuals can engage in different forms of *identity work*. As defined by Calabrese-Barton et al. (2013), identity work consists of

> …the actions that individuals take and the relationships they form (and the resources they leverage to do so) at any given moment and as constrained by the historically, culturally, and socially legitimized norms, rules, and expectations that operate within the spaces in which such work takes place. (p. 38)

An individual's identity work may also entail engaging in recognition work, reflective work, repair work, emotional work, and positioning. *Recognition work* (Gee, 2005) involves being recognized by the self and others as a certain kind of person; identity is formed through social interaction and participation with professional discourse with others. *Reflective work* (Gee, 2001) occurs in the interpretation and reflection on one's participation in a community. *Repair work* (Gee, 2003) may be necessary when individuals have core identities that run counter to the proposed (new) identity they seek. *Positioning* (Luehmann, 2007) involves defining roles and situating oneself in the broader culture. Individuals must also engage in *Emotional Work* (Luehmann, 2007), attending to their feelings and concerns about behaving differently and changing their ideas of who they are.

Such a view of leadership as identity necessarily entails a different view of teacher learning that goes beyond traditionally cognitive views; that is, while teachers must acquire a complex set of knowledge and skills and understandings of leadership, they also need to create and recreate their image of themselves as leaders within a professional community. Given that 'leaders' in schools historically have been

defined by positions of authority (e.g., principal), opportunities for teachers to become leaders may not be apparent within the existing culture of schools. Although not always conspicuous, these opportunities are crucial for leadership development as there is no straight forward formula to become leaders.

> Leadership is not handed out like blue books for a college examination. It is largely up to teachers themselves to locate and exploit opportunities for the professional growth and personal development that will increase their qualifications and credibility for leadership. (Task Force on Teacher Leadership, 2001, p. 20)

Recognizing the significant role that teacher leadership can play in the implementation and sustainability of reforms, there is an increasing interest in providing professional development that can support the development of teacher-leaders.

THE ROLE OF PROFESSIONAL DEVELOPMENT

The importance given to teacher leadership is evidenced in the U.S. National Science Foundation's (NSF) Math and Science Partnership program, which funds professional development efforts that aim to "prepare highly qualified, experienced teachers to become exceptional Teacher Leaders" (NSF, 2010). However, as Schiavo, Miller, and Busey (2008) pointed out in their analysis of professional development programs for teacher-leaders funded under this program, while researchers have reported positive impacts on participant knowledge and skills, studies of these programs were not designed to investigate the effects of the programs on teacher leadership, indicating an area that warrants additional attention from researchers.

Consistent with Schiavo et al.'s (2008) observations, within the science education literature, there are also few studies of professional development programs designed specifically for teacher leaders or that report program outcomes related to teacher leadership. Howe and Stubbs (2003) identified teacher leadership as an "unexpected outgrowth" of a science professional development program. Interestingly, though the authors describe the process of 'becoming' a teacher leader, identity was not used as a lens for understanding this process. Researchers concluded from a case study of three teachers that:

> To be most effective, a leadership development program [should help] the participants actualize the potential created by the program by providing some form of long-term support. This may consist of follow-up meetings, opportunities for participants to get together in other contexts, or a continuum of activities begun in the program. These continuing activities can foster the creation of a community of practice among the participants that reinforces and stabilizes the new meaning structures that have developed. (p. 287)

Such recommendations, however, differ little from those for providing high-quality professional development, more generally.

The growing body of empirical research on professional development provides insights into characteristics of programs that provide high-quality, high-impact opportunities for teacher learning (Borko et al., 2010; Desimone, 2009; Loucks-Horsley et al., 2010). These include: (1) a focus on subject matter content and how students learn that content; (2) opportunities for teachers to engage in active learning; (3) coherence, which includes consistency with both teacher knowledge and beliefs, and school, district, and state policies; (4) sufficient duration, in terms of number of hours and span of time; and (5) collective participation (Desimone, 2009). In addition, researchers advocate that PD be situated in the practice of teaching, and that PD facilitators model preferred instructional strategies so that participating teachers have the opportunity to experience the strategies as learners and then reflect on their effectiveness from the perspective as teacher—learners (Borko et al., 2010). Beyond that, Loucks-Horsley and colleagues (2010) emphasize that effective professional development experiences provide links to other parts of the educational system, and support teachers in deepening their professional expertise throughout their career and serve in leadership roles.

While critical, these insights provide general guidance in that they could be applied to programs with a variety of goals (e.g., supporting teachers in implementing a new curriculum), but do not suggest a specific set of design principles for programs intending to support the development of teachers' identities as leaders. For that, we turn to the literature at the intersections of research on teachers, leadership, and identity development.

Leadership Development

Palus and Drath (1995) provided a model for leadership development to guide professional developers, leadership development program planners, and evaluators who are interested in the leadership development of individuals and who organize leadership development programs. In this model, leadership development is a cyclic process of three categories which are time dependent and interlinked – *readiness for development, developmental process, and outcomes*. Readiness for Development focuses on the extent to which a particular individual is prepared to invest in the process of leadership development. Developmental Change, involves reorganization of one's thinking and attitude through five intermingled processes – experience, disequilibrium, equilibrium, construction and potentiation. Any new experience which does not assimilate within an existing framework of thinking creates disequilibrium. An individual reaches equilibrium via construction of new knowledge or new ways of thinking. Potentiation refers to the potential an individual cultivates for future leadership growth and development. The third category, outcomes, refers to what leaders accomplish.

This perspective highlights a need to consider whether individuals are developmentally ready for leadership. In terms of professional development for teachers leaders, working with teachers who are already in positions of leadership

is no guarantee that teachers experience readiness to lead. For example, Lewthwaite (2006) designed a professional development program for teachers who held positions of responsibility for the science curriculum in their schools; however, the researcher acknowledged that not all of these teachers would have viewed themselves as 'leaders' at this stage in their professional journey, despite being recognized by their colleagues and their school's senior administration as competent and confident teachers of science. Additionally, a teacher's years in the profession does not seem to provide an accurate indication of his/her readiness. In fact, recent research (Sinha, 2014) demonstrates that even novice teachers may assume roles as teacher leaders with success.

Palus and Drath's model also calls attention to the importance of considering the ways in which teacher leaders may experience a sense of disequilibrium. For example, teachers' own conceptions of 'leadership' and how they view their engagement in leadership practices may vastly differ from perspectives of professional developers. As shown by Hanuscin, Rebello, and Sinha (2012), teachers may already be engaged in a variety of leadership activities, but not view these as leadership and, as a consequence, not view themselves as being 'leaders' as they carry out these activities.

Leadership Identity Development

Komives, Owen, Longerbeam, Mainella, and Osteen (2005) constructed a model of leadership identity development through a grounded theory approach. While their subjects were college students, their model nonetheless has relevance to our purposes. According to their model, leadership identity development is a six-stage process through which individuals progress on their way to 'becoming' a leader. This process is subject to influence by a variety of factors, including developmental influences, group influences, personal growth and sense of self, and broadening views of leadership.

This model suggests that professional development may support this process by helping broaden teachers' view of leadership. Consistent with this, Sinha (2012) found that teachers may enter professional development programs with myths and misconceptions about leadership, and that these influence whether or not teachers view themselves as 'leaders'. More recent research also demonstrates that teachers' conceptions of leadership are a critical influence in the leadership development process, as these form the basis for defining their leadership identity (Sinha, 2014).

Similarly, other influencing factors described by Komives et al. (2005) can inform professional development that aims to support teachers' identities as 'teacher leaders'. For example, developmental influences highlight the importance of peer influences, reflective practices, and meaningful involvement. Another factor, group influences emphasizes the need for group engagement in order to develop leadership. In that regard, professional developers need to consider ways in which teachers can collaborate to offer one another support and reflect on their leadership practices.

This model also goes beyond self-perception in constructing a leadership identity by emphasizing the influences of groups with which an individual is associated. This directly has bearing on designing a PD for teachers. Professional developers should try to understand how participation in various groups, for example science departments, committees, and professional learning communities, supports or hinders teachers' leadership identity development.

Teacher Leadership Identity Development

Whereas Komives et al.'s model was related to leadership identity development more broadly, Gonzales and Lambert (2001) proposed a model of *teacher leadership identity development* based on their study of twelve emerging leaders within a professional development school:

> Our understanding of identity formation can be both affirmed and modified by our understanding of identity formation among these teacher leaders. New experiences and feedback from a community of learners served to facilitate the emergence of leadership identity. Within this context, identity unfolded as the 'self' became redefined and confidence grew, thereby enabling the transformation of teachers into teacher leaders. (p. 17)

While not a robust model, this work nonetheless calls attention to the importance of opportunities within professional development experiences for teachers to 1) take on new roles as leaders; 2) receive feedback from others on their leadership; and 3) reflect on their personal growth as leaders. These are consistent with the implications of Komives et al.'s model, as well as the recommendations from the research on supporting teachers' identity development, more generally.

Supporting Teacher Identity Development

In her review of the empirical literature, Avraamidou (2014) identified a common set of insights from research related to supporting science teacher identity development. These included enabling teachers 1) to examine and understand their selves as teachers; 2) to experience science as learners in a variety of formal and informal settings; 3) to engage in reflective conversations and interactions with others; 4) to attend professional development programs; and 5) to participate in the critique, adaptation, enactment and revision of science curriculum materials. While professional development is included as one among these items, one could also envision professional development experiences that provide the other four kinds of opportunities that support teachers' identity development. For example, a study by Deneroff (2013) illustrated how a teacher's professional development experiences shaped her understanding of her career trajectory and sense of self as she was introduced to new ideas about teaching. We note, however, that Deneroff's study is one of very few studies that link professional development and identity construction.

As such, our own work makes a significant contribution to addressing this gap in the literature.

Challenges to Developing an Identity as a Teacher Leader

While the 'self' is certainly essential to understanding identity, Beijaard, Meijer, and Verloop (2004) emphasize a need to focus on the *context* in which an individual's identity is developed as well. Often, workplace structure and school culture can impede teacher leadership. In addition to lack of incentives and inadequate time for teachers to collaborate, cultural norms of isolation and individualism can discourage teachers from stepping outside of their classrooms to work collaboratively (York-Barr & Duke, 2005). Becoming a teacher-leader involves risk-taking; as Johnson and Donaldson (2007) explain:

> …the professional norms of teaching present a daunting challenge to teacher leaders who are asked to improve their colleagues' instruction. Our interviews suggested that colleagues often resist these teacher leaders' work because they see it as an inappropriate intrusion into their instructional space, an unwarranted claim that the teacher leader is more expert than they, and an unjustified promotion of a relative novice to a leadership role. Thus, the norms of autonomy, egalitarianism, and deference to seniority that have long characterized the work of teaching remain alive and well in schools. (p. 8)

Thus, establishing an identity as a teacher leader requires that teachers challenge existing norms and contribute to changing the culture within their schools.

Summary and Design Considerations

While the literature discussed thus far varies in its focus and scope, we find nonetheless that there are significant points of intersection and overlap that can inform practical action. By drawing from the connections between these different lines of work, we have identified six principles for the design of professional development of teacher leaders (Table 10.1). In the sections that follow, we describe the enactment of these principles through our own work in a professional development program for ninth grade science teachers.

LEADERSHIP IN FRESHMAN PHYSICS

Professional development can provide a space for teachers to acquire new knowledge, develop their identities, and challenge existing cultural and social practices (Battey & Franke, 2008). *Leadership in Freshman Physics*, an NSF

Table 10.1. Supporting the development of science teachers' identities as leaders

Design Considerations for Professional Development	Examples of Supporting Literature	Relevant Perspectives on the Nature and Development of Identity
Programs should be flexible and supportive, taking into account teachers' varying levels of readiness to lead.	Individuals may be prepared to different extents to participate in the process of leadership development (Palus & Drath). Becoming a teacher leader involves taking risks and challenging existing norms (Katzenmeyer & Moeller, 2009).	In constructing new identities, individuals engage in *Emotional Work* (Luehmann, 2007), attending to their feelings and concerns about behaving differently and changing their ideas of who they are. Both a high degree of support and flexible scaffolding that changes over time are important *identity resources* (Luehmann, 2007).
Programs should include an explicit focus on leadership, based on a coherent vision and well-formed idea of what it means to 'become' a teacher-leader.	Teachers may not view themselves as 'leaders', despite holding leadership positions and engaging in leadership practices (Lewthwaite, 2006; Hanuscin et al., 2012)	Teacher identity is complex and multifaceted, consisting of various sub-identities that are interrelated.
Programs should support teachers in developing a shared vision of what it means to be a 'teacher leader'.	Becoming a teacher leader involves developing and clarifying a personal vision for leadership (Katzenmeyer & Moeller, 2009).	*Repair work* (Gee, 2003) may be necessary when individuals have core identities that run counter to the proposed (new) identity they seek.
Programs should support teacher leaders, as a community, in providing feedback to one another.	Teachers benefit from interactions with and feedback from others as they craft identities (Avraamidou, 2014; Gonzales & Lambert, 2001)	Teacher identity is socially constructed and constituted. *Recognition work* (Gee, 2005) involves being recognized by the self and others as a certain kind of person; identity is formed through social interaction and participation with professional discourse with others. Access to feedback from others is an important *identity resource* (Luehmann, 2007).

(Continued)

Table 10.1. (Continued)

Design Considerations for Professional Development	Examples of Supporting Literature	Relevant Perspectives on the Nature and Development of Identity
Programs should help teachers identify opportunities in their contexts to engage in leadership, whether through formal or informal roles.	Teachers need opportunities to take on new roles as leaders (Gonzales & Lambert, 2001) and exercise agency (Luehmann, 2007)	*Positioning* (Luehmann, 2007) involves defining roles and situating oneself in the broader culture. Teachers draw on *identity resources* including multiple opportunities to display competence, exercise agency, and be held accountable (Luehmann, 2007).
Programs should include guided and structured opportunities for teachers to engage in reflection their growth and development as leaders.	Teachers need opportunities to reflect on their person growth as leaders (Gonzales & Lambert, 2001) and to understand themselves as teachers (Avraamidou, 2014)	Identity is dynamic and fluid and constantly being formed and reformed; *Reflective work* (Gee, 2001) occurs in the interpretation and reflection on one's participation in a community.
Programs should take place of over the long-term, providing ongoing support to teacher-leaders.	Teacher leaders need support over the long-term to actualize the potential of professional development (Howe & Stubbs, 2003)	Identity development is an ongoing process, rather than identity being a static construction (Beijaard et al., 2004)

Math and Science Partnership, has the overarching goal of supporting a cadre of teachers-leaders to become advocates for excellence in subject matter knowledge and research-based pedagogy as their districts implement a ninth grade physics course. Two cohorts of 40 teachers attended a series of annual summer workshops (4 weeks) and academic year follow-up sessions (4 full days) that include sessions related to physics content, modeling pedagogy, and leadership development. In addition to these face-to-face sessions, the leadership component also takes place online throughout the academic year as teachers participate in discussion forums and author blogs about their experiences implementing a leadership action plan of their own design.

For the purposes of this chapter, we focus specifically on the leadership component, referencing the broader program where appropriate. In the sections that follow, we illustrate how the leadership component of the program exemplifies each of the design principles in action. Consistent with the view that identity is formed through the interpretation, narration, and recognition by one's self and others (Gee, 2001), we also follow our discussion of each design principle with a narrative commentary by

a teacher participant in the program (third author), to illustrate how he made meaning of his experiences and came to (re)define his identity as a teacher-leader through his participation. Mike's story is shared as an example of a teacher participant who was successful in realizing the affordances of the professional development for developing as a teacher-leader. Prior to the program, Mike's leadership involvement was limited to serving as an athletic coach and being appointed department chair. Through the program, he expanded his views of leadership, increased the repertoire of leadership practices in which he engaged, and redefined his role as a 'teacher leader'.

An Explicit Focus on Teacher Leadership

In our program, we ask teachers to see themselves as leaders; as the advocates, innovators, and stewards of their profession (Lieberman & Miller, 2005). For this to occur, however, many teachers needed to expand their ideas of what it means to be a teacher—to see themselves as the leaders and intellectuals who can make a difference in their schools and community. We supported this by having well-defined image of, and an explicit focus on, teacher leadership.

While it is certainly plausible that enhancing teachers' content and pedagogical knowledge would enhance their leadership capacity, we do not view teacher leadership by-product of learning content and pedagogy. In addition to engaging in professional development activities to learn new content and instructional techniques (e.g., hands-on activities, classroom coaching), teachers engaged in a variety of experiences to support their growth and development as 'teacher leaders'. These included taking part in discussions (both face to face and asynchronous/online) with peers; examining different perspectives on teacher leadership through books, articles, video, and web resources; creating an individualized leadership action plan; and blogging about their experiences implementing the plan throughout the school year.

Mike's story. When I decided to join the Physics First program, I don't think I even knew there would be a leadership component. I remember hearing about it during the first summer academy, but honestly, I didn't think much about it. I had never had any formal leadership training, and wondered how it had anything to do with teaching physics. I guess you could say my expectations were pretty low for the leadership part of the program. I wasn't prepared to become a teacher leader and was unaware of how much work we would put in and how much it would change my whole experience. Had it not been for the leadership component, I might have taken a much less active, and less rewarding, role in the program.

Constructing a Common Vision of 'Teacher Leadership'

Teachers entered our program with a variety of views on leadership, most notably a traditionally hierarchal views in which the 'leader' was the principal, not teachers (see

Hanuscin et al., 2012). In addition, we found discrepancies between what teachers considered to be 'leadership' activities and their day-to-day work. Although teachers indicated they engaged in many of the practices of teacher leaders (York-Barr & Duke, 2004), they did not consider themselves to be leaders. Therefore, because identity shapes how one participates and how one participates shapes identity (Lave & Wenger, 1991), it was important for us to create a sense of disequilibrium for teachers, whose incoming identities were incompatible with becoming a 'leader'.

We undertook efforts to help teachers expand their perspectives and construct a common vision of teacher leadership. As they participated in the leadership program sessions, teachers compared their own ideas about leadership to conceptions of teacher leadership in books and articles, and to those expressed by teacher leaders in personal writings and video interviews. Teachers also shared their own evolving ideas about leadership and listened to others' viewpoints. During the workshops there were one-on-one discussions (held in a 'speed dating' format), as well as small and large group discussions in which teachers identified areas of overlap and discrepancy between their ideas about teacher leadership. These activities helped all the participants understand their colleagues' definitions, synthesize their own ideas, and shape a common vision of teacher leadership. This vision continued to evolve and be shaped as teachers interacted with each other online via blogging and discussion forums, and served to frame teachers' action plans throughout the year.

Mike's story. I think that being part of a cohort of teachers from across the state helped tremendously as we went through the program. Each person brought unique thoughts and experiences to the table and we were encouraged to create a common vision of leadership through discussions, exercises, reading and reflection. From the first day of class, we were learning to build trust within our groups. The activities inspired us to challenge our thinking and the thinking of our peers as we reformed our definitions of teacher leadership. I wrote about this on my blog during the first year of the program:

> When we first met this summer and began our discussions about leadership, I immediately started thinking about those in visible positions of leadership – business leaders, professional sports coaches, and in the world of education-administrators. I honestly hadn't thought much about the classroom teacher as a leader. But after participating in the summer academy, working on my action plan, and reading your thoughts on these blog pages, I have recently begun seeing things a little differently. I started looking more closely at the job we all do every day and the opportunities we have to be teacher leaders.

As we began to explain our definitions of leadership, certain misconceptions emerged. As we engaged in dialogue about teacher leadership with our colleagues, some of those initial thoughts changed and we became more active participants as we gained interest in the subject. In other words, we were allowed to reflect on our thoughts and construct (or re-construct) our own definitions of teacher leadership

with the guidance of our instructors. We were never given a "correct" definition of teacher leadership; we were allowed to arrive at one on our own. That made a big difference, I believe, in the interest I took in the program. Had the delivery been such that we were given a definition, I would have tuned out. Instead, we were engaged in discussion, revision and reflection of our views on teacher leadership in such a way that I always looked forward to our next meeting.

Flexible Support That Takes into Account Teachers' Readiness to Lead

While the original intent of the grant was to identify and recruit teachers based on their potential for leadership, given local contexts and the needs and constraints of our district partnerships, we ended up working with a diverse group of teachers whose classroom experience ranged from 0–27 years. Few had a background in physics, and many would be teaching a course in physics for the first time as part of the program. Teachers' feelings of readiness to lead were not only influenced by how they viewed themselves as leaders, but also concerns about their competence and how they might be perceived by their peers. As such, the program offered support in several ways to allow teachers to develop their competence and to address challenges and barriers to teacher leadership.

Opportunities to display competence are critical to forming one's identity as a 'teacher leader'. Participation in the PD program helped teachers build competence and confidence in their knowledge of content and pedagogy, which contributed greatly to their leadership outside the classroom. One of the fundamental objectives of the professional developers was to support teachers to become intellectual leaders and advocates for excellence in physics content. All participants completed 300 hours of training which covered 12 units of physics content. The various components of the program were designed to help teachers grasp the 9th grade physics content and learn it in the same way they were expected to teach. For example, teachers were taught by program facilitators using modeling pedagogies; the teachers examined real world application of theories of physics, designed and conducted laboratories, developed explanations of scientific data by using multiple representations, and used white boards as a teaching-learning tool. This was further supported through provision of coaches and mentors during the academic year to support teachers' classroom implementation of the curriculum.

Luehmann (2008) emphasizes the value in offering opportunities for safe spaces in which teachers can take risks as they "try on" new identities. Teachers were provided access to support from their peers within their cohort throughout the program through an online community that was restricted to program participants. In this manner, teachers were encouraged to speak freely and openly about their leadership experiences and the degree to which their work contexts supported their leadership efforts. By participating in discussion forums and blogging, teachers were able to share challenges, solicit advice, and celebrate successes as leaders. Teachers received feedback and learned from one another's efforts.

Given teacher leadership involves taking risks and challenging norms, the program also offered support in the form of educating teachers about common barriers to teacher leadership. Norms of privacy and isolation, egalitarianism, and seniority were explicit topics addressed in the leadership PD sessions. Teachers identified potential barriers to teacher leadership and strategies for overcoming those—for example, working with reluctant colleagues to enact change. These then became an explicit component of teachers' leadership action plans.

Mike's story. I honestly felt about as prepared to become a "teacher leader" as I did to become a physics teacher. I had never taken a physics class (in high school or college) so I was naturally very apprehensive about devoting several weeks each summer learning to teach physics. In much the same way, I didn't feel prepared to offer much to the teacher leadership discussion during our first summer academy. As I wrote in my action plan the first year of the program:

> In starting the freshman physics program at our school I will not only be presenting new content, but also an entirely different teaching method that I have used in the past. As lead teacher in our department, I feel like I need to set a good example in this area, yet I have no more experience than any other teacher in our department.

I was interested in learning more about leadership, but my mindset towards leadership hadn't prepared me with much confidence in that area. I was surprised, however, to learn how much each part of the program depended on the other. Sometimes it's hard to think of my growth in the physics content separately from my growth as a leader.

As my confidence in physics grew, so did my confidence as a teacher leader. Likewise, as more opportunities were presented to explore teacher leadership, the more willing I was to take risks in teaching and learning. I reflected on this at the end of the program:

> It's almost a snowball effect to some degree, because I feel like as I take on more leadership, I gain more confidence. And with more confidence, I'm more likely to take risks and assume other leadership positions.

I would suggest that the majority of the teachers in the program were much like me. We came into the program with the intention of learning physics and were unaware how much we would learn about leadership and ourselves.

Helping Teachers Identify Opportunities to Lead

Given the differences in teachers' feelings of readiness to be lead, we did not anticipate all teachers following the same pathway toward becoming teacher leaders. Our program was guided by an assumption that not all teacher leaders look the same or function in the same ways; that teacher leadership is enacted both through formal and informal means, and cuts across a variety of domains of teachers' practice. By

helping raise teachers' awareness of the various dimensions in which teacher-leaders can impact their students, schools, and communities (York-Barr & Duke, 2004), we were able to help teachers pinpoint specific venues through which they could begin to position themselves as leaders. Teachers had the flexibility to personalize their action plans based on their particular context, concerns, and needs. As they shared their leadership activities with one another through their blogs, they provided their peers with diverse examples of opportunities in which teachers could become leaders within and beyond their classrooms.

Mike's story.   As we completed our action plans and put our reflections on our blog posts, I knew my definition of leadership was incomplete – if not completely wrong. At the same time, I began to take notice of the different leadership roles that I had in our school and in our district. I began to realize that leadership wasn't defined so much by title as it was by action.

For my first action plan, I formed a cadre with three other teachers for the purpose of doing peer observations. We each observed one another's classrooms twice during the first term of the school year. This was a very rewarding experience for a couple of reasons. I developed confidence as other teachers came in and observed my teaching. I was excited about the content and about the teaching pedagogy we were using. More importantly, however, I took a leadership role in forming the team and leading conversations after the observations had concluded. Each of the other teachers were very thankful for having been included and I felt like I had done something that was of real benefit to more than just my classroom. For possibly the first time, I felt like a teacher leader.

As I look at my current role in my school and my district, I see the leadership opportunities that are available. I understand that teachers can be teacher leaders in a number of ways. I see people in my department displaying leadership skills often by serving on committees and working with a team of teachers to help our at-risk students during advisory period. I see teachers in other departments working on curriculum changes and new instructional models as they start teaching an integrated English-Government class this year. It's not that these things (or things like them) weren't happening before, it's just that I didn't see them.

Receiving Feedback and Recognition

Research has shown the crucial contribution of feedback, support, and recognition with regard to teacher leadership identity development. Identity depends on others' perception as much as an individual's. In this way, identities are impacted and shaped by their participation in a community (Wenger, 1998).

Several of the PD venues provided opportunities for teachers to receive feedback and recognition, both from their peers and from the program staff. As mentioned prior, online discussion forums and blogging not only held teachers accountable for their action plans, but also provided them a platform to share their successes and

challenges with peers. In this online space, teachers commented on one another's blogs, offering encouragement and support, as well as expressions of appreciation and admiration. That is, it provided teachers an opportunity to have their actions be recognized as 'leadership' and for them to be recognized as 'leaders'.

'Share-A-Thon' sessions at academic year follow-up meetings provided a flexible venue for teachers to receive feedback from peers as well. Several hours of each full-day session were set up in a conference-style format with concurrent sessions. Teachers submitted a topic and were assigned a timeslot in advance. Attendees could then pick from among the various topics based on shared interests. Teachers capitalized on these opportunities to share successful strategies with others, but also to engage in collaborative problem-solving surrounding issues and challenges they faced. For some teachers, Share-A-Thons provided a platform for the presenters to display their competence, establishing their credibility as teacher leaders. For others, it provided useful ideas and resources through which they could further develop their skills and confidence as teacher leaders.

Teachers also received feedback from program facilitators throughout their Action Plan development and implementation. Each teacher received comments on his/her draft Action Plan, as well as at mid-year and end-of-year following their submission of a progress report on their efforts. Feedback during the development process helped teacher identify and clarify roles in which they could serve as leaders, anticipate barriers and challenges they might face, and strategize ways to navigate those. Midyear and final reports allowed facilitators opportunities to recognize teachers' leadership successes and support them in overcoming challenges they encountered.

Mike's story. I would say that during the first week of the workshop, I questioned myself several times. I wasn't sure I was cut out for the rigor of the program. My confidence level was pretty low. Another low was during our first year when we had two teachers we had to train in new curriculum. Neither of them was very happy or excited about learning a new curriculum or a new way of teaching. They were very reluctant, almost to the point of stubbornness. It took a lot of coaching to get them to the point we needed them to be at before their classes started. I didn't feel like much of a leader in either of those situations. I felt frustration, stress, and even a little despair, but I sure didn't feel like a leader.

As I continued in my efforts, however, this changed. The Physics First program was welcomed by our school administrators, who were excited about starting a program with such an emphasis on critical thinking and problem solving using modelling pedagogy. The freshman physics classes were quickly touted as "just what we needed" and as the new team leader, I became the spokesperson for our department. I found myself speaking at faculty meetings, inviting others to observe classes, arranging site visits and even doing some workshops on using whiteboards in the classroom. I wasn't actively seeking leadership opportunities, I was just excited to share our program with anyone who would listen. It was strange at first to realize

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that other people saw me as a 'leader', but I gradually became more comfortable in that role. The feedback I got from my colleagues in the program and from the staff only served to reinforce that.

Reflecting on Teachers' Growth as Leaders

Within the teacher leadership component of the program, various face to face and online activities were designed specifically to embed regular opportunities for teachers to reflect. For example, teachers were engaged in reflecting on their definition of teacher leadership, on the feasibility of their leadership action plans by anticipating challenges and how to overcome them, on their roles as teacher leaders, and on their progress towards becoming teacher leaders. An interesting aspect of these reflections was that they were both done both in private and public.

Self-evaluations are an example of reflection that teachers did privately. As part of their action plans, teachers completed a mid-year progress report and end-of-year report. The main purpose of these documents was to encourage teachers to gauge and assess their growth both in the particular context of action plan implementation and in the overarching context of their teacher leadership development. This in turn also helped in their teacher leadership identity development as they reflected on their development as leaders, evaluated their strengths and weaknesses with regard to leadership skills, and contemplated how they impacted their classroom, school and outside community as leaders. Reports were shared with the workshop facilitators, who provided feedback in response, but were not shared more broadly.

Face-to-face and virtual discussions provided further opportunities for teachers to engage in reflection, sharing their own perspectives and listening to those of their peers. In addition, blogging provided a platform for teachers to engage in identity work (see Hanuscin, Cheng, Rebello, Sinha, & Muslu, 2014). These were not public via the web, but rather were hosted within an online portal accessible only to program participants. Teachers blogged monthly and responded to the blogs of others, which created a chronological record of their leadership thoughts and activities throughout the three years of the program, allowing them to 'see' their growth over time.

Mike's story. My most significant and cognitive changes in my leadership experience came through the process of reflection. I've never been a person who does much reflection, at least not any prolonged and thoughtful reflection. This is what, in my opinion, made the most difference in changing my leadership definition. I feel like I learned the most about myself as I thought about and drafted my answers to action plan questions or blog responses. Sometimes I felt like I was revealing too much or that others would doubt my sincerity, but I found the process very rewarding. I've always enjoyed writing, but had never used it as a metacognitive tool, at least not in my professional life.

Another helpful aspect of our reflection was that much of it was done online through the use of blogging and online discussion forums. This allowed opportunities

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for me to not only see what my peers were thinking, but also for them to read and
make comments about my thoughts. Whether they challenged my thinking or agreed
with it, their responses often prompted me to re-think, and sometimes even revise
my ideas about teacher leadership.

Sustained Support for Teacher Leadership Development

Becoming a leader doesn't happen overnight; just as there is a recognized need for
long-term support for professional development, more generally, we recognize that
in order to support the development and growth of teachers as leaders, sustained
support is necessary. Over the three years of the program, teachers had multiple
opportunities to develop and enact leadership plans. Through multiple iterations,
teachers were able to explore different leadership trajectories, regroup when they
were unsuccessful, or build on their past efforts.

Consideration was given to sustaining support for teacher leaders beyond the end-
date of our funding as well. For example, the online community established for use by
teachers during the program will remain accessible and functional to enable teachers
to continue to reach out across districts to support one another in their leadership
efforts. What has emerged from this is a network of 'collaboratives', through which
small rural districts have been able to pool resources and manpower to enhance their
capacity to provide training and professional development to teachers.

Mike's story.   All too often, professional development for teachers has meant we
would attend a one-day or half-day workshop presented in a traditional "stand and
deliver" format. Teachers are bombarded with information and expected to return
to their classrooms with little or no follow up. Being part of a three-year program
that included several weeks each summer, action plans and follow-up meetings
throughout the year made a huge difference for me. Another difference was how we
were guided through the process, but allowed to craft our own definitions of teacher
leadership along the way. Throughout the entire program I felt supported by not only
the instructors, but also by my peers with whom I had contact both in person and
via our online resources. Had it not been for that constant support, I don't believe
my involvement in the program would have been so rewarding. In fact, even now
that the program has ended, I am still in contact with several colleagues from the
program, including the instructors. My role as a leader will not end with the program.

ON 'BECOMING' A TEACHER LEADER

Becoming a teacher leader is not simply a matter of acquiring new knowledge and
skills; as we have argued here, it requires *developing a new identity* as a teacher
leader. This is no simple or straightforward matter, and is an ongoing process that
necessarily takes time. Teachers must work to bring their identity as leaders in line
with views of 'teacher leadership' and their professional practice. Using identity as

a framework for teacher leadership requires rethinking not only how professional programs are designed, but how we gauge the success and impact of those programs. For example, the process of becoming a teacher leader is an ongoing construction, rather than a matter of teachers arriving at a certain point at which they can be considered 'leaders'.

Participation in the professional development program is but one chapter in Mike's experience in *becoming* a teacher leader, but it is a chapter that represented a turning point.

Mike's story. My early career was influenced greatly by the fact that I wanted to coach football. In fact, that was the reason I chose to pursue a degree in education. In college, I worked as a student assistant for the football team, and this is where my passion for coaching stemmed from. As an assistant coach at the first two schools I taught at, this was what consumed a majority of my time. It's also what shaped my early ideas of leadership. Football is very much a hierarchy when it comes to leadership. Your position or title pretty much defines your leadership role on the team. This is true of both coaches and players. So this is how my early ideas of leadership were shaped. I associated leadership with a position or title – the more important your position, the more of a leadership role you had. And I looked at my teacher leadership in exactly the same way. I was a new teacher, and basically just did my job and didn't even consider any type of leadership opportunity.

Transformation. Evolution. Metamorphosis. Those words might be a little dramatic, but my definition of leadership has definitely undergone a significant change, as well as the way in which I view myself as a 'teacher leader'. There are many factors that have contributed to that; however, I can easily point to my involvement in this program as the major reason for this shift. I know that my horizon of possibilities has expanded greatly since starting the program. Of course, that is somewhat of an illusion because the possibilities were always there, I just didn't have the vision to see them. The insights I have gained as I completed my action plan, blogged about my progress, and read about the experiences of others has been invaluable.

REFLECTIONS ON IDENTITY AND PROFESSIONAL DEVELOPMENT

From the perspective of evaluating our program's efforts to support teachers in becoming 'teacher leaders', Mike's story is a success story. Mike took advantage of the identity resources afforded by the program and engaged in identity work that helped him redefine himself as a 'teacher leader'. And, while Mike is certainly not the only teacher who did so, not all teachers who participated in the program came to identify themselves as leaders in the same way or to the same extent. As discussed prior, internal factors such as teachers' readiness (and willingness) to become leaders certainly plays a role in that. However, this process is also influenced by external factors. Identity work, as Calabrese-Barton et al. (2013)

emphasize, is constrained by historical, social, and cultural norms, rules, and expectations. While the professional development programs can serve as a context in which teachers engage in identity work collaboratively, the context in which they *become* teacher leaders is in their own classrooms, schools, and communities. In this sense, professional development programs may, at best, serve as *incubators* for teacher leaders. While it may be tempting to view supporting the development of teacher leaders' identities as too ambitious a goal for professional development, the very nature of teacher leadership refutes such a position. While existing norms may serve as barriers to teacher leadership, teacher leaders can play an active role in reshaping school culture and redefining norms. For example, Mike overcame norms of privacy and isolation to engage his colleagues in peer observation of one another's classrooms. Together, they constructed new norms for interacting and engaging in productive conversations about improving teaching and learning. He also took on advocacy roles, reaching out to parents, the school board, and community to help shape expectations for the kinds of learning experiences in which students should be engaging. In this sense, while professional development can be transformative for teacher leaders, teacher leaders can in turn be agents for transforming their schools, communities, and profession.

SUMMARY

Teacher leadership is a unique aspect of teacher identity. In this chapter we have explored the construction of 'identity as a teacher leader' through a review of the literature and have identified models and practices that have the potential to support teachers' in developing identities as teacher leaders. The chapter adds significantly to the literature on science teacher identity in a research area that has been overlooked: how teachers (re)construct identities as leaders through professional development. The specific set of design principles we offer (Table 10.1) provide a theoretically-based and empirically-supported approach that can inform efforts of professional developers and researchers. By offering a conceptualization of teacher identity in conjunction with teacher leadership and a model for professional development aligned with this view, our chapter advances knowledge of science teacher identity.

REFERENCES

Akerson, V. L., Pongsanon, K., Weiland, I. S., & Nargund-Joshi, V. (2014). Developing a professional identity as an elementary teacher of nature of science: A self-study of becoming an elementary teacher. *International Journal of Science Education, 36*, 2055–2082.

Avraamidou, L. (2014). Studying science teacher identity: current insights and future research directions. *Studies in Science Education, 50*(2), 145–179. doi:10.1080/03057267.2014.937171

Battey, D., & Franke, M. L. (2008). Transforming identities: Understanding teachers across professional development and classroom practice. *Teacher Education Quarterly, 35*(3), 127–149.

Beijaard, D., Meijer, P. C., & Verloop, N. (2004). Reconsidering research on teachers' professional identity. *Teaching and Teacher Education, 20*, 107–128.

Borko, H., Jacobs, J., & Koellner, K. (2010). Contemporary approaches to teacher professional development. *International Encyclopedia of Education, 7*, 548–556.

Calabrese-Barton, A., Kang, H., Tan, E., O'Neill, T. B., Bautista-Guerra, J., & Brecklin, C. (2013). Crafting a future in science: Tracing middle school girls' identity work over time and space. *American Educational Research Journal, 50*, 37–75.

Darling-Hammond, L., Bullmaster, M. L., & Cobb, V. L. (1995). Rethinking teacher leadership through professional development schools. *The Elementary School Journal, 96*(1), 87–106.

Deneroff, V. (2013). Professional development in person: Identity and the construction of teaching within a high school science department. *Cultural Studies of Science Education*, 1–21. doi:10.1007/s11422-013-9546-z

Desimone, L. M. (2009). Improving impact studies of teachers' professional development: Toward better conceptualizations and measures. *Educational Researcher, 38*(3), 181–199.

Gee, J. (2001). Identity as an analytic lens for research in education. *Review of Research in Education, 25*, 99–125.

Gee, J. P. (2003). *What video games have to teach us about learning and literacy.* New York, NY: Palgrave Macmillan.

Gee, J. P. (2005). *An introduction to discourse analysis: Theory and method* (2nd ed.). New York, NY: Routledge.

Gonzales, S., & Lambert, L. (2001). Teacher leadership in PD schools: Emerging conceptions, identities, and practices. *Journal of School Leadership, 11*, 6–24.

Goodson, I. (1991). *Biography, identity, and schooling.* London, England: Falmer.

Hanuscin, D. L., Cheng, Y.-W., Rebello, C., Sinha, S., & Muslu, N. (2014). The affordances of blogging as a practice to support ninth-grade science teachers' identity development as leaders. *Journal of Teacher Education, 65*, 207–222.

Hanuscin, D., Rebello, C., & Sinha, S. (2012). Supporting the development of science teacher leaders— Where do we begin? *Science Educator, 21*(1), 12–18.

Howe, A. C., & Stubbs, H. S. (2003). From science teacher to teacher leader: Leadership development as meaning making in a community of practice. *Science Education, 87*, 281–297.

Johnson, S. M., & Donaldson, M. L. (2007). Overcoming obstacles to teacher leadership. *Educational Leadership, 65*(1), 8–13.

Katzenmeyer, M., & Moller, G. (2009). *Awakening the sleeping giant: Leadership development for teachers.* Thousand Oaks, CA: Corwin Press.

Komives, S. R., Owen, J. E., Longerbeam, S. D., Mainella, F. C., & Osteen, L. (2005). Developing a leadership identity: A grounded theory. *Journal of College Student Development, 46*(6), 593–611.

Komives, S. R., Longerbeam, S. D., Owen, J. E., Mainella, F. C., & Osteen, L. (2006). A leadership identity development model: Applications from a grounded theory. *Journal of College Student Development, 47*(4), 401–420.

Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation.* Cambridge, England: Cambridge University Press.

Lewthwaite, B. (2006). Constraints and contributors to becoming a science teacher-leader. *Science Education, 90*, 331–347.

Lieberman, A., & Miller, M. (2005). Teachers as leaders. *The Educational Forum, 69*, 151–162.

Loucks-Horsley, S., Stiles, K. E., Mundry, S., Love, N., & Hewson, P. W. (2010). *Designing professional development for teachers of science and mathematics* (3rd ed.). Thousand Oaks, CA: Corwin Press.

Luehmann, A. (2007). Identity development as a lens to science teacher preparation. *Science Education, 91*, 822–839.

Luehmann, A. (2008). Using blogging in support of teacher professional identity development: A case study. *Journal of the Learning Sciences, 17*, 287–337.

National Science Foundation. (2010). *Math and science partnership program solicitation.* Retrieved from http://www.nsf.gov/pubs/2010/nsf10556/nsf10556.htm

NGSS Lead States. (2013). *Next Generation Science Standards: For States, By States. Achieve, Inc. On behalf of the twenty-six states and partners that collaborated on the NGSS.*

Palus, C. J., & Drath, W. H. (1995). *Evolving leaders. A model for promoting leadership development in programs, 4-13* (CCL No. 165). Greensboro, NC: Center for Creative Leadership.

Renn, K. A., & Bilodeau, B. L. (2005). Leadership identity development among lesbian, gay, bisexual, and transgender student leaders [computer file]. [Article]. *Naspa Journal* (Online), *42*(3), 342–367.

Schiavo, N., Miller, B., & Busey, A. (2008). *Summary of empirical research on experiences and interventions to develop teacher leadership.* Waltham, MA: Education Development Center, Inc.

Sinha, S. (2014). *Development of high school science teachers as teacher leaders at various stages of their career: A multiple case study* (Unpublished doctoral dissertation). University of Missouri, Columbia, CO.

Sinha, S., Hanuscin, D., & Rebello, C. M., Muslu, N., Cheng, Y. (2012). Confronting myths about teacher leadership. *European Journal of Physics Education, 3*(2), 12–21.

Task Force on Teacher Leadership. (2001). *Leadership for student learning: Redefining the teacher as leader.* Washington, DC: Institute for Educational Leadership.

Venville, G., Wallace, J., & Louden, W. (1998). A state-wide initiative: The primary science teacher-Leader project. *Research in Science Education, 8*(1), 17–38.

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

York-Barr, J., & Duke, K. (2004). What do we know about teacher leadership? Findings from two decades of scholarship. *Review of Educational Research, 74*(3), 255–316.

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