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## **Making the leap to teacher: Pre-service residents, faculty, and school mentors taking on action research together in an urban teacher residency program**

**By Emily J. Klein, Monica Taylor, Anna Karina Monteiro, William Romney, Meshelle Scipio, Alex Diaz, Barbara Dunn, Suzanne Poole**

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### **Abstract**

This article explores what happens when school mentors and university faculty co-facilitate a cycle of action research with pre-service science teacher residents in an urban teacher residency. The voices of all three constituents describe the process of doing action research together in community and its impact on their practice. The pre-service teacher residents narrate their questions, how they explore them, and highlight their findings. They discuss how the use of action research as a methodology deepened and extended their development as critically reflective practitioners. Finally we discuss the implications of the inquiry stance of action research for both the individuals and the schools and districts of which they are a part.

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### **Introduction**

Action research has been a major part of my learning, helping me to leap from student teacher to teacher. . . I became more aware of my own teaching as well as who my students were and how they learned.

While action research is included in many in-service teacher education programs and is the focus of a fair amount of research, there has been less work around pre-service action research as a means of developing their identities as teacher researchers from their earliest classroom experiences (Mertler, 2011). In addition, what action research *is* done by pre-service teachers is usually conducted in isolation as a coursework assignment with a mentor teacher acquiescing to the project rather than with mentors who are authentically and deeply engaged in the process. But what happens when university faculty and school mentors support pre-service residents in developing and enacting action research? What is the role of action research in preparing teachers in an urban teacher residency program, where

residents spend an intensive year in the classroom? How does the methodology of action research help residents in a third space blur the lines between theory and practice, as Routledge writes, and “live theory in the immediate” (1996, p. 401)?

This article, written collaboratively by residents, school mentors, and university faculty, describes the impact conducting action research has on pre-service residents as they develop their identity as teachers. We wanted to study the role of using action research on multiple levels: the level of the individual resident and their emerging teacher identity, the level of the mentor teacher and school where the action research was happening and the mentor teacher was taking the lead in supporting the process, and that of the residency teacher education program. We also wanted to examine how action research as collaborative inquiry extends and strengthens the non-hierarchical principles of an urban teacher residency program.

We share our collective process, findings from individual action research projects, and the challenges and benefits of action research during the process of learning to teach in an urban teacher residency program. Authoring this article together highlights the different contributions we made to the action research process and its potential as a means for nurturing reflective practitioners and improving one's practice.

## **Background of the urban teacher residency**

The setting for this study was the district of Newark NJ and Montclair State University where the two collaborated to create an urban teacher residency program in secondary math and science – the Newark Montclair Urban Teacher Residency (NMUTR). Urban teacher residencies were originally designed to meet teacher shortages in high need districts and were modeled on medical school residencies, pairing residents with school mentors for an intensive year of teacher preparation (Berry, Montgomery, & Snyder, 2008; Boggess, 2010; Solomon, 2009). Faculty led instructional rounds with residents and mentors, taught courses, and co-facilitated action research on-site in schools. Curriculum was negotiated and emergent and the program actively sought to integrate academic, practitioner, community, and student knowledge, and not to privilege one over the others (Klein, Taylor, Onore, Strom, & Abrams, 2013).

In year one, faculty guided residents' action research and hoped the mentors would take an interest in the process, although only one had a background in action research. Because the mentors did not co-lead this work, the projects were often not fully integrated into residents' and mentors' daily co-teaching practices and therefore the projects were burdensome and the faculty felt they lacked depth. Hence the following fall, faculty led a course for mentor teachers that would build mentors' capacity in action research, and prepare them to facilitate the residents' action research (Taylor, Klein, & Abrams, 2014).

One significant goal of the program was to create critical reflective practitioners who are

“researchers” and “experimenters” (Schön, 1983, pp. 66-69) and as Beck and Kosnik (2006) write, “generators of theory” (p. 134). Residents need opportunities to develop their own theories and practices based on their experiences and observations in classrooms. Action research helps residents view “teaching as integrally related to research and as a process that involves inquiry and experimentation” (Ross, 1987, p. 147). Including action research was a key component of our curricular model in the residency as we believe it is an essential strategy for nurturing such thinking.

## **Defining action research**

Although much has been written about action research as a means of developing reflective practices for teachers, as Price (2001) points out, “few scholars have examined its application to pre-service teacher education” (p. 43) and even fewer articles have been written from the collaborative perspective of pre-service teachers, school mentors, and university faculty (Mertler, 2011; Mitchener & Jackson, 2012). A significant number of action research studies highlight teacher inquiries and their process and completed written products (Bissex & Bullock, 1987; Goswami & Stillman, 1987; Hubbard & Power, 2003; Patterson, Santa, Short, & Smith, 1993). Focusing on residents' action research, our narrative describes the process, findings, and reflections through their eyes, as well as those of facilitators, mentors and university faculty.

Acknowledging that there are a variety of definitions, for our purposes action research involves a series of inquiry cycles, which are, as Price (2001) writes, “systematic, intentional, collaborative, and democratic in intent and process” (p. 43). Echoing Hubbard and Power (2003), we agree that action research provides teachers with ownership of their professional development. Conducting action research that relies on “classrooms as laboratories” and “students as collaborators” (p. xiii) allows residents to change how they work with students and systematically examine their practices. Action research involves what McNiff (2010) calls “finding ways to improve your practice and then explaining how and why you have done so” (p. 6).

The focus is on “How do I improve my practice?” (Whitehead, 1989, p. 137). In addition, it engages them as reflective practitioners based on actual data and not just on their perceptions and feelings about any specific classroom phenomenon. For pre-service teacher educators, all of this builds a notion of teacher as researcher from their earliest classroom experiences.

## Methods

### Becoming leaders of action research

In the fall of 2011, mentors took a graduate course in action research facilitated by the NMUTR faculty and a doctoral assistant. During that course, they completed an action research cycle about either their teaching or mentoring practice and a number of them contributed papers to national and international conferences about this work. The following spring, mentors co-facilitated an action research cycle for residents while faculty served as resources and also gave feedback on drafts of questions, data, and other written products. Throughout, mentors were involved not only in facilitating workshops, but in the daily process of gathering data, taking actions, shifting questions, and re-negotiating with students – as many of the residents made students co-investigators in the process.

### Action research process

Like Mills (2011), Mertler (2011), and others discuss, the residents’ action research process involved “Identifying an area of focus, Collecting data, Analyzing and interpreting the data, Developing a plan of action” (Mills, 2011, p. 5). Residents began by brainstorming and developing questions. Questions developed in conjunction with their mentor teachers and grew out of particular concerns and issues in their classrooms. After honing their questions over the course of a month, residents next decided what kind of data to collect. In all cases presented here, data collection coincided with taking action. For example, some residents wondered why their students were not doing well on summative classroom assessments. The process of asking their students about their experiences of learning content in biology became an action; engaging students as co-researchers in action research changed the nature of the

classroom dynamic as one of our residents discovered.

Although “action research has been conceptualized as an ongoing spiral where reflection and data gathering lead to a plan of action that is implemented...what are portrayed as discrete stages in the research literature blur together in the real world of teacher research” (Herr, 1999, p. 11). When we are involved in the work of teaching students at the margins of schooling, there is often little time for teachers to engage in a leisurely process of collecting and analyzing data. As Herr (1999) reminds us, “For those of us in the teacher research tradition who identify with critical, activist forms of research, there is much uncharted terrain as to what this process actually looks like when undertaken in one’s own work site” (p. 12).

Thus, while our monthly day-long sessions were devoted to discrete work topics of data collection, data analysis, and action plan development, the reality was that we were often engaged in many levels of discussions about all aspects of the action research process and our teaching practices at once. And while we only required one complete action research cycle, many residents went through a number of smaller cycles.

### Studying action research

University faculty, who were collecting data throughout, as detailed below, spearheaded the initial stages of studying the process of doing action research on a programmatic level. As part of a larger qualitative study of the program, we were already collecting data about the residency and were able to use field notes and semi-structured interview protocols to support this study. Studying the action research process, however, grew organically from our work together as we wanted to better understand the role it played programmatically, as well as on an individual level. Both studies were qualitative, as we wanted to capture a dynamic, phenomenological process – the lived experience of teachers and residents as they enacted the process of action research and school change.

## Data sources

In order to understand how action research influenced the residents, mentors, and the program as a whole, we sought data from multiple sources in order to triangulate our findings. Data sources included: notes from four day-long workshops around action research, copies of the residents' original questions (which changed throughout the process), residents' data collection and analysis plans, notes and reflections during the action research process from residents, and first and final drafts of papers from both the mentors and the residents. Residents, mentors, and faculty wrote reflections to prompts about the action research process, which served as the basis for sections of the draft of this article. Finally, residents and mentors were interviewed as part of the larger study of the program and were asked to speak about the action research process specifically.

## Data analysis

We used Glaser and Strauss's (1967) constant comparative method as we coded the data for emerging themes and we paid close attention to themes we saw across narratives – both of the residents and the mentors. We coded sections individually and then came together to check our codes and discuss them until there was consensus on their meaning. Because we co-authored this paper, member checks were ongoing as we wrote together and wondered aloud “does this read true?” In addition we used the work of Anderson and Herr (1999) who suggest a number of validity frames for action research: outcome validity (is the project successful and does it allow the practitioner to “reframe the problem in a more complex way” (p. 16)). Process validity asks whether the processes “permit ongoing learning of the individual or the system” (p. 16). Democratic validity considers whether the research was done collaboratively with those who have a stake in the problem. Catalytic validity examines whether the process “reorients” the reality of the participants. Finally, dialogic validity asks if the research report went through a form of peer review.

## Writing together

Three residents and three mentors volunteered to write with the faculty and this narrative represents the voices of residents, mentors, and university faculty. Throughout, we weave the “we” and the

“I” voice depending on if we are describing the entire process of doing action research together or the individual project, although all sections have been written collaboratively. We describe three individual action research projects, their questions and their findings, before describing the larger implications and findings related to our research questions.

## Residents' action research projects

Although their questions varied, each resident wanted to know how to best improve their teaching and saw their students as important research collaborators. These factors resembled the essential principles of action research (Hubbard & Power, 2003). All studies had a significant degree of dialogic validity as we engaged in the analytical process collaboratively and participated in “critical and reflective dialogue” with other action researchers (residents) and critical friends (mentors and faculty) who were “familiar with the setting” and could “serve as devil's advocate for alternative explanations of research data (Anderson, Herr, & Nihlen, 2007, pp. 43-44). This dialogic validity continued when residents presented their findings in paper form to the faculty and to each other in class. The peer review was extended to include teachers from the university's network of partner districts when residents shared their action research at the annual summer conference. Below three residents, Suzanne, Alex, and Barbara, individually present their action research projects and their reflections on the research experience. The “I” in each refers only to the author of the section identified.

### Suzanne

My question was, “How can self-reflection and the incorporation of student feedback help to improve my practice and maximize the students' understanding of content?” I was interested in finding diverse pedagogical strategies that would help my students retain information and more deeply engage with the material. I engaged students as co-collaborators in this process and they provided multiple data sources around this question including daily exit tickets – both to assess their knowledge but also to find out how the lesson worked for them. I also wrote daily self-reflections and designed and implemented unit

assessments, using a spreadsheet to keep track of all of it. This process opened my eyes to the affect student and teacher reflections can have on classroom culture, student/teacher relationships, and classroom management.

I found that negotiating the curriculum empowered my students, creating a classroom of respect and participation. Many of the students described feeling a sense of ownership when they were asked to reflect and provide feedback on the lesson, something I was surprised by and which changed the dynamic in my classroom almost immediately. That ownership created a respectful classroom and increased participation. In addition, my own reflection on my teaching created more insightful lesson plans that included student suggestions (which also increased student sense of ownership). I think that it really challenged me on a very personal level; I needed to humble myself before I could even begin. It also was very difficult to self-reflect after each lesson and it is surprisingly much easier to ask students to reflect on their learning as well as my teaching than to honestly reflect on my own teaching. Collectively, the increased reflection on both our parts helped to create a classroom where negotiation of curriculum was possible and valued.

Allowing students to have a say in what happens in the classroom gave them motivation to take part in classroom activities and even assessments. Although this was a strategy discussed and promoted throughout my education courses, I only now understand how effective it really is.

In particular, we saw that Suzanne's project had democratic validity in how she co-constructed with her students, the very participants who were most deeply influenced by its outcome. This was part of what made it so effective and thereby gave it outcome and process validity. Suzanne was able to re-frame the problem as more than one of students' inability to succeed on standardized assessments (something we noticed in early discussions around the problem), but as one of engagement through student ownership of the curriculum. This re-framing came through the collaboration that took place during the action research process. There was a deeply personal

statement of learning about how she understood herself as a teacher in relation with her students (Taylor & Coia, 2009), and perhaps also as a person. The transformative, catalytic nature of action research seemed to emerge here in its nascent form.

### **Alex**

I asked, "What happens when you ask students to reflect on school related issues?" I wanted my students to think about their actions and be reflective about their performance within and outside class. I began to use class time to scaffold how to reflect on challenges they face in school and develop action plans for managing those issues. I saw this as an opportunity to explore something outside of the curriculum. I saw many students' grades were consistent throughout the year and I wondered that if, through learning to reflect on their challenges, they could progress in school and hopefully use the skill in other areas of their life. Realizing how much I myself rely on self-awareness, I wanted to nurture this quality in my students.

Conducting action research gave me an outlet to attempt to address some of the problems that I saw students faced that are unrelated to the curriculum. I realized that student reflections are an important means by which students can learn from their experiences and that students gain perspective on their challenges by discussing them with peers. In particular, it is through discussion of personally relevant challenges, students feel more interconnected. By conquering feelings of loneliness that come from these challenges, students are empowered to act on solutions. Finally, reflections on challenges can serve as an avenue of honest communication between students and teachers.

Through action research, I have learned how powerful reflection is as a tool for learning for both my students and me. I realized that addressing the whole student, aside from the content, is part of the work we should be doing as educators. That, combined with being transparent, helps students develop as more than just students and helps bridge the gap between traditional ideas of education and the world for both them and myself.

The process of doing action research was a challenge, however. I struggled initially with my question, partially because I did not know what the implications of engaging in certain kinds of research with students might be – what they might share with me and what I was willing to take on. Because my question dealt with student reflections and considering that I was opening the floor for students to examine issues that were important to them, I was also concerned with their safety and I was unsure what exactly to do with the data once I had them. In addition because it was outside the traditional curriculum my students and I had to negotiate many different aspects of the project.

Similar to Suzanne, Alex's study had democratic validity in that it involved students as partners in his study and it sought to give them some agency or empowerment over their experiences in school. In fact, his study went through a number of iterations brought on by experiences students brought to the classroom. Alex's action research had a social justice and ethical dimension, which echoes Anderson, Herr, and Nihlen's (2007) definition of democratic validity. In addition, Alex's study had outcome validity – he was able to help students develop action plans to address issues of importance to them, but it also had process validity in that he was able to see the larger role reflection played in affecting student's lives in and outside of school and also in connecting students to teachers.

### **Barbara**

My action research question emerged from my observations that freshmen students in my school were often unprepared for class and lacked effective study habits. I asked, "How will implementing a self-assessment rubric impact student awareness of their preparation/study habits?" and then designed a self-assessment rubric that invited students to reflect on their personal study habits. I was trying to incorporate goals and self-reflection into the fabric of my classroom so that it became a natural process for students.

By learning about my students and how they view their own academic preparation I have gained insight into the thought processes of adolescents

as they begin high school. Some of the most important insights I gained were that students honestly rated themselves and their personal habits and mentioned good grades as goals as well as identified areas needed for improvement. "A" students scored the highest while the low scorers struggled to maintain their grades. Low scoring students also spent a great deal of effort identifying missing work and handing it in before the deadline. Most students were able to connect their habits with their success in my class and it made me realize the importance of reflection as a tool to help students look at those habits.

I see that what and how I teach should take into consideration my students' goals as much as my own. My responsibility as a teacher is not to simply teach science; I am here to provide my students with the tools to succeed in school and beyond.

Again, we saw process validity in this study and to some degree catalytic validity. Barbara was able to reframe this as more than simply a way to help her students have better work habits, but it eventually helped her re-frame her role as an educator in the classroom to be "more than a science teacher." We saw less evidence of democratic validity (students responded to surveys but were not co-investigators beyond that) and outcome validity (there was not resolution per se to the problem, although there was increased information about it).

## **What we learned**

In this section we looked at data across projects as well as from the mentor teachers working with the residents to see how action research influenced the mentors' and residents' work as teachers in their schools. In addition, we highlight what residents and mentors learned about the process of doing action research.

### **Definitions of action research: The methodology of action research**

As residents engaged in action research, they began to formulate their own definitions. They described action research as a tool for reflective practice, a means of engaging students as co-researchers, and as a vehicle for professional

growth. This shift in understanding the power of action research was deeply influenced by mentors' emerging definitions. In an interview, Will, one of the mentors, said:

So I didn't know that action research was a strong tool in the classroom- and that's a big deal because it's actually something I do every single day, but didn't think about it in, I guess, a holistic way, because as a teacher you watch your students you see how they react to you and then you change based on that, right? But I've never known how purposeful I could be in that regard, to actually then literally collect that data, like, write it down and see what trends I can find in that. That was awesome. It just takes the classroom to a whole 'nother level.

The mentor experience had an important influence on residents, who also began to see the power of action research as a tool for professional learning. For residents, action research enabled them to examine and problematize the often chaotic moment-to-moment classroom experience. Barbara described action research as a way for teachers to test those questions that often pop into their minds – the “wonderings,” as they search for more effective ways to help students achieve success. She saw it as an action-based, do-now kind of research to help teachers delve immediately into the problem at hand, giving the teacher an opportunity to look at their practices with their own students. Suzanne defined action research as a way to build relationships with her students and involve them in her decision making about teaching practices. Action research made concrete coursework theories about being a reflective practitioner, teaching democratically, student-centered practice, and formative assessment.

These were methodological issues in many ways; the residents began to understand how to do action research and the structure of doing it helped them with the process of investigating questions in their classroom. Barbara noted,

I was naturally curious as a teacher about my students and what motivated them. These "wonderings" drove my curiosity and I worked out a method of collecting data that allowed students to answer my questions in

multiple formats to provide me with information that I could triangulate. Devising a plan of action was not difficult because I felt connected to the issue; I was invested in the question. Action research gave me a process to get information that I could use immediately to look at my teaching now, as well as, in the future.

In other words, using an action research framework provided the residents with a means to examine their teaching and learning theories and practices in the immediate, echoing one of the guiding principles of the residency program that the curriculum of pre-service teacher education needs to emerge from the experiences of teaching in the classroom. Doing action research, rather than another type of research methodology, nurtured teacher inquiry as an integral part of being a teacher.

### **Action research and agency**

Exploring their questions with the help of their students, residents began to understand they had power in improving their classrooms and that the actions they took had significant impact both in their students' academic performance and in their personal lives. Realizing they have the potential to be change agents echoes the Price's (2001) work on action research in pre-service teacher education. Our mentors made similar journeys throughout the year. As Will wrote,

Action research has helped to shed light on some of the assumptions I make about my own motivations, as well as my actual practice in the classroom. I see myself as a person that is devoted to reflection...about everything. However, I found that the action research process helped me to unpack the rationale behind my teaching practices. After that I had to examine my biases and think more critically about the necessary separation of my life and the lives of my students.

We saw similar commitments to growth, personal reflection, and classroom practice in the residents' experiences. As Alex reflected:

I have learned a process to research, enact changes in my classroom, analyze their value, and modify/explore new questions that have come about through this process. It is a tool that will aid me in my personal development as a teacher, giving me the means to be a

change agent and providing me with a process that I can teach students to explore, act on, and learn from their own questions, school related or not.

Will and Alex both illustrate the ways in which action research has the potential to become a tool for personal professional development, providing the teachers themselves with opportunities to take ownership of their learning process and engage as change agents at the same time. These reflections echo Check's (1997) statement that "by validating teachers as knowers as well as doers, teacher research can turn traditional professional development on its head, offering the possibility of major long-term changes that are generated by teachers themselves, based on their own investigations of practice" (p. 6).

For new teachers, action research became a tool for formative feedback as well as a means to guide them in learning about student understanding and increasing their own self-efficacy. Barbara, in particular, noted this, writing:

Self-reflection guides me as a person. Action research provides reflective feedback on my teaching technique, the classroom, and my students both as learners and individuals. I see action research as a tool that uses reflection to assess my classroom as a system that includes the physical environment (including the lessons), me as the teacher, and my students. Action research offers timely answers to the concerns that I have as a teacher now. I can assess our progress as a class, but what I learn today can guide my teaching for years to come.

Sometimes the self-reflection engendered by action research was a challenge for the residents; the process was occasionally painful and taxing as Suzanne's earlier statement about the need for humility, reminded us. Barbara similarly talked about sleepless nights and the feeling of being constantly engaged by her action research. She reflected, "My action research was extremely engaging, and that very fact became my biggest challenge. I found myself not wanting to put it down, like a novel that you read from start to finish in one sleepless night."

Programmatically, data about the impact of doing action research were extremely important as they suggest that it helps begin the process of building reflective practitioners and that residents saw this as a means of honing their practice based on data and not merely assumptions.

### **Shifting from traditional experimental research design to emergent findings**

It was not surprising residents struggled with the move from traditional experimental research design to emergent, qualitative action research. This was a struggle for the mentors as well, and led the faculty to realize the importance of first engaging mentors in action research. How could they support residents in a process that was epistemologically foreign to them? Karina, a mentor, wrote, "As a science educator I have grown accustomed to and comfortable with numbers as most of the research I have come to know has been grounded in quantitative methods. When I first heard about action research and its qualitative methods, I was skeptical as it was such a foreign concept to me." Will, another mentor, despite excitement, had similar concerns, and he wondered, "Uhm, this is research?? How do you measure and control for all of the variables? What is the value of this?"

The residents worried too about the shift. Alex expressed hesitation after years of being grounded in "controlled variables, quantitative data, and correlations. So when they said that we were going to do research in the classroom I was not sure how we would exactly accomplish that given that we would be dealing with actual students constantly with no means for controlling for variables." Barbara reflected, "With a scientific background it was a challenge initially to get my head around the validity of this type of research." Again, engaging mentors in doing action research prior to doing so with the residents yielded a stronger foundation for the work. Mentors had already undertaken a similar journey and spoke to residents with authority about the possibility of finding "validity" in the "soft" data of interviews, narratives, and observations. As residents struggled through the daily process of trying to figure out how to make meaning of emergent data, mentors acted as teacher educators, with an authority that came from their own experience.

The residents began to appreciate the richness of qualitative data. As Alex stated, “Although you may have ‘hard’ data to look at, I found that the most influential part for me were the qualitative data, specifically the student interviews and reflections.” This mattered for the residency because it meant that our residents and mentors were developing richer and more complete pictures of classroom data, not relying simply on one or two measures of assessment to understand the nature of classroom dynamics. Despite a programmatic stance around such portraits of students and classrooms, it was the action research that seems to have made a significant shift in the thinking of residents and mentors around this.

### **Action research needs a teacher community**

Central to the process of doing action research for all three residents was the opportunity to engage in the investigation as members of a learning community. From being able to share and develop questions, build data tools, or make sense of emerging findings, doing it with others both who had already completed an action research cycle as well as those who were active in the same work was important. Suzanne described the workshop days as useful because they provided a set time to discuss and plan with her mentor. Alex explained that during the workshops he was able to get advice and lay out the details of his action research plans with his mentor and peers. Originally, he was unsure about how he was going to carry out the research. But by talking it over, he got a better sense of potential issues he could run into when conducting his research, ways to prevent and deal with them, and how he could use the data to triangulate findings. Barbara also valued time spent in workshops because of the support offered by peers and mentor teachers with varying degrees of experience and where all had opportunities to share ideas. Working with her mentor was particularly helpful, because it provided a way to look at her classroom from another perspective. Not only could she offer her experience as an action researcher, her mentor was an “insider” who knew the actual students and unique classroom dynamics. Mentors emerged as key supports in this community, helping residents in the process both at monthly workshops and in

the daily ways residents struggled to implement their projects.

Communities of practice also offer specific tools to provide support in a community (Wenger, 1998) and we made use of a number of graphic organizers to help residents organize the research process (see Figure 1). As Will noted, graphic organizers were particularly helpful in activities that require one to examine internal processes. This is especially important when having to assist someone else in his deconstruction and construction of a process. In that respect, Will described enjoying helping his resident think about his action research; it became a way for them to share various assumptions and reflections on the groups of students they co-taught. The tools became pathways into both the research and practice, but also into community. As Will reflected, “It is ironic. Two teachers, teaching the same students, supposedly in continuous reflection about their co-teaching practices (we are always together and talking) yet still able to learn new things about each other through a graphic organizer.”

### **Action research and teacher leadership**

The move towards agency that emerged as residents began to see action research as a tool for classroom change was magnified at the level of the mentors, who saw action research as a tool for school change. Because the mentors had engaged in action research as teachers and mentors, they emerged as teacher educators and teacher leaders in co-facilitating and in some cases leading this work. Meshelle, a mentor, wrote that her goal was:

...to take what I have learned as a first year mentor and transfer it to future leadership roles. Ultimately, my philosophy is that as teachers, we have a responsibility to be the best leaders for our students. Consequently, as a mentor, I have to show my residents how to lead effectively in pedagogy, mannerism, and preparation.

Action research with her resident became a form of leadership. There were interesting indications that perhaps this also had impact beyond their individual classrooms. Karina specifically began to see the impact on a larger scale, writing “Not only do I see action research as a re-occurring and ongoing process in my classroom but I also see it

Prompts	Questions	January, 2012
What?	What is the inquiry? What is (are) the research-able question (s) /puzzle here? What are the <b>supporting questions</b> /puzzles?	
Why?	What is the background or rationale of the research? Why are you/the researcher interested it? What motivates you?	
Who?	Who will be the participants in your study? What role if any will colleagues play in the study?	
How?	What data are relevant to the research questions? How do you the researcher plan to collect them? How will you the researcher analyze them?	
So What?	What data are relevant to the research questions? How do you the researcher plan to collect them? How will you the researcher analyze them?	

Figure 1: Action Research Framework (adapted from Anderson, Herr, & Nihlen, 2007).

as a strategy I can use within my department and school. By providing my colleagues with information, support and guidance in doing action research, I believe the school community will benefit greatly.” Her response echoed Darling-Hammond’s call to create “new schools” because “traditional schools provide few incentives to support the efforts of teachers who are willing to look for the answers to the knottiest problems of teaching and learning . . .” (1998, p. 169). Because one of the goals of the NMUTR is to enact school-

wide change in math and science teaching, it is an intriguing possibility that engaging mentors as teacher leaders in the process of action research may activate this process.

### Conclusion

Doing action research as a part of the NMUTR has been significant for all of us on multiple levels. For the residents, it has changed our notion of how we learn as teachers. We understand that to be teachers of inquiry we have to be inquirers of teaching and learning. Now, we define action

research as a personal platform for teacher exploration and development that involves researching, taking an action, collecting data, analyzing that data, and then exploring a new question. We now have more questions, not fewer, and we see that these questions can both bring us closer to our students and make us better as teachers.

As mentors and faculty, we saw the value of engaging mentors as the primary teacher educators in this process. In doing so, mentors also re-established themselves as teacher leaders, an important part of building our urban teacher residency. This process is becoming part of school-wide change effort in science education and we believe has the potential, through teacher leadership, reflective practice, and agency, to become a source of district-wide renewal.

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