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Becoming an Urban School Middle-Level Science Teacher

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Abstract

The purpose of this case study was to document the journey of three novice career change science inductees as they became middle-level science teachers in urban low socioeconomic status (SES) schools and included post-internship employment status data on all nine science teachers who completed the alternative certification program, up to the time of this writing. All teachers participated in a fast track master's alternative certification degree program and received in-depth education coursework and mentoring. Results indicated that support (i.e., administrative, parents, mentors) and teachers' beliefs about their students' capabilities may affect their effectiveness in urban, low SES middle-level science classrooms.

Urban middle school science teaching presents a complexity of issues for the novice (beginning) teacher. First, the beginning teacher must learn to orchestrate effective teaching and learning strategies in urban school settings. Urban schools have often been characterized as places that have a number of inequities (Cardenas, 2000; Hoff & McCarty, 1985) and low levels of student interest and motivation to learn (Tobin, 2001). In addition, novice teachers may face challenges in teaching middle school learners. That is, teaching at the middle level can be daunting. The National Middle School Association (NMSA) states that "teachers should understand the developmental uniqueness of young adolescents and should be as knowledgeable about their students as they are about the subject they teach" (1995, p. 13). Beginning teachers must also learn how to effectively teach school science. A person who has had success applying academic knowledge, skills, and experiences using mathematics and science in the real world does not necessarily mean that he or she will translate the knowledge and experiences to a successful middle-level teaching career. Shulman (1986) argues that teachers also need "pedagogical content knowledge," which he describes as knowledge that goes beyond understanding of the content to understanding the dimension of the subject matter for teaching. Taken collectively, these challenges may seem almost insurmountable for even veteran middle-level teachers.

Improvements in middle school mathematics and science teaching are needed, and getting more qualified teachers into these schools is of the essence. Teachers without teacher preparation courses tend to feel inadequate to teach and are not sufficiently prepared to handle the details and intricacies of diverse student populations, classroom management, and student assessments (Darling-Hammond, Chung, & Frelow, 2002). Ball (2003) succinctly states, "We cannot afford to keep re-learning that improvement of students' learning depends on skillful teaching, and that skillful teaching depends on capable teachers and what they know and can do" (p. 1).

This article reports case study findings of three career change teachers in a fast-track (one-year) middle-level mathematics and science master's degree program, which provided the education academic coursework and internship experience as they transitioned from the business world to middle-level mathematics and/or science teaching and employment data for all science teachers who completed the program.

Theoretical Framework

There is increased interest in getting qualified teachers of mathematics and science into the K-12 classroom setting, and urban middle school science teaching has been an area of tremendous need for improved mathematics and science instruction. Jerald (2002), referring to an educational trust data analysis conducted by Richard Ingersoll, reports that out-of-field teaching is too pervasive and the impact on middle schools is detrimental. Prospective teachers at the middle school level need to understand the unique nature of middle school teaching. Brand and Glasson (2004) have reported that there are various areas of tension that have complicated middle-level teaching, among them, and probably most important, is understanding the characteristics of the young adolescents and their educational needs. Research by Laczko-Kerr and Berliner (2003) suggests that subject matter knowledge is important but not the only factor in a certified teacher's success with mathematics and science students in the upper grades. Teachers need to understand the developmental characteristics of the middle-level students they teach (NMSA, 1995). Couple the need to understand the developmental characteristics of the middle-level learner with the context of urban low SES schools, and the urban middle school science teacher must acquire substantial knowledge and skills to orchestrate effective teaching and learning experiences in these settings.

Most urban school settings have a large diverse student population, and many of the students are from low socioeconomic backgrounds. Hence, middle-level science teachers, in many cases, must orchestrate teaching and learning in an environment that is culturally and economically much different from their own. Connell (1994) makes the following observation: "Poor children are, generally speaking, the least successful by conventional measures and the hardest to teach by traditional methods" (p. 125). Atwater (1994) adds . . .

> Diversity in the classroom is both a challenge and an opportunity. It is a challenge because our knowledge and skills for effectively teaching diverse student populations has not kept up with the influx of students we need to serve. It is an opportunity to teach about the joy of experiencing a variety of cultures and languages and of respecting people. (p. 560)

Novice teachers transitioning to education are faced with a host of complex issues, including their own beliefs about teaching and learning. Teachers' beliefs are important as they relate to their teaching practices. In science education, a plethora of research exists on teachers' beliefs about learning and their instructional practices (Brickhouse & Bodner, 1992; Cronin-Jones, 1991; Nespor, 1987; Pajares, 1992). Haberman (1991) describes a "pedagogy of poverty," which, he argues, is pervasive in urban teaching. Pedagogy of poverty is characterized by a series of teaching acts (e.g., giving information, asking questions, giving directions, making assignments, monitoring seatwork, reviewing assignments, giving tests, reviewing tests, assigning homework, reviewing homework, etc.), which are often performed to the exclusion of inquiry and problem solving experiences.

Middle-level urban science teachers are expected to effectively lead and guide science teaching couched in an understanding of urban teaching, middle school learners, and teaching school science. Science as taught in our public schools is defined in a Western world view of science (AAAS, 1989, 1993; NRC, 1996). Teachers must be able to encourage students to explore the nature and meaning of science and make the necessary connections to bigger science ideas. Atwater (1994) states, "In order to have a scientifically literate society, it is necessary for all students to understand science concepts. Many factors influence science learning. Some are related to the student, others to the teachers. Both cognitive and affective characteristics of students determine how and what they learn. Ways of knowing, styles of learning, and prior knowledge and skills interact" (p. 561).

We need more qualified, competent, and prepared middle-level science teachers who can successfully negotiate the complex terrain of urban teaching. To be successful urban teachers, these novice teachers need high-quality education programs that provide substantial mentoring support. Teachers that emerge from high-quality preparation programs are more likely to remain in teaching (Darling-Hammond et al., 2002).

Schools are complex social environments. Connell (1994) argues, "Nobody is content with the state of urban public schools, least of all the people who work in them" (p. 396). Given the often lusterless portrayal of urban schools and their challenges, novice teachers must be given appropriate preparation and substantial support as they transition to urban middle-level science teaching. The focus of this article is on three urban teachers' classroom experiences, factors that contributed to their successful transition to middle-level teaching, and post-program employment data on all science teacher graduates of the program.

Program Description

This alternative certification program was a partnership between a local large urban school system and a college of education. The program began in 2003-2004 and is now in its third year; it has graduated approximately 25 career change, novice teachers. Ten of the career change novice teachers were certified in science. When this study was completed, nine of the ten novice teachers who completed the program had transitioned to K-12 science teaching. There were six novice science teachers in the 2005-2006 core group.

The recent review of alternative certification literature revealed that it lacks a clear definition of what constitutes an alternative certification program (Zeichner & Conklin, 2005). Hence, in the research literature, alternative certification programs occur in a wide array of structures and models. This alternative certification program accepted novice teachers into a one-year (36-semester-hour) master's of arts in science or master's of arts in mathematics program with a paid internship. The novice teachers began the program during the summer and completed nine semester hours followed by nine semester hours of coursework in both the fall and spring while they taught one academic school year as either a full-time teacher or shared a teaching internship position with another student in the program. The following summer, students completed program coursework requirements and presented a capstone (portfolio and presentation), which provided evidence that they had met the Florida Educator's Accomplished Practices. At the same time that teachers completed courses and internships, they obtained a certificate of eligibility from the state department of education. In order to obtain the certificate of eligibility, students had to have a bachelor's degree and either have passed the mathematics or science subject area examination or completed the required coursework stipulated on their college transcript. Completion of these requirements meant that the student was considered *highly qualified* and hirable by a school district.

Teachers in the program received mentoring from several sources. First, *schools* provided mentors to the novice teachers. According to the school, the amount of mentor support novice teachers received varied, but, ideally, mentors were sought who would meet with novice teachers regularly and model effective instructional practices in mathematics and science teaching. Additionally, in this school system, the curriculum resource teacher, instructional coaches, or administrators could assist in mentoring novice teachers. In addition, the *university* provided an internship supervisor. The university supervisor attempted to meet with each assigned intern bimonthly and provided feedback on observed teaching lessons and mid-term and end-of-semester evaluations. Teachers in the job-share positions often had the same school-based mentor who provided instructional support. Teachers in this program also completed all or most of their coursework together and often provided peer support and peer mentoring to each other.

In sum, teachers completed a 36-hour master's program while teaching either full-time or part-time in a paid internship. To support teachers transitioning from the business world to middle school mathematics and/or science teaching, a multilayered mentoring system was provided.

Methodology

A case study method was used to investigate three novice science teachers' classroom practices as they transitioned to middle-level science teaching in urban low socioeconomic status middle schools. Three purposefully selected case studies that illuminate emergent themes from teachers' journals, observations, interviews, and field notes are presented in this article. Case study analysis is followed by a table that shows the employment status and subject area for each teacher who completed the program and transitioned to the K-12 school setting.

Yin (1989) offers a technical definition of the term *case study*: "A case study is an empirical inquiry that (1) investigates a contemporary phenomenon within its real-life context; when (2) the boundaries between phenomenon and context are not clearly evident, and (3) in which multiple sources of evidence are used" (p. 23).

A case study was an appropriate methodology for this research because it provided the framework for the inclusion of multiple sources of data couched in a real-life context (i.e., urban middle school science classroom). The researcher was able to observe the novice teachers as they interacted in the complexities of the urban classroom. This alternative program was in its third year at the time this study was completed, and all of the novice science teachers presented in this article transitioned to science teaching positions.

There were multiple sources of data compiled throughout this case study research. Extensive rich field notes and observations of teachers' classroom instructional practices were documented. The field notes were collected over a period of one year from September to May for each cohort group. Classroom visits ranged in length from 45 minutes to an hour each. In addition, teachers' journals were read and read again to ascertain insights into their perceptions of their classroom practice and experiences. A mid-year interview was also conducted through which novice teachers communicated their perceptions about the student internship experience and opportunities they needed to work on during the second half of the school year.

All narrative descriptions of field notes were examined and re-examined for researcher bias. Miles and Huberman (1984) stated, "The researcher must be careful not to jump to hasty impartial and unfounded conclusions" (p. 21). Hence, to add to the trustworthiness of assertions presented, the researcher triangulated findings across multiple sources of data.

Teacher Participants

Three case studies were representative of teachers in the program in that two of the teachers were successful in their original placement and one teacher had to be reassigned to another school to complete her internship. All three teachers successfully completed the program in one year.

Paul (pseudonym), a white male, taught middle-level science full-time in the same urban school district, low SES school in which he did his internship. He was in his early 40s and had a terminal degree in plant biology. It is unusual to have an applicant with a terminal degree enter the program, but Paul wanted to move back to Florida, which is his home state, and this program provided an opportunity for him to make the transition. The school where he worked had a student population of about 90% Latino, and approximately 85% of the students were on free and reduced lunch.

Amelia (pseudonym), a black female, taught middle-level science full-time in her second placement school. She was in her late 30s and had a bachelor's degree in biology. Amelia was successful in her second internship placement. This school was over 90% Latino and was located in a large urban school district. Approximately 90% of the school's students were on free and reduced lunch; whereas, her first placement was in the same school district, and its demographics were approximately 35% African American, 45% Latino, 19% Caucasian, and 1% Asian/other.

Kathy (pseudonym), a white female, taught middle-level science full-time in the same urban school district, low SES school in which she did her internship. Kathy was in her early 30s and had a bachelor's degree in chemistry. Kathy and Amelia were at the same school, and Kathy served as a mentor to Amelia. Kathy was a graduate of Cohort One (2003-2004), and Amelia was a graduate of Cohort Two (2004-2005).

Data Analysis

The following themes were validated through a triangulation of findings using multiple data sources: field notes, observations, teachers' journals, and interviews. The rich descriptive case studies of selected teacher participants were completed by analyzing all qualitative data sources for emergent themes and patterns.

The narrative descriptions of transcribed data were analyzed to determine the main themes and patterns that emerged across participants' data. Narratives were read and re-read for similarities and differences and sorted into categories. This iterative process (Strauss, 1987) resulted in the three case study narratives.

The interpretation of case studies was situated in Creswell's (1994) and Yin's (1989) perspectives. The case study is an exploration of a bounded system over time that includes data collection involving multiple sources of content-rich information (Creswell, 1994). In this case, the sources of information included all of the sources listed above. The foci of the case studies were on the teachers' classroom instructional practices. The intent of these case studies was not to generalize as portrayed in a quantitative paradigm, but it was more a naturalistic generalization (Stake, 1995). Therefore, there was not an attempt to generalize, yet "people can learn much that is generalizable from single cases" (Stake, 1995, p. 85).

Results

Findings of this research suggested two important themes relevant to the focus of this article: (1) It was important that the novice teachers believed in the capabilities of their students to achieve and that they demonstrated that belief and (2) Novice teachers expressed the importance of having substantial support (e.g., administrators, parents, and mentors) during their first year of teaching in urban low SES middle schools.

Classroom Practice

Paul was one of the few teachers who consistently used inquiry, even though he had classroom management challenges. Paul was also a former research scientist, so it is probably expected that he would get his students involved doing inquiry early in his internship experience. In fact, he was observed the first month of school having students inquiring into plant growth and analyzing the pH of different soil types. Observations of Paul's class discussion in September of 2004 followed this questioning pattern:

- Compared to the control, do you see a difference in plant A?
- What did you predict?
- What part of the scientific method is it?
- Can you tell me the variables? Okay, can you tell me what the red cabbage juice is?
- So, what is an indicator? Okay, tell me what the pH of each chemical is.
- Let's have more discussion about pH.

Paul's instructional style was to guide students to the desired responses through questioning, and he would extend students' conceptions of the topic by involving them in more in-depth discussions. Paul demonstrated that he thought that the students were capable of thinking about their learning and assisted that process both during classroom instruction and an outside science fair project. In his journal, he wrote the following: "I am so proud of all the students who participated [referring to the science fair project]. I talked with several of the judges, and they said that, in general, my students lacked completeness and thoroughness in their projects. I take full responsibility as their instructor and need to improve on this aspect for next year" (January 2005).

Paul did not doubt that the students were capable, but they needed more in the way of instruction from him. Paul planned well for science instruction, but in spite of very good planning, student challenges were evident. In another journal entry, he wrote about events of the day:

> Unfortunately, the students had another agenda. Teaching the materials became less important than maintaining class control. During my fifth

> period, students became disruptive; they dared me to call an administrator and get control of the class. So I did. I called an administrator in and had three students removed and placed in in-school suspension. It made a tremendous difference in the rest of the class. It's great to have this administrative support (February 2005).

During classroom observations, Paul often complimented the school administrators for the support he received. Although Paul still had some classroom management challenges over the period of his internship, he was observed providing consistent, meaningful instruction to all of his students and growing in his classroom management skills. Paul believed that the administrative support he received and his consistent science instruction in which he engaged students were important to his success in completing his internship.

Amelia was now in her second internship placement. She had both classroom management and administrator challenges at her first school placement, so it was decided by the program managers, in conjunction with the school principal, that it would be better to move Amelia to a different school. It was agreed that she had good instructional skills and deserved a second chance. The second school placement worked out well for Amelia, and she was positive about what to expect at her new assignment. In her journal, she wrote, "The transition was not easy, but I do not have any preconceived ideas about my new school . . . . It was a situation where the principal wanted it to work, and I desperately wanted it to work. I was unemployed" (January 2005).

Amelia realized she needed to go to her new placement with positive expectations for herself and her students. She was unemployed and wanted another chance to try and succeed. She stated, "The students have accepted my routine. They know what is expected of them every day, and I try to make class interesting" (January 2005). During previous mentor-mentee conversations with Amelia, she often blamed the students for not wanting to learn. Additionally, during previous written reflections, she would not self-reflect on her own practice. Amelia tended to stand and lecture a lot, but she soon realized that this method of instruction did not work for her. She began to engage students more in the lessons. For example, instead of just showing a video about force and motion, she had students experience Newton's laws on force and motion using different activities, toys, and equipment (January 2005).

Amelia also was thankful for the support she received, not only during the transition but while at her new school. She commented, "I still struggle with my last period. This is the end of the day, and they are tired. . . . There is a leader, and he just sets off the other students. . . . As soon as I have made contact with the parents, the disruptive student becomes putty in my hands" (February 2005). Amelia has made substantial progress in increasing her expectations for students' learning by having them involved in the learning process; managing the classroom; and communicating with administrators, parents, and students.

Kathy was in the first cohort (2003-2004) and demonstrated essential classroom management skills early during her internship. She stated clear expectations for students and was very consistent. During a mid-year interview, she stated, "My mom is a teacher, so I might have picked up some things from her" (December 2003). Kathy was responding to an interview question about her obvious strong classroom management skills. Kathy's teaching style was more discussion-based, and she called on students to participate during different parts of the lesson. She did laboratory activities directly from the lab manual and did not tend to use inquiry much at all, yet she did use substantial hands-on activities during science instruction. She shared a teaching position her first year with another teacher in the program. Kathy stated this model worked well for her, and she and her partner tended to mentor each other. Kathy demonstrated such strong mentoring and leadership attributes that she provided mentoring to Amelia and other teachers at her school in the alternative certification program. During year two, Kathy was asked by the principal to take over leadership of the science team. The principal supported her growth as a teacher and completely funded her attendance at the 2005 National Science Teachers Conference along with two of her other colleagues. There have been several other teachers in the program who demonstrated similar strong teacher characteristics and have been equally successful. The key, said Kathy, "was to have high expectations and be consistent—that's what I do" (December 2003).

For each teacher, the depth of instructional support needed varied, yet it was important to the success of these novice teachers that they received support from various school community members and college professors. Additionally, all of the teachers realized that their perceptions of students' capabilities and their interactions with them were probably important to the successful completion of their internship experience. The next section summarizes teacher participants' employment status and teaching assignment when this study was completed.

Status of Alternative Certified Science Teachers

Name (pseudonym)	Employment Status	Subject
Saul	Same middle school	Science
Florence	New middle school	Science
Kathy	Same middle school	Science
Amelia	Same second placement	Science
Diane	New school (private)	Science
Joyceline	New school (rural)	Science
Paul	Same middle school	Science
Joshua	New high school	Science
Betty	New elementary school	Core subjects

First, based upon follow-up telephone conversations and/or employer contacts, we learned that all of the nine teachers who completed the program were employed. Ins addition, four of the nine teachers are at the same schools in which they completed their internships. The fact that these teachers returned to the same school per the request of the principals served to provide additional support for the perceived success of these teachers. Of the five teachers at new school placements, the reasons given for the change in placements varied. Florence moved back to her hometown area, which was in a different part of the state; Diane and Betty took jobs closer to their homes; and Joyceline and Joshua were not asked back to their previous school placement but were able to find employment in other middle and high schools. Joshua obtained employment at a high school in the same school district where he completed his internship. Six of the nine teachers were still teaching in urban school settings.

Discussion

Teachers' beliefs are important as they relate to their teaching practices, and there exists substantial literature on teachers' beliefs and practices (Brickhouse & Bodner, 1992; Cronin-Jones, 1991; Nespor, 1987; Pajares, 1992). All three teachers consistently focused on students learning important science concepts. Research supports that teachers' expectations for students' learning matters (Darling-Hammond, 2003). Additionally, teachers had classroom instructional support from an array of sources. Paul focused on the strong administrative support he received at his school, and Amelia stressed the mentor support she received from university faculty in making the transition to her new school as well as the principal's support. Kathy was not in need of substantial administrative support with classroom management. She already demonstrated strong classroom management skills, but her principal fully supported her professional growth as a teacher, and she grew as a mentor to other teachers. Finally, to the delight of the program principal investigator, all of the nine teachers were teaching science, either in a high school, middle school, or elementary school setting. Of the science teachers who completed the program, all of them (100%) were still teaching science.

Researchers have voiced concern about the quality of middle school science teaching and teachers, and novice teachers often reported feeling unprepared to teach and not sufficiently prepared to handle the details and intricacies of diverse student populations, classroom management, and student assessments (Darling-Hammond et al., 2002). Although some of these novice career change teachers had classroom management challenges, they did feel that they were supported, and in part, this may have contributed to their success. Additionally, as Ball (2003) succinctly states, "We cannot afford to keep re-learning that improvement of students' learning depends on skillful teaching, and that skillful teaching depends on capable teachers and what they know and can do" (p. 1).

This article presented some details of an alternative certification program, which provided education coursework and mentor support to career change novice science and mathematics teachers and data on the actual classroom experiences of three novice career change teachers. These novice teachers' success as middle-level teachers was linked to their beliefs about the capabilities of their students to learn science and the support they received as they transitioned from the business world to middle-level science teaching.

Conclusions

These case studies of the novices' journies in becoming middle-level science teachers are important. As the number of teachers needed to teach science increases in 21st century schools, we will need to recruit teachers from an array of professions in addition to current traditional education programs. Hence, more research on successful second career teachers in science education is needed. We can learn much from the stories of these three teachers as they transitioned from the business workplace to teaching. Their experiences may provide guidance as we develop teacher preparation programs that better facilitate the transition of career change teachers to education and help them become effective urban middle-level science teachers.

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References

American Association for the Advancement of Science (AAAS). (1989). *Science for all Americans.* New York: Oxford University Press.

AAAS. (1993). *Benchmarks for science literacy.* New York: Oxford University Press.

Atwater, M. (1994). Research on cultural diversity in the classroom. In D. Gabel (Ed.), *Handbook of Research on Science Teaching* (pp. 558-576). New York: Macmillan.

Ball, D. L. (2003). Mathematics in the 21st century: What mathematical knowledge is needed for teaching mathematics? Available online at www.ed.gov/inits/mathscience/ball.html

Brand, B. R., & Glasson, G. E. (2004). Crossing cultural borders into science teaching: Early life experiences, racial and ethnic identities, and beliefs about diversity. *Journal of Research in Science Teaching, 41*(2), 119-141.

Brickhouse, N., & Bodner, G. (1992). The beginning science teacher. Classroom narratives of convictions and constraints. *Journal of Research in Science Teaching, 29,* 471-485.

Cardenas, J., & McCarty, J. (1985). Children at risk. *Educational Leadership*, 4-7.

Connell, R. W. (1994). Poverty and education. *Harvard Educational Review, 64(2),* 125-149.

Creswell, J. W. (1994). *Research design*: *Qualitative & quantitative approaches.* Thousand Oaks, CA: Sage.

Cronin-Jones, L. (1991). Teacher beliefs and their influence on curriculum implementation. Two case studies. *Journal of Research in Science Teaching, 28*, 235-250.

Darling-Hammond, L. (2003). Keeping good teachers; why it matters; what leaders can do. *Educational Leadership, 60,* 6-13.

Darling-Hammond, L., Chung, R., & Frelow, F. (2002). Variation in teacher preparation: How well do different pathways prepare teachers to teach? *Journal of Teacher Education, 53*, 286-302.

Haberman, M. (1991). The pedagogy of poverty versus good teaching. *Phi Delta Kappan, 73*, 290-294.

Hoff, D. J. (2000, September 6). Gap widens between black and white students on NAEP. *Education Week*, *20*(1), 6-7.

Jerald, C. (2002). *All talk, no action: Putting an end to out-of-field teaching*. Washington, DC: The Education Trust.

Laczko-Kerr, I., & Berliner, D. (2003). In harm's way. *Educational Leadership, 60*(8), 34-*39*.

Miles, M., & Huberman, A. M. (1984). *Qualitative data analysis: A sourcebook of new methods*. Beverly Hills, CA: Sage.

National Middle School Association (NMSA). (1995). *This we believe: Developmentally responsive middle level schools*. Columbus, OH: Author.

National Research Council (NRC). (1996). *National science education standards*. Washington, DC: National Academy Press.

Nespor, J. (1987). The role of beliefs in the practice of teaching. *Journal of Curriculum Studies, 19,* 317-328.

Pajares, M. F. (1992). Teacher's beliefs and educational research: Cleaning up a messy construct. *Review of Educational Research, 62*, 307-332.

Shulman, L. (1986). Those who understand. Knowledge growth in teaching. *Educational Researcher, 15*(2), 4-14.
Stake, R. E. (1995). *The art of case study research.* Thousand Oaks, CA: Sage.
Strauss, A. L. (1987). *Qualitative analysis for social scientists.* Cambridge, England: Cambridge University Press.
Tobin, K. (2001). Learning/knowing how to teach science in urban high schools. *Educational Horizons, 89*, 41-44.
Yin, R. K. (1989). *Case study research: Design and methods.* Newbury Park, CA: Sage.
Zeichner, K. M., & Conklin, H. G. (2005). Teacher education programs. In M. Cochran-Smith & K. M. Zeichner (Eds.), *Studying teacher education: The report of the AERA panel on research and teacher education* (pp. 545-735). Mahwah, NJ: Lawerence Erlbaum Associates.

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