Examining Incoming Identities in an Alternative Certification Program in Mathematics and Science

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In response to the shortage of qualified secondary mathematics and science teachers in the United States, alternative certification programs (ACPs) are proliferating. This study used identity as a theoretical lens to examine the incoming identities of 19 participants with post-baccalaureate degrees who entered an ACP. Within this cohort, the participants' incoming teacher identities ranged from "Always a Teacher" to "Late Deciders" to "Career Explorers." Participants held multiple non-teaching identities, some which supported their teacher identities (e.g., parent, tutor) while other identities (e.g., college instructor) created tension. Implications include recommendations for alternative certification program development and further research.

Keywords: Alternative Certification, Identity, Secondary Mathematics Education, Secondary Science Education

INTRODUCTION

The United States faces a growing demand for teachers, with at least two million new teachers needed by 2010. This demand is due to the aging of the current teaching force, class-size reduction initiatives, and teacher attrition (Feistritzer, 1999; Haberman, 2001; Hussar, 1999; Schaefer, 1999; U.S. Department of Education, 2001). Concerns about the availability and quality of teachers, especially in the areas of mathematics and science, have led many states to develop policies encouraging the development of alternative certification programs (ACPs)—"teacher education programs that enroll noncertified individuals with at least a bachelor's degree offering shortcuts, special assistance, or unique curricula leading to eligibility for a standard teaching credential" (Adelman, 1986, p. 2). The development of ACPs creates new opportunities and new challenges for institutions of higher education, because the backgrounds of individuals entering ACPs tend to be markedly different

from traditional undergraduate students (i.e., students completing a 4-year undergraduate program). However, little is known about the backgrounds of individuals entering ACPs or how those backgrounds could impact the design of these programs. In this paper, we discuss how the incoming identities of the entrants to one ACP appeared to support or hinder the formation of a teacher identity, an identity that we view as critical in the process of becoming a teacher.

Background on Alternative Certification

In the United States, universities and state departments have developed ACPs to increase the available pool of teachers in high needs certification areas. Research has found that ACPs certify more ethnically diverse teachers than do traditional certification programs (Feistritzer, 1992; Shen, 1998). In addition, ACPs attract a higher percentage of males into the teaching profession. ACPs, by their nature, bring a large percentage of individuals into teacher education programs with work experiences in non-teaching fields (Shen, 1998). ACP teachers demonstrate a greater willingness to teach in urban or rural settings than traditionally certified teachers (Natrielo & Zumwalt, 1992). Thus, ACPs have increased the number of mathematics and science teachers and placed a large

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proportion of these teachers in urban settings (Shen, 1998). Chin and Young (2007), in a large-scale survey of ACP teachers (grades K-12), used cluster analysis to identify six general profiles of individuals entering ACPs in the state of California: (a) compatible lifestylists, (b) working-class activists, (c) romantic idealists, (d) followers in the family tradition, (e) second-career seekers, and (f) career explorers.

Despite differences in demographic backgrounds and experiences of individuals entering ACPs, little is known about the nature and design of ACPs (Zeichner & Conklin, 2005). Scribner (2005) found that some ACPs placed ACP teachers in the same teacher education courses as traditionally certified teachers, leading to questions about how the potentially differing needs of ACP participants and traditional students could be met in the same courses. At our institution, we designed our ACP as a separate program from our undergraduate teacher preparation program. Though we found the demographic background literature on ACPs interesting, it provided little guidance for designing a program.

Theoretical Considerations

The social theory of learning proposed by Wenger (1998) is a useful tool for examining teacher learning. According to Wenger, learning involves participation in a community of practice (Lave & Wenger, 1991). This process includes four components: learning as experience (meaning), learning as doing (practice), learning as belonging (community), and learning as becoming (identity). Identity is a "way of talking about how learning changes who we are and creates personal histories of becoming in the context of our communities" (Wenger, p. 5). In Wenger's view, identity is not merely a label, but part of lived and negotiated experience. Identity is both individual and social. It affects and is affected by the process of membership in a community of practice. Identity is also a learning process, "a trajectory in time that incorporates both past and future into the meaning of the present" (p. 163). According to Gergen and Gergen (1983), "one's present identity is a sensible result of a life story" (p. 255).

Various theories of identity, related to the social formation and interactions of individuals, help to understand Wenger's views. For example, Goffman (1959) framed identity within an acting metaphor. He proposed that individuals present different identities, in the form of masks, as they perform for others. This performance is not a conscious act (Ivanic, 1994) but happens naturally as individuals act out various identities in different contexts. The performance metaphor suggests that individuals possess a complex set of identities defined in part by society, rather than one true identity. This conception of identity is illustrated in the life story of Robert (Tierney, 1993), a 40-year-old Native American gay faculty member with AIDS, whose various identities were often forced to be segregated in his life. As described by Gergen (1991), the postmodern notion of "relational realities" of self has replaced the romantic ideal of the individual self.

Educational researchers have applied various perspectives on identity to researching teacher learning in teacher preparation and classroom settings. For example, Marsh (2003) described the learning of two early childhood teachers as the negotiation and shaping of identities. Abell (2000) examined the negotiation of identities that occurred when university and school-based colleagues co-taught science in an elementary school. Danielewicz (2001) posited that becoming a teacher involves adopting a teacher identity. She demonstrated how developing a teacher identity was facilitated or constrained by other identities and developed pedagogy for teacher preparation that focused on identity formation. In a study of a beginning chemistry teacher, Volkmann and Anderson (1998) described the tensions that occurred in transitioning from student to teacher identities. Likewise, researching the case of a preservice secondary mathematics teacher, Travers (2000) found that the shift from student to teacher identity was essential for one teacher's development. Helms (1998) described the role that subject matter played in shaping the personal and professional identities of 5 middle and high school science teachers.

Thus teacher education researchers have recognized the development of teacher identity as a dynamic process involving multiple influences (Cooper & Olson, 1996; Knowles & Holt-Reynolds, 1991). However, identity frameworks have yet to be applied to understanding teachers in alternative certification programs. We believe that the use of an identity framework in understanding ACP participants is particularly compelling. We hypothesize that these nontraditional teacher education students have a variety of life histories that have shaped their identities, and that these multiple identities are relevant to the development of teacher identity within a community of practice. This study is a first step in applying an identity framework to understanding participants in alternative routes to teacher certification; we wanted to understand participants' personal histories of becoming in other communities of practice in order to understand their developing identities as teachers.

We believe mathematics and science teacher education programs cannot be successful unless they have the power to support the development of professional identities. When we began the study, we anticipated that teacher candidates would come into the ACP with established mathematics or science-related professional identities. We believed these individuals

would need to develop new identities as teachers and reconcile these identities with their former professional identities. Our research questions focused on the following:

1) What are the incoming teacher identities of the participants in an ACP?

2) What other identities do the participants bring to the ACP and how do these identities relate to the participants' teacher identities?

METHODS & ANALYSIS

This is an intrinsic case study of the incoming identities of post-baccalaureate participants who entered an ACP at a large midwestern university in the United States. The case is intrinsic in that the researchers sought to understand the identities held by this particular cohort of participants (Stake, 2000). All 19 individuals (9 males and 10 females) in the cohort agreed to participate in the study. The cohort consisted of 11 individuals seeking certification in mathematics and 8 individuals seeking certification in science. Data collection occurred throughout the 15-month program. Data sources included a 1-hour, semi-structured interview, application materials, and course artifacts, including autobiographies and on-line discussions. Prior to the interview, the participants completed a pie chart activity, indicating various components of their identities. The interviews, conducted in the summer they began the ACP, focused on professional and personal identities, perceived tensions between these identities, the decision-making process for entering the ACP, and follow-up questions relating to the autobiography and pie chart assignments. (See Appendix for the interview protocol.) The interviews were audio-taped and transcribed verbatim.

The first phase of data analysis involved data reduction of the interview transcripts (Miles & Huberman, 1994). As a team, the researchers read through several interview transcripts and inductively generated the following initial codes: decision to teach, personal identity, identity as a teacher, identity conflicts, supporting identities, confidences and worries related to teaching, metaphors for teaching, teacher roles, attitude toward content, teacher characteristics, and beliefs about others' perceptions. These codes were used to analyze a subset of the interviews. In this process, we eliminated some codes (e.g., attitude toward content) and collapsed other codes (e.g., teacher role and teacher characteristics became "image of ideal teacher"). After the initial analysis, the research team agreed upon the following inductively-derived codes: background and decision to teach, personal identities, teacher identity, confidences and worries related to teaching, image of ideal teacher, and metaphor for teaching. Next, each member of the research team coded a subset of the interviews. After coding an interview transcript independently, pairs of researchers met to compare coding and to co-author a descriptive summary profile of that participant.

We employed grounded theory techniques in the second phase of data analysis, generating theory inductively from the data (Glaser & Strauss, 1967). Working from the summary profiles, we used a constant comparative technique (Glaser, 1992) to develop categories of teaching identities and other identities. Each member of the research team analyzed the remaining data, including autobiographies, application essays and on-line course discussions for the same subset of participants. In this level of analysis, we were looking for confirming and disconfirming evidence. We refined the categories and described the dimensions of each category. To validate our interpretations, we invited participants to engage in member checking. All of the participants read the categories we generated and placed themselves within the category schema, providing a written rationale for their choice. Based on the results of the member checking, we further refined the categories.

DATA INTERPRETATIONS

We divide the findings into two sections in response to the guiding research questions. The first section focuses on the participants' incoming teacher identities (related to teaching grades 6-12), while the second section examines other identities that the participants held when they entered the ACP.

Teacher Identities Upon Entering the ACP

As participants entered the ACP, they varied in the degree to which they viewed themselves as middle/high school mathematics and science teachers. Three general groups of participants (see Table 1) emerged from the data analysis process: (1) Always a Teacher, (2) Late Decider, and (3) Career Explorer. These groups should not be viewed as distinct categories, but should be viewed as groups or clusters along a continuum of teacher identities.

Always a Teacher

Participants in the Always a Teacher group entered the ACP with teacher identities in place. We attributed these participants' teacher identity to several factors. These individuals knew from a young age that they wanted to be teachers. Sally's recalled that she knew in junior high school that she wanted to teach. She said, "It's what I thought I would always do. I would always be a teacher and a coach" (Interview, lines 39-40). Second, these individuals had experience as teachers in

Table 1. Incoming Teacher Identity Continuum

Groups	Participants
Always a Teacher	Diego (Science)
	Katrina (Science)
	Peter (Science)
	Sally (Science)
Late Decider	Alison (Math)
	Barbara (Science)
	Carla (Math)
	Candace (Math)
	Daniel (Math)
	Edie (Math)
	Gary (Math)
	Kelly (Math)
	Sharon (Science)
	Ted (Math)
Career Explorer	Alan (Math)
	Craig (Science)
	Dave (Math)
	Keith (Science)
	Rebecca (Math)

some capacity prior to entering the ACP. For example, both Peter and Diego had taught high school science in private schools before they entered the ACP. Katrina taught English and mathematics at an elementary school in Argentina and Sally taught health classes at a small college. Sally stated, "I coached and taught there [a small college] for four years. . . . This experience just reaffirmed my belief that I wanted to be a teacher" (Autobiography). When asked about his teacher identity, Diego discussed his role as a teacher prior to entering a Ph.D. program in chemistry, stating, "I am a teacher since well before coming into chemistry [Ph.D program]. I am returning to what I enjoy" (Autobiography). Prior to entering the ACP, these individuals already identified themselves as middle/high school teachers.

A third pattern for this group emerged during the data analysis. These individuals had previously encountered obstacles that prevented them from becoming certified in mathematics or science. For example, Sally had a negative experience in collegiate athletics and decided not to pursue her original goal of becoming a coach. Because Sally had always viewed herself as both a coach and a teacher, she also dropped out of her undergraduate biology education program. Diego was a member of a religious order dedicated to teaching. When he left the religious order, he also left teaching. The ACP offered these individuals the opportunity to fulfill their original career goal of becoming a mathematics or science teacher. All of these individuals completed the ACP, at the time of this writing, and have been successful teachers for 2 years.

Late Decider

Individuals in the second group, Late Decider, held emerging teacher identities when they entered the ACP. Members of the Late Decider group decided late in their undergraduate programs or later in their lives to become teachers. These individuals were not trying to bypass traditional undergraduate teacher education programs. Rather, they made their decision to become teachers too late to enroll in traditional programs or obtained undergraduate degrees at institutions that did not offer an undergraduate education degree. All the individuals in this category completed the ACP and secured teaching positions. We divided this category into subgroups: recent graduates and second-career individuals.

Recent graduates. The recent graduates were all in their mid-twenties. Late in their undergraduate programs, or within a few years of graduation, they made the decision to become teachers. For example, Sharon majored in environmental sciences and Daniel majored in mathematics. Sharon and Daniel both decided to become teachers during their undergraduate programs. Sharon talked about the influence of her undergraduate tutoring experience on her decision to become a teacher.

> A feeling of joy was present when I'd watch a student go from a complete lack of understanding to some sort of breakthrough . . . . This joy, combined with my beloved interaction with kids, and I knew that teaching was something I would love to do with my life. (Autobiography)

However, neither Sharon nor Daniel attended institutions with undergraduate teacher education programs, so they explored alternative certification programs shortly after graduation.

The remaining individuals in the Recent Graduates group switched undergraduate majors and worked at a variety of jobs for 1 to 2 years before entering the ACP. Ted became dissatisfied with his undergraduate computer science program and dropped out of college after his junior year. For the next 2½ years, he held a variety of jobs, including working at a movie theatre, a country club, a dental office, and a retail store (Interview, lines 23-72). He returned to college to become a mathematics teacher. However, Ted learned that the undergraduate mathematics education program would require an additional three years to complete. Instead, he chose to complete an undergraduate degree in mathematics in three semesters and then applied to the ACP. Barbara and Kelly also changed undergraduate majors and worked at a variety of jobs before deciding to become teachers. Barbara was a pre-veterinary major before she changed her major to biology. After graduation, she took a position as a research assistant. She was unhappy working in a research lab and decided to become a teacher within a year of graduation. Kelly's

grades in calculus prevented her from pursuing an engineering degree. She graduated with a degree in Parks and Recreation and worked at a variety of sports-related jobs before deciding to become a teacher. All of the individuals in this sub-group made the decision to pursue a teaching career either late in their undergraduate programs or within 1-2 years of graduation. In high school and early in college, they did not plan to become teachers. However, they entered the ACP with the view that they wanted to become teachers.

Career changers. The remaining individuals in the Late Decider group were older, generally in their middle 40's. These individuals differed from the recent graduates in that they had worked in non-teaching careers for an extended period of time. These individuals were successful in their previous careers and developed strong career identities in non-teaching professions. For a variety of reasons, they chose to leave these careers and become teachers.

Family played an important role in career decisions for Carla, Candace, and Edie. Both Carla and Candace worked as engineers for many years, but decided to leave the engineering field when their children were young. As stay-at-home mothers, they were involved in their children's education and served as substitute teachers in their children's schools (Autobiographies). When Candace discussed her decision to enter the ACP, she said that it would take a lot of catching up to return to the engineering field. She said, "I could do that . . . but I don't really have the desire for that life anymore" (Interview, lines 72-74). Throughout Edie's career path, she placed a high priority on her family. She was a graphic artist for 20 years before she earned a degree in computer science. She then moved to a small town because of her husband's job, and was unable to find a computer-programming job. Not wanting to live away from her husband, she applied for a job teaching mathematics and computer science at the local school and taught for one year under a temporary certificate before entering the ACP (Interview, lines 9-93).

Alison and Gary were also career changers, but their decision to become teachers was not driven by family considerations. Alison earned a degree in film studies and worked in the film industry for many years. She was unable to make an adequate salary at her first love, documentary films, so she took jobs working in commercial filmmaking. Alison became dissatisfied with commercial work and looked for a career where she would have a greater impact on others. "I felt my time was not being spent contributing to positive aspects of the world, especially when I was working as an assistant editor editing high-end commercials" (Interview, lines 35-38). For many years, Gary worked for a university's computing services, assisting on various research projects and teaching courses in computer science. As

the research portion of his position became more specialized, Gary found greater enjoyment in his teaching. "I find teaching for now returned more autonomy and direct, personal influence compared to many other options" (Interview, line 41). Gary explored other career options, and thought he could make a greater impact on society as a high school mathematics teacher. All members of the Late Decider group successfully completed the ACP and are currently teaching secondary mathematics or science (with the exception of Gary who is substitute teaching and currently seeking a teaching position).

Career explorer

In contrast to the individuals in the Always a Teacher and Late Decider groups, individuals in the Career Explorer group entered the ACP with no professional identity, as teachers or other professionals. Alan's statement is representative of members of this group:

> In the winter of 2000, I received my undergraduate degree in math. I was the firstto receive a college degree. My family was very proud. But I still did not know what I wanted to do for a career. (Autobiography)

As a group, these individuals were generally recent college graduates who expressed uncertainty with their career paths, viewing the ACP as an avenue to explore teaching as a career. Individuals in the Career Explorer group were divided into three sub-groups: (1) those with many career choices who considered teaching among their many options, (2) those who did not like the long-term prospects of working in a laboratory setting, and (3) those who appeared to have few career choices and fell back on teaching.

Many career choices. In this first sub-group, Rebecca described the many careers that she considered. She enrolled in law school, though she quickly recognized that this was not a good career choice, "I'm just not super competitive and driven by money" (Interview, line 127). Instead, she took a job as a tutor because she "thought tutoring might be a good option for me, and that would get me into kind of a teaching setting, and then I could try it out and see how I liked it" (Interview, lines 58-61). Rebecca remained tentative in her decision to teach. She stated that she was considering teaching as one of many other career paths. After 12 months in the ACP, Rebecca took a leave from the program to work in the Peace Corps. She has not yet completed her ACP program.

Rejecting lab work. This sub-group included former science majors who did not want to pursue careers as research technicians. Following graduation with a B.S. in biochemistry, Craig held a few jobs that involved manual labor until he was able to obtain a position in a

biochemistry laboratory. Craig enjoyed working in the lab, but was unsure about the long-term prospects of this career. He stated,

> I don't know if I could work in a lab 10 hours a day, six days a week. I don't know. I love working in the lab, I do, but I just couldn't see myself doing that for 30 years or 25 years or whatever, so then I started looking around to see what else I could do. (Interview, lines 56-60)

Craig completed the program and has been successfully teaching for 2 years.

Few options. The third sub-group included individuals who had below average performance in their undergraduate mathematics or science course work. The members of this group had few career options and began to consider teaching as a viable career. For example, Alan stated that he was unsure what he would do after graduating with a B. S. in mathematics. When approached by a school administrator, Alan stated that, "They needed somebody bad, and they just kinda knew me, and they said, 'Would you like to try it?' and I said, 'Yes.' I didn't have a job yet anyway, so I figured I would do it to make some money, and I liked it" (Interview, lines 30-33). Alan's first love was coaching. He viewed his first year of teaching as an opportunity to coach and to explore teaching as a career. All of the individuals in this sub-group struggled with what to do following graduation with their undergraduate degrees. They entered the ACP because it was a way to use the knowledge gained in their undergraduate programs. Only two of the five individuals in this category completed the ACP and obtained teaching positions.

Other Incoming Identities

As teacher educators, our goal was for individuals to develop strong teacher identities in the ACP. The participants entered the ACP with varying degrees of teacher identities but they also held other identities. Some of these identities appeared to support their middle/high school teacher identities, whereas others seemed to conflict with their newly developing teacher identities. In the following sections we discuss six of the most important incoming identities that the ACP participants discussed in relation to their teacher identities: parent, student, professional, tutor, coach and college instructor.

Parent

Many of the post-baccalaureate participants who entered the ACP described one of their identities as "parent," an identity that appeared to provide some support in their transition to becoming a teacher. Those who identified themselves in this manner fell into two groups: those with children who were currently in school or recently graduated, and those with preschool-age children. These individuals viewed their decision to seek teacher certification in differing ways.

Those with school-age/graduated children noted the connections that they made to children's thinking. For example, Carla stated that because of her interactions with her own children,

> I feel like I kind of know what's going on, I have a little bit better perspective of what's going on in their minds because I have my own (children) and I can relate to them and I know what things they like. (Interview, lines 152-154)

Similarly, Candace noted that her prior experience with her children provided enthusiasm for teaching mathematics, "I feel so strongly about the importance of that particular material (middle school mathematics), and I'm excited about it" (Interview, lines 137-138).

In contrast, parents of preschool children were more concerned about their families and having a family-friendly career. Kelly mentioned that, "The aspect of family with regard to the wife and mother things, that's definitely very important; that's kind of what led me to the career change" (Interview, lines 88-90). Her previous position required her to spend many evenings each week at work, so she began to consider other jobs that she thought would allow her to spend more time with her 4-year old son. Similarly, Katrina viewed teaching as a family-friendly career, stating "I really focused my priorities on my daughter," (Interview, lines 71-72). The parents of preschool children viewed teaching as a career compatible with their family life.

Student

Participants who were recent college graduates tended to view teaching through their recent experiences as students in both high school and college. For example, Daren stated, "When I think of myself as a teacher, a lot of what I want to do is based off of my prior experience (as a student), whether it was good or bad. I want to either do the things that were good or avoid the things that were bad" (Interview, lines 100-102). Participants with strong student identities described themselves as successful students, but they realized that many of their future students would not be like them. Ted explained,

> Part of what has made me good at math is my ability to see all the things that are connected and make it work on my own. I just didn't have to struggle through it. However I know that some of my students will have difficulty in mathematics. (Interview, lines 311-313).

Similarly, Sharon noted that her future students would probably lack the motivation she had as a student.

I find it hard like in classes I'd taken previously, people who don't really like it and don't really put forth the efforts. I kind of get upset with them like when they are in my group, like how could you not, not just in group work, but like going through high school, people who wouldn't turn in homework or study for a test, I couldn't see why they would not do that. Obviously there are a lot of reasons that that might have happening, but I think that still may be a problem that matters to me if they don't try I don't know, I have to work on that definitely. (Interview, lines 67-74)

Sharon recognized that she would have to better understand the motivation of her students and seek resolutions to the motivational issues she would face as a teacher.

Although participants predicted that their student identities would differ from those of many of their future students, they felt that their student identities provided them with a strong desire to learn, a trait that would serve them well in the teaching field. Ted noted,

> I would say that every teacher is a life-long learner. I believe every good teacher is a constant student him or herself. The best teachers are excited about teaching because they love the subject and because they are learning something new every day they teach. If we did not love to learn, we would not be able to go to school every weekday, nine months a year, for 30 years. (Online Discussion)

Participants with strong student identities viewed this identity as supportive of the development of their teacher identity, although they realized that many of their future students would not be as motivated as they were in school.

Professional

The individuals who fell into the Career Changer sub-group (discussed previously) brought job experiences to the ACP that impacted their teacher identities. Some of these experiences were viewed as supporting their future roles as teachers, whereas other experiences required adjustments in their view of this new profession. For example, Keith explained that he brought knowledge that would support his students from his prior work as a science researcher. He explained,

> I think that I have a familiarity with how research is done. I think it helps me as a teacher. I guess one way is that it helps me with students who are interested in going on in science; I think I can be a resource for them as to what they can expect to encounter. (Interview, lines 96-99)

Such experiences as a researcher allowed Keith to inform students of what they could expect in a science career. Candace noted the importance of the mathematics that she learned in the middle grades and how little she used advanced mathematics in her work as a ceramic and mechanical engineer. She said,

> Everything that you really need to know for daily life in most professions, you learn in middle school math. And so beyond that, if you're learning it, from myown, I mean I was an engineer for 7 years and never did calculus on the job. Never. (Interview, lines 291-294)

Her engineering experiences allowed her to recognize what was important, provide examples, and make connections to students' lives in mathematics.

Although they noted the advantages of prior work in a different professional environment, some of the participants also realized that teaching would differ considerably from their experience. Gary mentioned that, in his career as a computer programmer, "I write a computer program, it's never quite finished, but it does work and you know exactly what you need to do and you could turn off the blooming computer while you work on the next step – whereas, kids aren't like that" (Interview, lines 330-333). Gary recognized that, as a teacher, he would not have the opportunity to just stop and ponder what to do in particular situations. He would need to make quick decisions without the benefit of the time he often had as a programmer. Gary described his former self as a "computer geek" as someone who was "often very concerned with technology, sometimes to the exclusion of manners and hygiene" (Interview, line 506). In his work as a computer programmer, the focus was often more on the product than on interacting positively with others. He noted how teaching differed from his prior experiences in that he would need to pay attention to the social interactions with students, not simply on the content.

Tutor

For many of the participants, tutoring provided a window into the world of teaching. Tutoring allowed the participants to experience the joys of teaching and to see it as a potential career. Barbara reflected on her college tutoring experience,

> I was helping them grasp what [the professor] was saying in a way they could understand. . . . I was so proud of that. Gosh, I helped out someone. It made me feel good. (Interview, 639-643)

Observing her students "make sense" of biology helped Barbara view teaching as a career in which she could make a difference in the lives of students. As such, the tutoring experience provided a sense of fulfillment. Rebecca expressed that, as she explored careers, she used tutoring as a way she "could try it [teaching] out and see how I liked it" (Interview, lines 58-61). She found that although "it really wasn't like

classroom teaching, it was more one-on-one and small groups. I found that just the teaching and interacting with students was really fulfilling, and I really enjoyed it" (Interview, lines 63-66). Through tutoring, participants began to view themselves as teachers, sensing the intrinsic rewards of the profession.

Tutoring also provided an opportunity for the participants to take authority positions similar to classroom teachers. Rebecca mentioned that, "I went up to the board and I was writing on the board and explaining and I think they were hopefully understanding the material better so in that case I felt like a teacher" (Interview, lines 384-386). As she moved into this position of authority, she felt she was engaging in what she perceived as teacher-like work--presenting information to a group of students. Such tutoring sessions also allowed the participants to recognize characteristics of teachers in themselves. Ted stated, "Through tutoring, I saw that I was a lot more patient with younger kids than I thought I was" (Interview, lines 208-209). Ted viewed patience as an important characteristic of a teacher. Seeing this attribute in himself helped Ted begin to develop his teacher identity.

Coach

Generally, the ACP participants saw the role of coach as closely linked with the role of teacher. Coaching allowed them to assume authority roles and provide opportunities to motivate young people. Based on their experiences as athletes, many participants recognized the importance of the motivation that coaches provide. As Kelly noted in reference to her high school basketball coach, "(My coach) still wanted them (other players) to keep trying, no matter how difficult it was for them, to keep trying" (Interview, lines 316-317). Kelly saw this as an important role for herself as a teacher—to encourage students to keep trying even when they experienced difficulties. Alan viewed coaching as a metaphor for instruction,

> As far as coaching, there are so many experiences I believe that you can get, in some ways that you can't get elsewhere. I'm not just talking about the football field, but like even putting them on a team and asking them to do something where each person has to do this to accomplish this. If all you guys don't do that to get here, it won't work. (Interview, lines 98-104)

Alan's experience as a coach transferred to managing a group of students to work toward the collective good. Alan saw his coaching experience as an important in supporting the development of his teacher identity.

In contrast, Sally saw tension between her coaching identity and her identity as a teacher.

How they differ is, I think a coach, not necessarily always, but sometimes, is more critical. (The coach) has to point out flaws . . . whereas in the classroom, even though you are under a time crunch, I think that with the cognitive aspects, in my opinion, it's better for discovery, figure it out on your own. I mean, granted, I can point you in the right direction, or say maybe you ought to think about this, but as a coach I think it's more of a pointed out type situation. (Interview, lines 260-273)

Sally felt that, in her role as coach, she must be quick to point out the need for improvement in player performance. As a teacher, she wanted the students to spend time evaluating their own thinking. Thus, Sally recognized a tension between her coach identity and her teacher identity.

College Instructor

Not all identities were viewed as supporting the development of secondary teacher identity. Participants with a previous identity as a college instructor noted that they tended to focus on lecturing and entertaining, and expressed concern with their new management roles in grades 6-12 classrooms. In their prior experiences as college instructors, these individuals focused on providing clear presentations of material. For example, Keith and Alison stated that a strong teacher was "someone who can explain concepts well" and someone who "never confuses students." Similarly, Gary compared the role of the teacher to that of the preacher, someone who needed "to persuade, encourage, be almost theatrical. Preachers, mathematicians, and mathematics teachers can be pedantic" (Autobiography). Gary noted that he was working to downplay these parts of his personality to meet the pre-college instructional expectations that teachers engage students in discussions about mathematical concepts.

Those with college teaching experience contrasted their college instructor role with their new roles in middle and high school classrooms, especially with regard to motivation. Gary explained that "the college classroom, with a lack of discipline issues, relative uniformity of student skills, and acceptance of lecture, strikes me as twenty times easier than the classrooms of secondary and middle schools" (Autobiography). As such, he expressed concern about his ability to manage students who lacked the motivation of college students. Alison, too, noted that she often became frustrated with "people who don't want to try" (Interview, line 264). Her previous teacher identity, shaped from her experiences as a college instructor, led to concerns about her ability to successfully transition into becoming a high school mathematics teacher.

DISCUSSION

In this section, we will briefly compare our findings to two related studies (Chin & Young, 2007; Helms, 1998), and then examine, in greater detail, identity as a framework for understanding individuals entering ACPs. Chin and Young (2007) reported a similar category, Second Career Seekers, in their large-scale study of K-12 teachers entering ACPs in California. When we designed our ACP, we adopted the prevailing assumption that ACPs would primarily attract individuals seeking a second career in teaching. This assumption has shown to be incorrect. Chin and Young (2007) reported less than 20% of survey respondents were Second Career Seekers. Our findings are similar, with only 3 of the 19 participants being Career Changers. Chin and Young (2007) reported additional profiles that do not correspond to our findings, particularly Working Class Activists who "were more likely to be Latino/a and were seeking elementary credentials" (p. 80). We contribute these differences in categories to sample sizes, research methods and populations (K-12 teachers versus secondary science and mathematics teachers).

While Chin and Young's (2007) study was grounded in ecological models of development, Helms (1998) used an identity framework to explore the professional identities of 5 experienced middle and secondary science teachers. Helms reported that the teachers' subject matter (science) played an important role in shaping their professional identities. Over time, this may also be true of our participants; however, we do not have supporting data from this study. We conducted the interviews when participants entered the ACP. As part of the interview, we asked participants if they would still go into teaching, if they could not teach mathematics or science (see Interview Question 4). The majority of the participants indicated that, if necessary, they would pursue a teaching career in another discipline. We attribute this response to the timing of the question. Participants had recently quit their jobs and, in many cases, secured school loans as part of their commitment to entering the ACP. To explore the role of subject matter knowledge and teacher identity, we will need to collect additional, longitudinal data.

Identity provided a useful lens to better understand the individuals entering our institution's ACP. Wenger's (1998) concept of identity as a learning trajectory focuses this lens. According to Wenger, "We define who we are by where we have been and where we are going" (p. 149). Trajectories should not be viewed as set paths, but rather "a continuous motion – one that has a momentum of its own in addition to a field of influences" (p. 154). Data collection at entry into the ACP provided a useful window into one point in participants' learning trajectories for becoming mathematics and science teachers, allowing us to focus on the contributions of their past histories. The participants' past histories involved memberships in multiple communities, which Wenger refers to as a "nexus of multimembership" (p. 158). In this section, we apply the concepts of identity as a learning trajectory and a nexus of multimembership to gain further insight into the data interpretations.

Identity as Learning Trajectories

As we designed the ACP, we envisioned our future students as career-changers with well-developed non-teaching, professional identities. We anticipated individuals would struggle with identity issues, needing to reconcile their former professional identities with their emerging identities as teachers. Through interviews and interactions in classes, it quickly became apparent that we needed to discard our initial assumptions. Viewing the process of becoming a teacher as a learning trajectory gave us a new perspective for understanding our participants. The groups described above (i.e., Always a Teacher, Late Decider, and Career Explorer) may be better viewed as groups on different learning trajectories (see Figure 1).

Members of the Always a Teacher group entered the ACP with well-developed teacher identities. These individuals could be described as being on an "insider trajectory" because they were already members of the community of practice (Wenger, 1998, p. 154). As part of their history, the Always a Teacher group had been teachers, participating in communities of practice (e.g., private K-12 schools). Wenger described three distinct ways of belonging to a community of practice: engagement, imagination, and alignment. The individuals in the Always a Teacher group were engaged in teaching communities of practice, putting them on an "insider trajectory" as they entered the ACP. Members of the Always a Teacher group entered the ACP to further develop their teaching skills and to obtain certification to teach mathematics or science in public schools (grades 6-12).

Members of the Late Decider group might best be described as being on an "inbound trajectory." Wenger (1998) defines this trajectory in the following way: "Newcomers are joining the community with the prospect of becoming full participants in its practice. Their identities are invested in their future participation, even though their present participation may be peripheral" (p. 154). The Late Deciders differed from the Always a Teacher group, because they were not already engaged as members of the teaching community. Rather, the Late Decider group had developed a sense of belonging to this community through imagination. Wenger (1998) describes this mode of belonging to a community as a "process of expanding our self by
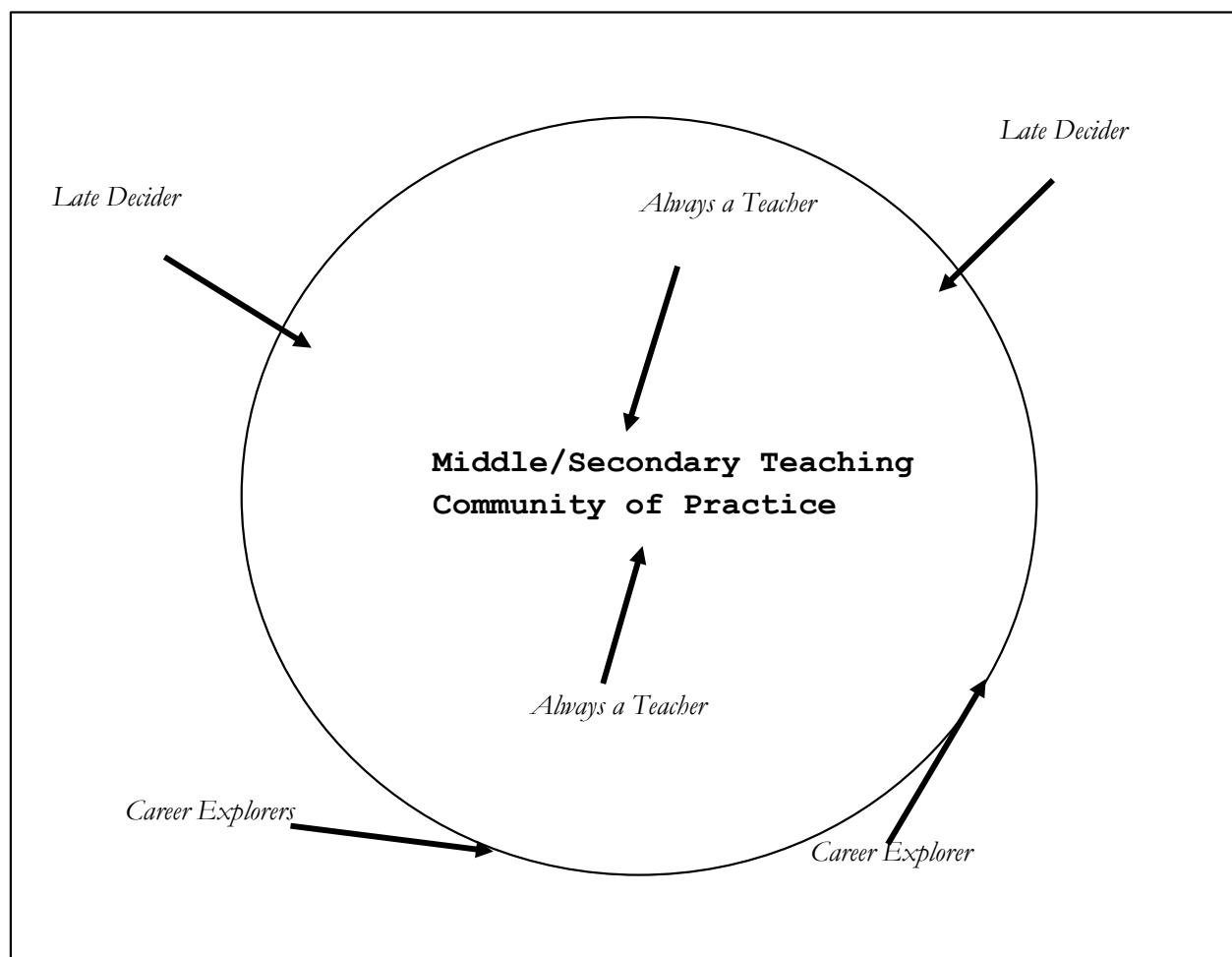
Figure 1: Trajectories of teacher identities.

transcending time and space and creating new images of the world and ourselves" (p. 176). Members of this group were not teachers when they entered the ACP, but they had begun to imagine themselves as teachers several years earlier through membership in other communities of practice (e.g. tutoring, parenting).

Within the Late Decider group, there was a small sub-group of individuals who were true career changers. Of these five persons, three left their professional fields many years ago to become full-time parents. Any career-related identity struggles appeared to have taken place during the transition from professional to full-time parent. In the interviews, these individuals did not discuss recent career transition struggles. Rather, their family-related identities appeared to support their trajectory of becoming a teacher, well before their entrance into the ACP. Only two individuals, Alison and Gary, were recent career changers. These two individuals expressed dissatisfaction with their recent careers and entered the ACP to change careers. One might view their participation in their former communities of practice as one of marginalization, which led them to search out new careers. Overall, members of the Late Decider group were on an

"inbound trajectory" of becoming mathematics and science teachers at the time of their entrance in the ACP. Whether through imagination or marginalization within their former community of practice, these participants were very much invested in their future participation as teachers of mathematics and science. They entered the ACP to learn how to become mathematics and science teachers.

Members of the third group, Career Explorer, were relatively young and had yet to establish themselves in any career. At the time of their entrance into the ACP, they can be viewed as being on "peripheral trajectories." Wenger (1998) described this type of trajectory in the following way: "By choice or by necessity, some trajectories never lead to full participation. Yet they may well provide a kind of access to a community and its practice that become significant enough to contribute to one's identity" (p. 154). These participants were not necessarily entering the ACP to become teachers; rather these individuals were using the ACP to explore teaching as a career option. The ACP gave these individuals access to the teaching community and its practice.

Individuals in the Career Explorer group present an intriguing challenge for teacher educators working in ACPs. Only 3 of the 6 individuals in this group moved from a "peripheral trajectory" to an "inbound trajectory" by completing the ACP and pursuing teaching positions. The other 3 individuals continued on a peripheral trajectory that failed to support the development of a teacher identity. We assumed that all individuals entering the ACP were doing so to become teachers. However, through this study, we became aware of a sub-group of individuals who use ACPs not to become teachers, but to explore teaching as a career option. We question whether ACPs, due to their intensive nature, are the most appropriate avenue for Career Explorers.

Nexus of Multimembership

"An identity is thus more than a single trajectory; instead, it should be viewed as a nexus of multimembership. . . . In a nexus, multiple trajectories become part of each other, whether they clash or reinforce each other" (Wenger, 1998, p. 159). In this section we discuss the participants' other identities formed through participation in a variety of communities of practice. The participants held a variety of identities, including parent, student, professional, tutor, coach, and college instructor. Some of these identities reinforced their teacher identity, while others created a tension.

Parent and tutor identities helped participants attend to student thinking. Within the ACP, we emphasized the need for teachers to build upon students' prior knowledge and ideas. Participants with strong parent identities readily shared examples of their own children's mathematical or scientific thinking. Some of the participants had extensive tutoring experience that helped them focus on student thinking. In addition, participants who were tutors, coaches and/or parents of older children were more confident in their ability to work with and manage middle and high school students. Some aspects of professional career identities supported developing teacher identities. Participants who had worked in mathematics or science-related fields shared practical insights about the nature of their disciplines. Keith saw his previous work as a laboratory researcher as beneficial in that he could help students better understand the nature of scientific research. In contrast, prior professional identities sometimes involved working environments that differed considerably from school environments. The luxury of being able to stop and reflect on one's work, or work involving little social interaction, differs considerably from the professional lives of teachers. Other identities, such as the college teaching identity, appeared to clash with the goals of the ACP. A prevalent assumption of many college instructors is that students will be motivated to learn and the role of the teacher is to provide clear presentations in a lecture-based style. Participants with strong college instructor identities struggled at times with the student-centered philosophy of the ACP. In helping participants develop a teacher identity, it is important to consider the nexus of multimembership that comprises participants' life histories. Some identities did reinforce the participants' teacher identities, while aspects of other identities were a source of tension.

IMPLICATIONS

The findings of this study challenged many of the assumptions we held during the ACP design phase. Prior to data collection, we assumed that all participants would enter with strong non-teacher, professional identities. We did not anticipate that some individuals would enter the ACP with strong teacher identities, nor did we anticipate the number of individuals using an ACP to explore teaching as a possible career option. In addition, we did not foresee the complexity of the nexus of multimembership in the formation of a teacher identity. Based on these findings, we generated implications for alternative certification programs and for further research into teacher identity formation.

As researchers, we gained new perspectives of our ACP participants through the use of an identity lens. We recommend that this same tool, identity, be made an explicit part of ACP coursework. Teacher educators should share the identity framework with their ACP students, and design opportunities for students to reflect on their own developing teacher identities. Students should be encouraged to examine their own nexus of multimembership. Which identities support their developing teacher identity and which identities create tension? Through the explicit use of identity as a reflective tool, ACP students can gain new perspectives of what it means to become a teacher.

In addition, we make specific recommendations for two very different groups in our study, Always a Teacher and Career Explorer. Teacher educators need to be aware of these two groups and their differing needs. Course instructors should acknowledge and draw on the teaching experiences of the Always a Teacher group. As members of teaching communities, these individuals share important insights into the practices and norms of their communities. Intern placement and supervision should be carefully considered for members of the Always a Teacher group. These individuals should be placed with strong classroom teachers who will acknowledge their prior experiences while mentoring them to continue to grow as a teacher. Discussions of teacher identity are often more challenging to facilitate with individuals in the Always a

Teacher group. Since these individuals enter the ACP with strong teacher identities, it can be challenging to have them re-construct the process of becoming a teacher.

Just as teacher educators need to be aware of the unique needs of the Always a Teacher group, they must also recognize the differing goals and needs of the Career Explorer group. Members of the latter group may gain the greatest benefits from explicit discussions of identity. Teacher educators should ask students to consider the type of teaching position they envision, if any, for themselves in future years. These discussions could be a source of clarification and decision-making for Career Explorers. By acknowledging the goals of the Career Explorers and through candid class discussions, this group may gain legitimacy in the ACP. In retrospect, we realized that the voices of Career Explorers were often silenced in class discussions. It is important to provide legitimate exit points for Career Explorers who wish to leave the program. In addition, guidance and information should be provided about other career opportunities.

The findings of this study raised many questions about how to best support Career Explorers within ACPs. For example, what role does the internship play in supporting their career decision? What criteria should be used in making internship placements for Career Explorers? Should they be placed in multiple, consecutive internships of shorter duration so they experience a wide range of teaching contexts? Typically, we place ACP students with highly committed mentor teachers who have strong teacher identities. Do these mentors provide the kind of support needed by Career Explorers? Within the coursework of the ACP, what types of assignments best support Career Explorers? What roles do other members of the cohort (e.g., Always a Teacher) play in supporting the Career Explorers' learning trajectories? Research needs to be conducted on specific ACP support structures for Career Explorers.

This study focused on the identities of participants as they entered an ACP. Longitudinal studies are needed that follow students throughout their ACP and into their induction years of teaching. Longitudinal studies of this type, although difficult to conduct, will help us better understand the various factors that contribute to or hinder the development of a teacher identity. We also need to better understand the relationship among incoming identities, the development of a teacher identity, and teacher retention. To what extent is the development of a strong teacher identity related to teacher retention? What supports assist the development of teacher identity that can increase teacher retention? We have only begun to examine the formation of teacher identity with ACP students. We need to further understand the development of teacher identity in order to design appropriate ACPs that both meet the needs of all students and build on the students' life experiences.

Based on the range and diversity of incoming identities, it is a challenge to design ACPs to meet the needs of each group: Always a Teacher, Late Deciders and Career Explorers. ACPs play an important role in that they allow individuals to enter the teaching profession in the high-need areas such as mathematics and science. Rather than engaging in discussions about the advantages and disadvantages of ACPs vs. traditional certification routes, we must seek to further understand the factors that can support the transition of these individuals into the teaching community of practice.

Endnote

[1] All participants are referred to by pseudonyms.

REFERENCES

Abell, S. K. (2000). From professor to colleague: Creating a professional identity as collaborator in elementary science. *Journal of Research in Science Teaching, 37,* 548-562.

Adelman, N. (1986). *An exploratory study of teacher alternative certification and retraining programs.* Washington, DC: U.S. Department of Education

Chin, E., & Young, J.W. (2007). A person-oriented approach to characterizing beginning teachers in alternative certification program. *Educational Researcher, 32,* 74-83.

Cooper, K., & Olson, M. (1996). The multiple "I's" of teacher identity. In M. Kompf, D. Dworet, & R. Boak (Eds.), *Changing research and practice* (pp. 78-89). London: Falmer Press.

Danielewicz, J. (2001). *Teaching selves: Identity, pedagogy, and teacher education.* Albany, NY: SUNY Press.

Feistritzer, C.E. (1992). *Who wants to teach?* Washington DC: National Center for Educational Information.

Gergen, K. J. (1991). *The saturated self: Dilemmas of identity in contemporary life.* New York: Basic Books.

Gergen, K. J., & Gergen, M. M. (1983). Narratives of the self. In T. R. Sarbin & K. E. Scheibe (Eds.), *Studies in social identity* (pp. 254-273). New York: Praeger.

Glaser, B.G. (1992). *Emergence vs. forcing; basics of grounded theory analysis.* Mill Valley, CA: Sociology Press.

Glaser, B.G. & Strauss, A. L. (1967). *The discovery of grounded theory: Strategies for qualitative research.* New York: Aldine De Gruyter.

Goffman, E. (1959). *The presentation of self in everyday life.* Garden City, NY: Doubleday.

Haberman, M. (2001). The creation of an urban normal school: What constitutes quality in alternative certification? *Educational Studies, 32,* 278-288.

Helms, J. (1998). Science---and me: Subject matter and identity in secondary school science teachers. *Journal of Research in Science Teaching, 35,* 811-834.

Hussar, W. J. (1999). *Predicting the need for newly hired teachers in the United States to 2008-09.* Washington, DC: U.S. Department of Education.

Ivanic, R. (1994). I is for interpersonal: Discoursal construction of writer identities and the teaching of writing. *Linguistics and Education, 6*, 3-15.

Knowles, J. G., & Holt-Reynolds, D. (1991). Shaping pedagogies through personal histories in preservice teacher education. *Teachers College Record, 93*(1), 87-113.

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

Marsh, M. M. (2003). *The social fashioning of teacher identities.* New York: Peter Lang.

Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook* (3rd ed.). Newbury Park, CA: Sage Publications.

Natriello, G., & Zumwalt, K. (1992). Challenges to an alternative route for teacher education. In A. Lieberman (Ed.), *The 91st yearbook of the Society for the Study of Education* (Part I, pp. 59-78). Chicago: University of Chicago Press.

Schaefer, N. (1999). Traditional alternative certification: A view from the trenches. In M. Kanstoroom & C. E. Finn, Jr. (Eds.), *Better teachers better schools* (pp. 137-161). Washington, DC: The Thomas B. Fordham Foundation.

Scribner, J. P., Bickford, A., Watson, S. T., & Valentine, E. P. (2005, April). *Teaching about teaching in alternative certification programs: Are the essential skills sufficient to produce good teachers?* Paper presented at the annual meeting of the American Educational Research Association, Montreal, Canada.

Shen, J. (1998). The impact of alternative certification on the elementary and secondary public teaching force. *Journal of Research and Development in Education, 32,* 9-16.

Stake, R. (1995). *The art of case study research.* Thousand Oaks: Sage Publications, Inc.

Travers, K. A. (2000, April). *Exploring the development of teacher identity.* Paper presented at the Annual Meeting of the American Educational Research Association, New Orleans, LA.

Tierney, W. G. (1993). Self and identity in a postmodern world: A life story. In D. McLaughlin & W. G. Tierney (Eds.), *Naming silenced lives: Personal narratives and processes of educational change* (pp. 119-134). New York: Routledge.

U.S. Department of Education. (2001). *The condition of education: 2001.* Washington, DC: Author.

Volkmann, M. J., & Anderson, M. A. (1998). Creating professional identity: Dilemmas and metaphors of a first year chemistry teacher. *Science Education, 82*, 293-310.

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

Zeichner, K. M., & Conklin, H. G. (2005). Teacher education programs. In M. Cochran-Smith & K. M. Zeichner (Eds.), *Studying teacher education*, (pp. 645-735). Mahwah, NJ: Lawrence Erlbaum Associates.

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Appendix

Identity Research Interview Protocol

1. Tell me what else you've done in your life, including work experiences before you entered this program?
Have you ever thought of being anything other than a teacher?
Why? Have you ever had another career? If so, what?
When did you decide to become a teacher?
Why?

2. Follow-up on Pie Charts: In class you were asked to complete a pie chart activity. I have your pie charts with me today, and I would like you to talk me through the pie chart you created.
Explain the different sections.
In the first pie chart, which sections support your identity as a teacher? Explain your answer.
Which sections of the pie work in opposition to your identity as a teacher? In what ways does this happen? Please give some examples. Additional prompts for the second pie chart.

3. Metaphor Follow-up: Tell me about the metaphor you chose for yourself as teacher.

4. If you couldn't be a mathematics/science teacher, would you still want to be a teacher?
Why or why not? What other subjects can you see yourself teaching?

5. When you imagine yourself teaching, what aspects of your personality will help you be a successful teacher?
What aspects of your personality, if any, do you think you will need to downplay or mask when you teach?

6. During your first year of teaching, what aspects of teaching do you think will be fairly easy for you? (For example: building a rapport with students, etc) What aspects of teaching do you expect to be challenging? What concerns do you have about being a teacher?

7. If you were going to select one individual in the cohort who exhibits a strong teacher identity, who would it be? On what basis, did you select this individual?

8. Is there a difference between "acting like a teacher" and "being a teacher"? What connections exist between these two things?

9. Views of teaching:
How do you want your students to view you as a teacher?
How do you want other teachers to view you?

Describe an event in your life in which you really felt like a teacher. What were you doing at this time? What helped you feel like a teacher in this situation?
Describe a teacher role model that you have.
Where do you see yourself in 5 years? In 10 years?