PRESERVICE TEACHERS' CHARACTERIZATIONS OF THE RELATIONSHIPS BETWEEN TEACHER EDUCATION PROGRAM COMPONENTS:
Program Meanings and Relevance and Socio-Political School Geographies

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Abstract

This dissertation represents a product of research conducted in 2004-2005 examining the curriculum network of an elementary teacher education program at a large public university in the United States. Using ethnographic data (e.g., interviews with preservice teachers and faculty, observations in and outside of coursework, and other artifacts), I address the questions of how preservice teachers characterized relationships between teacher education program components, how those characterizations varied and changed, and how preservice teachers explained the value or relevance of program components to teaching.

I discuss how preservice teachers shaped their understandings of main program emphases. I describe how they tended to experience closer correspondence between program recommendations and the policies and philosophies in certain schools and classrooms in suburban county schools near the university compared to the policies and philosophies in certain schools and classrooms they identified as having, for example, fewer resources (e.g., funds, manipulatives). I make the case that the program-based philosophies developed by and for the preservice teachers helped to coordinate context-specific meanings and relevance for program components and further to construct failures of the kind where either (1) schools interfered with the accomplishment of program objectives or (2) program objectives proved unrealistic for schools. Without intending to, and perhaps even contrary to certain program intentions, program suggestions treating instruction as context-independent tended to favor middle-class White children and to marginalize urban or diverse schools and classrooms, or schools having more limited resources, as viable places to engage in program-recommended practices for good teaching.

These results have potential implications for practice in teacher education and mathematics education and also have relevance to discussions of ongoing standards-based teacher education and mathematics education reforms. I offer that these results help to reveal certain limitations of popular ways of defining and researching preservice teachers' learning and teacher education program coursework and fieldwork relationships. I raise the question of whether teacher educators or researchers might benefit from considering how to more substantively integrate curriculum and give greater attention to *place* and to the broader socio-political goals we aim to accomplish through our work.

Dedication

For my parents, Kenneth and Frances Jacobsen, and for my husband, Jeff.

Mom and Dad, your love and confidence in me have given me conviction to build and pursue my dreams. Thank you for always believing in me and for instilling in me a passion for learning. You have shared in all the joys and pains of this challenging process and have provided a constant source of strength.

Jeff, you have always stood beside me as I have been changing and growing these last few years in both my career interests and my sense of self. Your constant support and encouragement inspired me to persevere. You quietly and generously made so many sacrifices for years so that I could have this opportunity. I could never thank you enough.

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My experiences in the doctoral program offered me tremendous and exciting opportunities to learn and grow both professionally and personally. I leave this program with a greater understanding of what is important to me and with a commitment to continue learning how I can give meaning and value to my work. So many colleagues and friends have contributed to this process, and to all of you, I am forever grateful.

I am deeply appreciative of the guidance of my advisor, Gwen Lloyd. Gwen, you have been with me every step of the way and I have learned so much from you. You gave me numerous excellent opportunities to learn in my graduate research assistantship and have always provided intelligent, thoughtful feedback. To my dissertation committee—Sue Magliaro, Jan Nespor, Jay Wilkins, and Skip Wilson—thank you for the commitment you bring to your work and for the time you have taken to help me with mine. Sue, I learned so much in your courses and also retain my excitement for teacher education learning communities that you helped me to develop and that I hope to make use of in my future work. Jan, your courses and your research have strongly influenced my career trajectory and have motivated me to treat my interests and work not as simply academic or mathematical, but as tools for learning about and taking action on the world. Jay, your enthusiasm for mathematics shines through in all that you do and is refreshing. Skip, you have been a true pleasure to work with and have shared many interesting and entertaining insights over the years to keep me on my toes. Each of you has helped me to establish my own voice as a teacher educator and researcher and to realize how very much more there always remains to learn. It is because of you, your colleagues, and our many colleagues at

other universities that I know I must read and think broadly about the nature and purpose of my work and to question even those things about which I feel most certain.

I am also so very appreciative of my family and friends for their loving and strong support for years. All of you have kept me focused and sane through this difficult process. Jeff, Mom, Dad, Linda, Kenny, Jimmy, and extended family—thank you for always being there for me and sharing your words of wisdom. Stephanie, we have grown close by working, learning, and laughing so much together. John and Heath—what could I have ever done without the Femoyer gang and ice cream breaks? Thanks also to my Navy friends and Carolyne who shared jokes and listened to dissertation woes. Donna, you are a star and always convey energy and strength. Ann Mary, I have much enjoyed and been comforted by our dissertation "meetings." Dana, thanks for being our cheerleader. Cecile, your thoughtfulness and view toward the future these last few months have helped more than you know. To my many new friends in the Mathematics and Statistics Department at Radford University, I am very grateful for your wonderful collegiality and willingness to put up with and cheer on this ABD for some time now. Finally, the many participants of this study are what made it possible. Thank you for the time and energy you contributed to this project and for your openness to sharing your stories and allowing me into your lives.

All of you, and many others, have been my dissertation team, and I thank you.

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Chapter 1 Introduction

With both undergraduate and graduate degrees in mathematics, I began a doctoral program in mathematics education in May 2002 after several years of college mathematics teaching. As a mathematics instructor, I worked with many college students majoring in fields like biology, fisheries and wildlife, and forestry who needed to complete my courses to graduate but who took little interest in anything explicitly mathematical. Many described mathematics as the one subject they had always disliked or struggled with. They looked forward to clearing the hurdle of my calculus course and then "forgetting this stuff forever."

I spent my three and a half years as an instructor working on initiatives to make course topics more meaningful and accessible to students by reducing the number of topics addressed, introducing data sets and applications from students' various undergraduate major fields, and giving students more opportunity to work together to discuss and do mathematics. These changes meant at least as much as me as they did to students. Through these efforts, I personally learned new and interdisciplinary ways of understanding and using calculus concepts. I began to think and question why mathematics appeals so little to so many of its students and to ask how I might contribute to making students' experiences of mathematics more conceptually rich and meaningful.

I entered the doctoral program largely because I wanted to learn how to help improve the quality of children's mathematical experiences in K-12 schooling. I hoped eventually to work with preservice and inservice mathematics teachers to develop close-knit mathematical communities learning and researching together how we might accomplish improvements of school mathematics. I developed a special interest in

elementary teacher education while working as a research assistant with Dr. Gwendolyn Lloyd on her project examining teachers' learning with and from mathematics curriculum materials.[1] During my assistantship, among other assignments, I took field notes in mathematics content courses for preservice elementary teachers and in school classrooms, interviewed preservice teachers, and developed and taught a teaching methods component of a mathematics course. These types of tasks helped shape my interests in studying preservice elementary teachers' experiences with learning mathematics and with learning to teach mathematics.

In the doctoral program, my educational foundations coursework with Dr. Jan Nespor compelled me to develop and combine these mathematics education research interests with my broader personal interests in standing against social injustices. For example, I took greater interest in learning about students' differential positioning according to race, ethnicities, and social class with regard to knowledge and its construction. I also took greater interest in learning about social and political structures and functions of school curriculum and of teacher education programs and about implications for diverse and multicultural learners. Given my relatively strong background in mathematics and less substantial background in education, I believed I might only develop robust ideas for improving mathematics education alongside a constant social and political tempering of my viewpoints and readings. Whereas my research interests had previously focused almost exclusively on mathematics-specific issues, my broader personal interests led me to position mathematics differently and to

[1] The term "curriculum materials" is popularly used in mathematics education to distinguish National Council of Teachers of Mathematics [NCTM] *Standards*-based (1989, 2000) text materials from more traditional mathematics textbooks having, for example, greater emphasis on drill and practice.

learn from mathematics in new ways. Rather than define my doctoral program research and career objectives in terms of improving the teaching and learning of mathematics, I began to use mathematics education research and personal experiences to mediate and strengthen my understanding of things like educational politics and teacher education programs and curriculum. I continue to do this in my dissertation.

I have included this personal background information because much of my past and future work has been and will be in mathematics education. Readers in my field might expect to read something different in my dissertation than what I offer. My work, outlined in sections that follow, presents only limited discussion of issues particular to mathematics education. Instead, I use examples and discussions from mathematics education to talk in more general terms about preservice elementary teachers' experiences and ways of shaping activities and meanings in a teacher education program.

I address issues and pursue arguments related to how teachers learn and how teacher education programs organize themselves and their relations with schools. These issues and arguments might appeal as much to researchers in teacher education or educational foundations as to researchers in mathematics education. However, I do target some points specifically to mathematics educators. My choice of addressing broad and interdisciplinary topics relates to the shifts I have described in my research interests. It also relates to my hope that such a focus might help me question how to best define and position my future work as a mathematics educator within a teacher education program and in ways socially and politically consistent with my worldviews. Ideally, each reader will identify components in this dissertation that help raise new questions and considerations regarding how our individual and joint work with preservice teachers

extends beyond the particular course or field placement assignments for which we are responsible.

The Dissertation Study and Central Arguments

This dissertation represents a product of research conducted in 2004-2005 examining the curriculum network[2] of an elementary teacher education program at a large public university in the United States. Using ethnographic data (e.g., interviews with preservice teachers and faculty, observations in and outside of coursework, and other artifacts), I describe preservice elementary teachers' characterizations of the relationships between teacher education program components and the relevance of those relationships to teaching. I show ways that preservice teachers assigned meanings and relevance to courses and field placements and ways that they reassigned new or different meanings and relevance to courses and field placements as they moved through the teacher education program. Throughout the dissertation, I treat the preservice teachers as the experts on the program and on the program's relevancies to their ongoing work in schools. I try to focus primarily on communicating and summarizing as best as possible the preservice teachers' personal descriptions and analyses of program and school experiences. At times I include descriptions from my research fieldwork, but I try to limit my own explanations for students' experiences and the meanings of those experiences.

I describe how the preservice teachers developed shared ways of observing and describing teaching. This development occurred partly through similar and repeated messages across coursework and through some instructors' modeling of those instructional practices they supported. I make the case that the program-based

[2] cf., Nespor, 1994. I introduce this term in the next section.

philosophies developed by and for the preservice teachers helped to coordinate context-specific meanings and relevance for program components and further to construct failures of the kind where either (1) schools interfered with the accomplishment of program objectives or (2) program objectives proved unrealistic for schools. I describe how without intending to, and perhaps even contrary to certain program intentions, program suggestions treating instruction as context-independent tended to favored middle-class White children and to marginalize urban or diverse schools and classrooms, or schools having more limited resources, as viable places to engage in program-recommended practices for good teaching. For example, preservice teachers tended to describe closer correspondence between program recommendations and the policies and philosophies in certain schools and classrooms in suburban county schools near the university compared to the policies and philosophies of certain other schools and classrooms they identified as having fewer resources (e.g., funds, manipulatives). Likewise, the preservice teachers viewed the first group of schools and classrooms in more favorable light in relation to the program than the second.

These results have potential implications for practice in teacher education and mathematics education and also have relevance to discussions of ongoing standards-based teacher education and mathematics education reforms. I offer that these results help to reveal certain limitations of popular ways of defining and researching preservice teachers' learning and teacher education program coursework and fieldwork relationships. I raise the question of whether teacher educators or researchers might benefit from considering how to more substantively integrate curriculum and give greater

attention to *place* and to the broader socio-political goals we aim to accomplish through our work.

Introduction to Theoretical Grounding and Research Questions

I came through unusual means to develop the research questions I address. My research interests are primarily in mathematics education and teacher education, but I did not draw closely from any particular study or group of studies in these fields to direct the overall focus of my work. Many other studies address the various individual results and issues I highlight throughout this dissertation, and I make many different kinds of connections from my work back to other teacher education research. However, I largely developed the particular research questions I address by drawing upon the field of educational anthropology and my reading, from the perspective of a mathematics teacher educator and researcher, of Nespor's (1994) suggestions for reconstructing the aims of educational studies.

Nespor (1994) examined curricular networks of undergraduate physics and management programs and students' trajectories through these networks. Following in part from his research, and drawing on social studies of science and on geography, among other fields, Nespor elaborated a persuasive argument for incorporating a networks perspective in educational research:

> When we act we're simultaneously interacting with the people and things in the immediate environment and with people and things spatially and temporally removed from us, but nonetheless present in the situation in some way. To understand how activity is connected to learning and knowledge we have to deal with both threads of interaction. This requires us to look closely at how distant activity is transported into and made manifest in particular settings, and at how activities in those settings are connected to activities and spaces elsewhere. (p. 3)

Such a perspective includes an emphasis on space and time that traditional educational research stemming from cognitive and situative perspectives does not include. It was my reading of Nespor's (1994) text combined with my work with him in courses that helped generate my interest in spatiality. For example, I was compelled by Nespor's arguments that educational research must examine relations and movement rather than people and communities and that any analyses of knowledge and learning must take into account that we live in a global world system. I took interest in topics such as how preservice teachers contextualized their experiences in teacher education program coursework and fieldwork, in how the program helped students to perform particular kinds of program contextualizations, and in the socio-political significance of these contextualizations.

Nespor's (in press) suggestion, which draws on ideas from Hutchins (1995), Munn (1992), and Gell (1992), is helpful for thinking about what it might mean to consider spatiality in research:

> Some of what we observe only makes sense if it's seen as 'coordinated' with distant structures, in the sense that some or all of its organization or operation is defined by structures, schedules, and schemes located or unfolding at a distance in space and time. (p. 9)

Related to this and particular to education, Weade (1992) suggested a view of interactions "as dynamically constructed events that are situated within the multiple 'moments' of past, present, and future that occur both inside the classroom and in other sites of learning" (p. 104).

In my dissertation research, I thought of spaces and times not as frames of reference "inside" of which events occur, but instead, as produced and constituted through activity (e.g., Lefebvre, 1991; Massey, 1993; Nespor, 1994; Soja, 1985). Such a view does not imply that there are no physically bounded spaces or time schedules (e.g.,

classrooms, or a one-hour class meeting, respectively). A simple explanation of what this view means for researchers is that we focus not within these "bounds," but instead on the relationships that extend activities and their meanings to others elsewhere. Drawing from this premise, for example, when I took field notes in certain courses (which were physically bounded in classrooms and in time across a 15-week semester), I tried to continually listen to and look for how preservice teachers related particular courses or course activities both to other things in these courses (e.g., to what the textbook or instructor said) and also to things elsewhere. Since in this way courses and activities had no clear boundaries, I took less interest in things such as the "impact" of particular courses and more interest in how students described these courses and activities in relation to others elsewhere.[3]

In my research, I did not view the "social" as a domain within which people participate and things take place. Rather, I drew upon Latour's (1987, 2005) actor-network theory description of the social as a moment in time detectable by tracing movements from one association to the next. I kept in mind also that stable patterns are sometimes visible in the movements between associations (Nespor, 1994). These and related networks-based ideas helped me address my established research interests in elementary teacher education while also explicitly attending to my ontological view that the world works in socially, politically, and economically integrated ways. I aimed to design my project from the perspective that to understand (mathematics teacher education) activities, we must understand how they are connected to and shaped by others across space and time, and that further, the ways activities are connected and shaped can

[3] These activities from "elsewhere" thereby were simultaneously also "in" the courses or activities.

never be independent of broader, global issues (e.g., Callon & Law, 1997; Latour, 1987, 2005; Law, 1999; Nespor, 1994).

I defined the *teacher education curriculum network* as my research unit of analysis, with my use of the term "curriculum network" borrowing most closely from Nespor (1994, see e.g., p. 23), who drew on a range of ideas from actor-network theory and elsewhere. Latour (1999) suggested of actor-network theory, "It is a theory that says that by following circulations we can get more than by defining entities, essence, or provinces" (p. 20). With special attention given to mathematics education, I examined not bounded "entities" such as people or courses, but instead, relations and movement. I do identify groups, such as "graduate students," but my interest is not in defining them or their cognitions. Instead, I am interested in the relations between and beyond the students, their courses, the program, schools, and so forth.

My research focused on how knowledge and curriculum were constructed, linked, and transformed in an elementary teacher education program. I discuss ways preservice teachers drew connections across and distinctions between teacher education program components. I focus on connections and distinctions they made between their undergraduate and graduate programs, their mathematics-related experiences, their in-major and core curriculum courses, and their coursework and fieldwork—and I look at how the program helped students to do this. This dissertation addresses these questions:

- How do preservice elementary teachers characterize relationships between teacher education program components, and how do those characterizations vary or change?

- How do preservice elementary teachers explain the value or relevance of these components to teaching?

My work highlights preservice teachers' descriptions of their teacher education program experiences. In my research, I considered students' contextualizations of their experiences as *producing* task- and time-dependent meanings and relevancies (e.g., Dyson, 1999; Miettinen, 1999; Moll, Tapia, & Whitmore, 1993; Nespor, 2002) of program activities, courses, field placements, and theories. For example, I tried not to assume that particular course assignments had particular or fixed meaning for students. Rather, I considered the ways students gave assignments meaning by relating them to other things, such as to other assignments or to fieldwork. As another example, I took note of variations in students' explanations of their experiences and learning in the child development laboratory ("lab school")—for instance, whether students described their lab school experiences in relation to a particular teacher education program course or whether they described those experiences in relation to experiences in other field placements.

Overview of the Dissertation and Its Significance

I introduce the teacher education program I studied and my research methods in the next chapter (ch. 2). In two results chapters, I use preservice teachers' explanations and analyses of their experiences in the program to describe how they assigned and re-assigned meaning to coursework, fieldwork, and main program ideas and emphases (ch. 3) and how they related main program emphases to their work and learning in schools (ch. 4). These chapters point out issues associated with preservice teachers' assignments of program relevance such as:

- how collaborative and supportive relationships between coursework and fieldwork supported preservice teachers' learning of program ideas. Similar and repeated messages across the program extended the relevance of program ideas for students and communicated to them what they should or should not do in their teaching. (ch. 3),
- how the amount of time preservice teachers spent in field placements and what they did during that time contributed to their ways of assigning and reassigning meaning and relevance to courses and to course activities. (ch. 3),
- how courses' positioning in the curriculum helped to shape their relevance, and more generally, how preservice teachers shaped and re-shaped their own learning, attitudes and the relevance of program components as they moved through the program and participated in new kinds of field placement roles. (ch. 3),
- how paired program and school efforts for school change supported students to identify the program philosophy more closely with some schools and classrooms than others. (ch. 4), and
- how such an identification process produced certain kinds of socio-political geographies[4] as either constraining (or supporting) program-recommended practices. (ch. 4)

[4] I use the term "socio-political geographies" rather than "socio-political contexts" because of my interest in stable trends and also the fluidity of social and political relationships (cf., Nespor, 1994). This avoids the tone of a hierarchical view of activities as defined by or happening "in" contexts and also of their being particular, fixed socio-political "contexts" associated with activity.

As I communicate these kinds of results, I also show various ways that my research relates to and extends ongoing discussions in teacher education research. For example, in chapters 3 and 4, based on my discussions of students' shifting and context-specific characterizations of coursework and fieldwork relevance, I suggest that students' learning and assignments of relevance to their experiences could not be explained by their work in any particular course or field placement or over any given timeframe. I describe how this result helps point out certain limitations of teacher education researchers' almost exclusive tendency to focus on, for example, whether preservice teachers' conceptions change and are sustained over time and into the first years of teaching (e.g., Ambrose, 2004; Borko & Putnam, 1996; Clift & Brady, 2005; Steele, 2001) or how or whether field placements settings support, constrain, or otherwise transform teachers' learning (e.g., Cole & Knowles, 1993; Ensor, 2001; Greeno, 1998; Peressini, Borko, Romagnano, Knuth, & Willis, 2004).

In chapters 3 and 4, I shape arguments that preservice teachers established meanings for the program as a whole that also helped to coordinate what they learned in individual courses and how they constructed relevancies of the program in general. Related to these arguments, I issue for consideration additional questions for teacher education programs and approaches to teacher education research. I describe how certain popular approaches to research examining what students do or learn in one course or field placement—without looking at how those experiences fit into teacher education programs as a whole (Hollins & Guzman, 2005)—tend to overlook the larger picture of how students extend the value and relevance for some program components by relating those components to others with similar focuses.

As another example of how I relate my work to ongoing teacher education discussions and research, in chapter 5, I refer to the popular question of whether coursework and fieldwork should “align” or “fit” in vision and purpose with teacher education program objectives (e.g., Borko et al., 2000; Goodlad, 1990; Mewborn, 2000; Tom, 1997) or alternatively whether students might at times learn as much or more from classrooms that do not match program ideals (e.g., Ebby, 2000; Peressini et al., 2004). Based on my descriptions of the place-specific relevance students assigned to the program in general and to program components and of how these assignments of relevance tended to favor middle-class White children, I look at possible limitations of discussions focused on whether teacher education programs can or should focus on selecting field placements that do or do not “fit” with program ideologies—with aim for students to learn how to adapt program philosophies in a supportive or difficult “context” (e.g., Peressini et al., 2004).

Among other questions I raise, I ask whether teacher educators might find it advantageous to develop additional or different program emphases that more directly acknowledge and address the context-specificity of students’ learning and the broader purposes of schooling or the socio-political goals we aim to accomplish. I offer as one possibility that teacher educators and researchers might draw on perspectives of school “contexts” not as supports or constraints for preservice teachers’ learning but instead as part of the teacher education program and program ideology themselves (cf., Nespor, 2002). Related to this, I ask mathematics educators the question of what can or should be our roles in helping more substantively integrate curriculum and “context” (e.g., foundations topics, classroom management) into our instruction and other work with

preservice teachers. For teacher education in general, I raise for consideration whether or how teacher education programs and research might benefit from increased attention to *place* and to the socio-political geographies of schooling.

Chapter 2 The Teacher Education Program and My Research Methods

In this chapter, I introduce the 5-year elementary teacher education program I studied. Then I describe the research methods I used for this dissertation work.

The Teacher Education Program

In the 5-year teacher education program I studied, students planning to teach elementary school generally completed the Early Childhood Education [ECE] option of the undergraduate Human Development major in $3\frac{1}{2}$ years and then completed a $1\frac{1}{2}$ year Elementary Education graduate program in the Department of Teaching and Learning. Students exited the combined program with their master's degrees (MAED) and endorsement for licensure in grades preK-6. As often recommended for teacher education programs in recent years (e.g., Goodlad, 1990; Peterson et al., 1995; Tom, 1997), the program used a cohort group organization in which groups of students took many of their courses together across the 5-year time span.

In the undergraduate ECE program, those students who were sophomores at the time of my study had not completed field placements during their freshman year. All other students had participated in a field placement of some kind every semester in the 5-year program, except during the first semester of the graduate program. Some undergraduate placements were in preschool classrooms and the rest were in elementary schools—including graduate placements. Each field placement assignment was coordinated by one particular course (e.g., *Middle Childhood, Principles of Interacting with Children and Parents, Observation and Assessment of Children, Issues in Elementary Education*), and those courses also served as the primary places the program provided for students to talk about fieldwork.

Faculty in the undergraduate ECE and graduate Elementary Education programs had worked collaboratively to organize the 5-year program. Several faculty members described positive relations and overlapping objectives across these departments. For example, graduate program faculty member Dr. Norene Joseph explained:

> I think there's a comfort in knowing what kind of undergraduate program your students are coming from. And so I think there's an advantage in having a relationship—like we had a relationship with ECE, and so I guess I *knew* what courses they had [in] undergraduate. I knew the people that taught their courses most often, you know? And we did sit down with ECE and talk on a regular basis so we knew what was going on. We had some common themes and issues that we were trying to address across a 5-year program.

These relationships produced an overall cohesiveness for undergraduate and graduate program components.

The undergraduate ECE program focused on child development theory, research, and developmentally appropriate practice. The Child Development Lab (or "lab school"), where students' junior year field placements were carried out, grounded its philosophy in social constructivist theory.[5] Specifically, the lab school incorporated the early childhood education approach known as Reggio Emilia.[6] The graduate Elementary Education program described its work from a view of "powerful teaching" as based upon the interplay of knowledge of, inquiry into, and reflection upon "children and child development, teaching and learning processes in general and in specific content areas, and the children themselves and the contexts of their lives at home and at school."[7] In addition to helping students develop a strong knowledge base in these areas, the mission

[5] I obtained this information from the lab school's online mission statement and statement of philosophy.
[6] Reggio Emilia is a city in Italy recognized for early childhood education based on child development concepts such as emergent, or child-centered curriculum.
[7] I obtained this information from the graduate program's online mission statement.

included having students examine research-based instructional approaches; having faculty model instruction that students could apply in practice; engaging students in inquiry about children, teaching, and learning; and having students participate in diverse field experiences.

Participants and Data Collection

I spent the fall semester, 2004, doing ethnographic research examining the curriculum network (cf., Nespor, 1994) of one 5-year elementary teacher education program in a large public university in the United States.[8] I worked mainly with sophomore year or fifth-year students. I focused on these two cohorts primarily because of my interest in mathematics education; students generally enrolled in the *Mathematics for Elementary Teachers Course* in their sophomore year and in the *Math Methods* course in their fifth year. Table 1 lists the students I refer to in this dissertation.[9] Of the two sections of *Math for Elementary Teachers* I studied, one section enrolled 27 students and the other 29—all female, and all full-time, traditional-age college students. Of these 56 students, 54 identified themselves as European American/White on a survey.[10]

The *Math Methods* course had 16 students: 13 in elementary education and 3 in secondary mathematics education. Of the elementary education students taking *Math Methods*, 3 identified themselves as African American, 1 as Asian American, and the

[8] Appendix B includes materials submitted to the Institutional Review Board [IRB] and information about IRB project approval.
[9] A total of 17 other students (13 in *Math for Elementary Teachers*, 3 in *Math Methods*, and 1 other graduate student) also participated in 1 to 3 interviews each. I assigned each student a unique first name.
[10] During the first two weeks of the semester, all students completed an online survey requesting primarily demographic information.

remaining 9 as European American/White. Unless otherwise noted, all students listed in Table 1 from *Math for Elementary Teachers* were enrolled in the undergraduate ECE

Table 1
Students' Names by Course

Students in *Math for Elementary Teachers*		Students in *Math Methods*		Other Graduate Students	
Beth (2)	Sophomore	Aleesha	(2)	Felicia	(1)
Chrischiana (1)	Junior	Alena	(4)	Marian	(1)
Connie (2)	Junior	Angie	(0)	Meredith	(1)
Corinne (1)	Senior, non-ECE	Bobby	(1)		
Emma (1)	Junior	Donna	(4)		
Jackie (1)	Sophomore, non-ECE	Emily	(3)		
Janet (1)	Junior	Jamie	(0)		
Kristy (1)	Junior	Jennifer	(1)		
Megan (1)	Sophomore, non-ECE	Renae	(1)		
Rachel (1)	Sophomore	Valerie	(3)		
Samantha (1)	Sophomore	Veronica	(2)		
		Wendy	(2)		

program. All *Math Methods* students and other graduate students listed were enrolled in the Elementary Education graduate program. Numbers in parentheses represent how many times I interviewed each of these students.[11]

I collected most of the data I draw upon in this dissertation during the fall 2004 semester. I also draw upon five follow up student teaching interviews from spring 2005 with the graduate students with whom I had become closest. Data collection included the following, with further explanation provided below:

- Online survey to collect primarily demographic information from preservice teachers
- Copies of preservice teachers' schedules and transcripts
- 13 loosely structured interviews with faculty, including the faculty advisor for all undergraduates in the ECE program, the program area leader for the graduate

[11] Five interviews were conducted jointly with 2 or 3 students together.

Elementary Education program, graduate teaching methods course instructors (for *Math Methods, Science Methods*, *Social Studies Methods,* and *Content Literacy*), all faculty advisors for the graduate Elementary Education program (four of whom have already been described in other roles, and two additional advisors), the *Math for Elementary Teachers* instructor, the third (of three) mathematics education faculty at the university, and several other faculty

- 52 loosely structured interviews with preservice teachers: 47 of these were individual interviews; for various reasons, the other 5 were in pairs or groups of three students
    - 24 with preservice elementary teachers in *Math for Elementary Teachers*
    - 19 with preservice teachers in *Math Methods*: 2 of these were with preservice secondary mathematics teachers taking the course
    - 4 with other preservice elementary teachers in the graduate program
    - 5 with elementary student teachers during the spring 2005 term: All had taken *Math Methods* in fall 2004 and participated in previous interview(s) with me
- Many informal conversations with preservice teachers and faculty
- Approximately 200 hours of fieldnotes
    - Approximately 125 hours of fieldnotes in both sections of *Math for Elementary Teachers* (≈ 85 hours) and in *Math Methods* (≈ 40 hours)
    - Approximately 40 hours of fieldnotes in other courses, mostly in the graduate program

  - Approximately 35 hours of fieldnotes in 7 different field placements, in mathematics-related groupwork, in meetings of student-led elementary education organizations, and in other program-related meetings or activity

- Photographs and captions provided by 14 students of their workspaces, resources, and other places and materials important to their teacher education experiences; I asked students to think of themselves as co-researchers in helping to communicate images that capture the meanings to them of their teacher education experiences
- Copies of other various artifacts (e.g., some course syllabi, e-mails sent to various elementary education listserves, information about the teacher education program and the National Council for Accreditation of Teacher Education [NCATE], some newspaper clippings)

I aimed to align my research methods with the theoretical framework summarized in chapter 1. My approaches to data collection followed from my interests in learning as much as possible about the program and preservice teachers' experiences and also in situating preservice teachers' descriptions and analyses. I worked to gain rapport with students by spending time with them during some of their program activities, and I sought diversity in generating a sample and in collecting many kinds of data so that I might gain a broad understanding of the program. This goal for diversity in sampling relates to Becker's (1998) discussion:

> Remember that random sampling is designed to *equalize* the chance of every case, including the odd ones, turning up. The general method for sampling to avoid the effects of conventional thinking is quite different: it consists of *maximizing* the chance of the odd case turning up. (p. 86)

Hoping to understand the relations between activities across space and time and to identify a broad range of students' experiences and learning, I did the following:

(1) studied the experiences of elementary preservice teachers in various stages of their undergraduate or graduate programs,

(2) spent time sitting with preservice teachers at each of the different tables in the undergraduate *Math for Elementary Teachers* and the graduate *Math Methods* courses,

(3) worked with several secondary mathematics preservice teachers or other undergraduates not in the undergraduate component of the 5-year program but planning to teach,

(4) interviewed elementary preservice teachers in different preschool and elementary school placements and grade levels in the two school districts used by this program and also visited some of these placements,

(5) observed a number of different kinds of program-related activities in and outside of college coursework, and

(6) interviewed several preservice teachers who had completed the mathematics-related courses of the elementary teacher education program in previous semesters.

The next two sections describe my approaches to interviews and observations.

Interviews

Interviews generally lasted from 45 to 60 minutes and were loosely structured. I entered each interview with a range of topics I wanted to ask participants to address, but rarely used exact or ordered lists of questions. As Hammersley and Atkinson (1995) suggested:

> Ethnographers do not usually decide beforehand the exact questions they want to ask, and do not ask each interviewee exactly the same questions, though they will

> usually enter the interviews with a list of issues to be covered. Nor do they seek to establish a fixed sequence in which relevant topics are covered; they adopt a more flexible approach, allowing the discussion to flow in a way that seems natural (p. 152).

The topics addressed in interviews with preservice teachers included such things as students' overall experiences in the program, their experiences with courses in general and with mathematics courses in particular, their experiences with fieldwork, what they did with course textbooks and other resources at the end of each semester, their social and academic relations with others in and outside of courses, their relationships with faculty, their past experiences with schooling, and so forth. Interviews with faculty addressed topics such as their goals for particular teacher education program courses, their choices of course texts, what kinds of students they had, how their courses fit into the department or program, and their role and collegial ties in the program or department. If faculty also supervised field placements, I asked them questions about their supervision. At times, I also asked faculty about particular course activities I had heard about from students or elsewhere (e.g., I asked the *Psychological Foundations* professor about a mathematics-related video a student indicated having watched in the course.).

I used what participants told me to help guide the course of each interview and to help generate follow-up questions (cf., Hammersley & Atkinson, 1995). Throughout much of my data collection and analysis, and for interviews and observations alike, a main objective of mine was to listen to and question how preservice teachers' drew boundaries and distinctions in their descriptions. For example, I listened to how they distinguished in-major courses from program courses or some field placements from other field placements. I often asked students to explain further when I noticed these kinds of distinctions being made. I asked myself questions such as: "Who is drawing the

line? What are they distinguishing between by doing it? What do they think they will accomplish by making that distinction, drawing the line there?" (Becker, 1998, p. 150). When are such distinctions rendered significant (cf., Nespor, 1994, p. 11; Star, 1995, p. 11)? Becker offered that in challenging established boundaries, we might work to unravel the multiple associated meanings, to ask people to explain things we don't understand and then to follow up by checking it against what we see and hear.

Observations

Although there is no "pure" description (cf., Becker, 1998), part of my intent as a researcher when writing fieldnotes was to take Becker's advice and make "simpler, less analyzed observations" (p. 79), including as much detail as possible. Becker made this suggestion to help researchers suspend judgments and pre-categorizations of data. I took this suggestion as a key for my writing of fieldnotes. I paid attention in my fieldwork to what faculty members did or asked students to do and also to what students did and what they talked about with each other or with faculty—whether or not this had particular or explicit relationship with courses' academic content. I also took note of how long students worked on particular activities (e.g., time spent working on in-class group assignments), how classrooms or other spaces were physically arranged, how many people were present and their race and gender,[12] and so forth.

In my observations of Dr. Marisa Sullivan's two *Math for Elementary Teachers* classes and Dr. Paul Dalton's *Math Methods* class, I tended not to say very much. I talked to students about the things they brought up at their tables, but for the most part did not help them with the class activities and tried not to raise new topics of discussion. In other

[12] I did not usually note these things for consecutive visits to the same courses.

words, I generally did not initiate conversations with students about the activities they were working on or about their field placements during class, but I did sometimes follow up things they mentioned in class with questions or comments.

Mostly, I aimed not to interfere with Marisa or Paul's work or to distract students from theirs. I rarely spoke during whole class conversations. I was included in and included myself in students' conversations in different ways and occasionally asked students whether they minded my note taking and audio recording. Everyone told me they did not mind,[13] and I was never asked to turn the tape recorder off or to stop taking notes. On a few rare occasions in Paul's class, students picked up the recorder to speak directly into it, but typically the recorder sat untouched in the middle of whichever table I was sitting at or on a table along one of the room's walls. Undoubtedly, the classes were not the same with me in them as they would have been without me,[14] but as best I could tell, students mostly acknowledged me and carried on with their work and conversations with minimal discomfort with my presence and note taking.

Reflexive Design

Hammersley and Atkinson (1995) argued that in the course of ethnography, "research design should be a reflexive process which operates throughout every stage of a

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[13] One exception came early in the semester from one table in Marisa's class. Sitting at one table, I noticed two of the students looking back and forth at the tape recorder, each other, and sometimes at me as they did their group work. I did not spend much time at this table because I thought myself potentially more disruptive there. This was the only time I can recall such an incident.

[14] Becker (1996), for example, writes:

> Most ethnographers think they are getting closer to the real thing than that, by virtue of observing behavior *in situ* or at least letting people tell about what happened to them in their own words. Clearly, whenever a social scientist is present, the situation is not just what it would have been without the social scientist (p. 61).

project" (p. 24). To remain familiar with the data throughout my project, part of what I did was to revisit on a day-to-day or week-to-week basis some of my fieldnotes and interviews. For example, of the 65 interviews I conducted, I transcribed 46 of the fall 2004 interviews that same semester, which allowed me to continue to think about what I was learning from students. I hired transcription help for the other 14 interviews that semester (so that all 60 interviews from the fall were transcribed prior to December 25, 2004) and the 5 student teaching interviews conducted during spring 2005. Further, I typically typed up my hand-written field notes within 24 hours of observations (cf., Emerson, Fretz, & Shaw, 1995).

The types of things I learned on a regular basis informed the ways that I continued the project. In a sense, I thought of participants as co-researchers with me (Erickson, 1986) and used their suggestions to help direct some of my attention. For example, one of the first preservice elementary teachers I interviewed indicated having participated in a campus organization for Early Childhood Education the previous year. I asked her to talk more about her experiences and then followed up this interview by asking her when the first meeting of the year would be for that organization, eventually attending that meeting and interviewing the organization's president. As a second example, in an interview with one faculty member, I learned about how Kathy Willis (mathematics supervisor) and Natalie Hall (science supervisor) from the surrounding Lewiston County had been invited to lead seminars in *Issues in Elementary Education*, and I attended and took fieldnotes at those sessions.

My ways of adjusting data collection strategies based upon what I learned from preservice teachers and faculty helped shape the kinds of things I learned in the study.

For example, sitting in on Kathy's sessions and hearing the emphasis on *Everyday Mathematics* (University of Chicago School Mathematics Project [UCSMP], 1997), which I had to some extent also heard in Paul's course, led me to give more thought to mathematics-related differences in the program's relationships with field placement schools in Lewiston County and Bremont City. This observation also helped identify some of my major points from this study regarding differences in the program's place-based relevance in schools.

More on Data Analysis and Writing

I indexed each interview using descriptive categories that included as little analysis as possible, in a manner similar to Becker's (1998) suggestion for writing fieldnotes. These indices helped me to locate places in transcripts where participants talked about particular topics or ideas, and I used them as a referencing tool on a regular basis from the time I began producing them during data collection through the time of my completion on the writing of this dissertation. I stored these indices using *Excel* software and have included below as Table 2 a sample from my indexing of a transcript with Donna from September 14, 2004.[15]

[15] This is an index for approximately the first 5 pages of a 17-page interview. In the table, "Ugrad" represents "undergraduate" and "Grad" represents "graduate."

Table 2
Sample of Transcript Indexing

Line #s	Topics
11-36	Field placement this semester
37-59	My visit to her classroom
60-74	Ugrad program - preschool, child development
75-92	Grad program, lesson plans/unit plans, tutoring
93-121	Modeling, lesson plans
122-131	Past experiences with science, timing of field placement
132-160	Ugrad/grad relation, purpose of ugrad
161-184	Field placements, coursework/fieldwork
185-189	Lab school - Reggio Emilia approach
203-216	Signing up for courses
217-226	Electronic portfolios

Although such indexing unavoidably involves analysis, it should "not be thought of as the analysis in itself" (Coffey & Atkinson, 1996, p. 26), but as a tool for organizing, managing, and retrieving data. The indexing of transcripts proved very helpful in my identification of relevant data sources for review. I revisited transcripts and fieldnotes, as well as some of the other data, many times from the beginning of data collection through the writing of this dissertation. I jotted many notes to myself about my research both during and after data collection and during my writing. I reviewed these notes throughout the project, also making notes about my notes, similar to the process Dey (1993) referred to as "annotating data" (p. 88). "From such lines of questioning and reasoning, working recursively back and forth between hunches and data, one progressively arrives at new insights" (Erickson, 1998, p. 1165).

As I have suggested above, much of what I did was to consider ways that preservice teachers distinguished components of the curriculum and how they drew those distinctions. When I heard students separate out their in-major courses from core curriculum courses, coursework from fieldwork, the undergraduate program from the graduate program, or lab school from other field placements, I took note of what they

were distinguishing—beyond structural or taken-for-granted definitions (Nespor, in press). I also related these distinctions to what I had heard previously from preservice teachers, often referring back to previous transcripts and jotting notes about similarities and differences in their descriptions.

Also for data analysis, on several occasions I did such things as pull out many transcript chunks (sometimes 1 paragraph; sometimes 1 or 2 pages) in which students drew various distinctions or connections across the program and then sorted those into piles where students gave similar explanations for how or why program activities were related—also jotting notes based on these sorting activities. This activity proved helpful to data analysis. For example, it was during my sorting of various student comments regarding lab school that I recognized differences in how students tended to talk about their work in lab school, and I noted how their current field placements helped to coordinate these differences. I realized that I could not effectively describe the meaning or value students awarded lab school without also providing information about their current placements. As another example, it was also during my sorting of students' comments about field placements that I came to conclusions regarding the significance of the timing of courses and their relationships with field placements in making the program seem realistic and important to students. It was these types of activities paired with feedback from colleagues that eventually helped me to organize my thinking for this dissertation into its present form.

From my analysis of the data, I selected for this dissertation those topics I thought might have greatest significance for teacher education programs, faculty, and researchers. I wanted to challenge popular assumptions (e.g., assumptions about learning based on

cognitive and situative perspectives) and to raise issues and questions having social, political, and economic implications. I chose not to write about, for example, differences I observed and otherwise learned about between the experiences of preservice teachers in the ECE program and of those students who were planning to teach elementary school but majoring in a field such as Interdisciplinary Studies. I did not aim to incorporate all possible research results or to discuss only my most commonly noted observations or student responses. Instead, I selected and used particular data I thought best responded to my research questions and best highlighted the issues and questions most important about my work.

Research Limitations

My research should not be thought of as an example of a study carried out within the framework described in chapter 1, but only as being informed by these ideas. Given the limited capabilities of independent dissertation research, I did not spend as much time in students' college courses (e.g., methods courses in content areas other than mathematics) as I would have liked and spent only very limited time in students' field placement classrooms. Ideally, this study would have been longitudinal across student teaching and into students' first several years of school teaching. Longitudinal research of this kind—including many observations in the various urban, suburban, and rural schools of student teaching and full-time teaching—could have proved invaluable to understanding the value and relevance students later assigned to the program once they became immersed in schools and school cultures.

My research would have been improved by working collaboratively with colleagues at multiple universities so that together we might learn more about preservice

teachers' learning and their shaping and re-shaping of relationships between coursework and fieldwork in programs having different goals and structures. A research team could have learned more about the different meanings and relevance (or irrelevance) that students assigned to different kinds of teacher education program components in different urban, suburban, or rural schools and classrooms across the U.S. or internationally. Having collaborators would also have provided me with more opportunity and time to talk to cooperating teachers and school principals across schools and school districts. Such data collection, along with collecting copies of much of students' work over time in the teacher education program, would have helped me contextualize students' experiences and learning further and to also better situate students' descriptions of their experiences in socio-historical contexts. All of these research approaches would have improved the study's quality as well as its overall consistency with the networks-based theoretical ideas drawn upon.

Chapter 3 Curriculum Networks

In the next two chapters, I communicate how students shaped program meanings and how the program helped them interpret their experiences in schools. In this chapter, I look across the undergraduate and graduate programs to begin describing some of the ways students assigned and re-assigned meaning to coursework, fieldwork, and main program ideas and emphases. I discuss how students separated out core curriculum courses and other courses, and I communicate various things helping preservice teachers to shape and re-shape their own learning, attitudes, and the relevance of program components. For example, I describe the contributions of similar and repeated messages across the 5-year program, of collaborative and supportive relations between coursework and fieldwork, of the time preservice teachers spent in field placements and what they did during that time, and so forth. In chapter 4, I explain how graduate preservice teachers' experiences in the program helped them produce the program's different relevance in different schools and school districts having varying racial and ethnic diversity, financial resources, discipline policies, and so forth.

First, to further clarify my research focus, I introduce popular cognitive and situative perspectives in educational research. I then discuss how my research departs from research from these perspectives.

Cognitive and Situative Perspectives

> From a cognitive perspective, knowledge and beliefs are major determinants of what teachers do in the classroom, and a central goal of teacher education is to help prospective teachers acquire new knowledge and beliefs. A situative perspective suggests that knowledge and beliefs, the practices they influence, and the influences themselves, are inseparable from the situations in which they are embedded. (Borko & Putnam, 1996, p. 73)

Cognitive and situative perspectives dominate research on teachers' learning. For about the past 20 years, investigations of teachers' beliefs and knowledge have been very common in teacher education literature. Commonly investigated topics in this area include preservice teachers' prior beliefs, knowledge, and attitudes, changes in these constructs in association with program coursework and fieldwork, and connections between stated beliefs and teaching practices (e.g., Borko & Putnam, 1996; Carter 1990; Clift & Brady, 2005).

In mathematics education, research from cognitive perspectives has been very popular, and especially in the late 1980s and the 1990s. For example, researchers have suggested that preservice elementary teachers enter teacher education programs with prior conceptions of mathematics as a fixed body of facts, rules, and formulas (e.g., Ball, 1988, 1989; Foss & Kleinsasser, 1996; Roth-McDuffie, McGinnis, & Graeber, 2000; Steele & Widman, 1997; Stuart & Thurlow, 2000), as a school subject largely disconnected from the real world (Ball, 1988; Schram, Wilcox, Lanier, & Lappan, 1988; Thompson, 1992), and with right or wrong answers (Steele & Widman, 1997; Stuart & Thurlow, 2000) and one best way to obtain correct answers (Frank, 1990; Lappan & Even, 1989). Research making these types of conclusions generally can be associated with assumptions that preservice teachers' "prior knowledge" or "prior conceptions" impact much of what they experience in the teacher education program as well as the ways in which they eventually teach (e.g., Lortie, 1975; Pajares, 1992; Thompson, 1992). The major question regarding "learning to teach" in cognitive psychology is "how knowledge and beliefs change over time as novice teachers learn to teach and

experienced teachers attempt to make changes in their teaching practices" (Borko & Putnam, 1996, p. 673).

From situative perspectives, learning represents a process of changing participation in socially organized activity (Lave, 1988; Lave & Wenger, 1991). Situative perspectives argue that "knowing and learning are situated in physical and social contexts, social in nature, and distributed across persons and tool" (Putnam & Borko, p. 12). From a situative perspective, understanding teacher learning requires examining the relationship between what people know and the settings in which they know (Greeno, 1997). Researchers give attention to how different settings for teacher learning afford different kinds of knowing (Putnam & Borko).

Peressini et al. (2004) presented a conceptual framework for studying the process of learning to teach mathematics from a situative perspective. In their *Learning to Teach Secondary Mathematics* study, Peressini et al. conceptualized beginning teachers' learning to teach as "a trajectory through the multiple contexts of teacher education" (p. 71). One novice teacher they studied, Mr. Hanson, completed his student teaching in a wealthier and less diverse district surrounding his university and his first year of teaching in Rose Tall Middle School, located in a diverse, mostly working class suburban school district with over a fourth of its 600 students Hispanic. Peressini et al. interpreted Mr. Hanson's very different instructional practices between student teaching and his first year teaching "as an interaction between his developing professional identity and the affordances and constraints of these two settings" (p. 82-83). They offered as a possible explanation for the discrepancies in his instruction to center on the "relationship between Mr. Hanson's evolving identity as a teacher and two very different teaching situations"

(p. 87), explaining the sociocultural context and the demands placed on Mr. Hanson at Rose Tall Middle School to be at odds with his developing professional identity.

Ebby (2000) and Mewborn's (2000) dissertation research similarly represent examples from mathematics education that drew on situative perspectives. Ebby and Mewborn conducted similar studies in that each looked across a mathematics methods course and a field experience to examine preservice elementary teachers' ways of connecting these experiences. Mewborn searched for the characteristics of activities that enabled preservice teachers to reflect on mathematics teaching and learning in a field experience centered on and encouraging reflection on children's thinking and its impact on instruction. Ebby described how students tied together and learned from particular groupings of coursework and fieldwork "in a teacher education program that consciously aimed to integrate these two contexts" (p. 71).

Mostly working from cognitive and situative perspectives, teacher education research has focused heavily on preservice teachers' learning in particular course or field placement experiences or in a paired coursework and fieldwork experiences. Very little research has looked beyond these individual and paired experiences to examine how beliefs or meaning-making are shaped and reshaped over time (Clift & Brady, 2005). In my research, I did not view preservice teachers' cognitions to be developmental and based on some fixed prior knowledge or conceptions, as in some cognitive studies. I also did not view preservice teachers' learning as situated in particular course or field "contexts," and I did not focus on preservice teachers' ways of making use of particular program knowledge in particular field placements. Studies examining these issues can be very valuable, but they tend to do little to position students' experiences and learning

either in the teacher education program in general or in broader socio-political geographies. I aimed to address both of these things in my own research.

Relation to My Research from a Networks Perspective

As previously noted, I approached my research from a networks-based perspective in which I focused on relations and on movements between associations. I tried to understand students' ways of producing and re-producing program meanings and relevance. I considered the relations students formed and re-formed between their various experiences as representing the transitioning meanings and relevance of the program and program activities. Because I thought of preservice teachers' ways of participating in, shaping, and making meaning of activities as being coordinated with other distant activities (cf., Nespor, in press), I tried to identify patterns and differences in the ways students identified or described relationships between activities.

In this chapter, I begin to show how students' learning and assignments of relevance to their experiences could not be explained by their work in any particular courses or field placements or over any given timeframe. I also point out certain limitations of teacher learning research that questions whether preservice teachers' conceptions change in programs and are sustained over time (e.g., Ambrose, 2004; Borko & Putnam, 1996; Clift & Brady, 2005; Steele, 2001) or how or whether field placements settings support, constrain, or otherwise transform teachers' learning (e.g., Cole & Knowles, 1993; Ensor, 2001; Greeno, 1998; Peressini et al., 2004). In chapter 4, I point out how such practices also tend to overlook teacher education programs' different kinds of relationships with schools and how different groups are positioned differently in relation to knowledge and its movement (cf., Nespor, 1994).

Separating Out Core Curriculum and Other Courses[16]

Research has suggested attendance at college to impact critical thinking and reasoning skills, improve written and oral communications, and increase intellectual flexibility (Pascarella & Terenzini, 1991). Although much research has been conducted on college student learning, thus far very little research has specifically addressed the general education experiences of preservice teachers. In their report to the AERA Panel on Research and Teacher Education, Floden and Meniketti (2005) indicated finding no studies meeting their analysis criteria that addressed the impact of arts and science courses outside of preservice teachers' field of study. Floden and Meniketti described these courses to include those taken as part of undergraduate education and as electives or to fulfill general education requirements. My dissertation research does not offer any new information about possible general impacts of college on students' learning, but it does give attention to preservice teachers' descriptions of their college coursework—including their descriptions of general education, or core curriculum, coursework.

Preservice teachers explained how some college courses included content more relevant to their futures than others, or how some groupings of courses (e.g., "in-major courses") included content more relevant than other groupings (e.g., "core curriculum courses"). I asked students how they drew distinctions between courses as they performed these characterizations (cf., Becker, 1998). Chrischiana, a junior in ECE, explained reasons why some courses better prepared her to teach than others:

> Laura: You made a distinction between some of your courses you felt like were preparing you more to teach—you mentioned *Math* [*for Elementary*

[16] Appendix A includes program checklists for the undergraduate Human Development program, with an Early Childhood Education Option. The core curriculum courses taken by most preservice elementary teachers are summarized on this checklist.

> *Teachers*] and *Human Development*. And then you also mentioned things like astronomy that you have to take. Can you talk more about how you see those distinctions being made? Like how you're making the distinctions, I guess I should say?
>
> Chrischiana: Okay. Sure. I feel that as a teacher, I'm not going to be teaching my students college level astronomy. And I know that it's important for me to have that knowledge because, you know, if I just came to college and learned only, like, elementary-level everything, it wouldn't be good. But I think that at the same time, if I'm going to be in an astronomy class, I want them to talk about how I can apply it to elementary school students. "Okay. You're in the astronomy class. Well let's say you're teaching an elementary school class. What are some of the things that would be important for you to teach this grade level? What are some of the key things that they're learning at this age?" And things like that. For *Math* [*for Elementary Teachers*] we do that. Because we focus a lot on what [kids] are learning and what it means. I think in my *Human Development* classes, some of them were very specific towards teaching—like *Middle Childhood* and *Principles of Interacting with Children and Families*…And we specifically talked about different discipline strategies, things like that. I'm trying to think. Some of the classes, I just…I feel like those are much more important because they're giving me practical skills that I can use when I graduate.

Chrischiana identified some of her courses to focus on what kids are learning or to include discussions about discipline strategies.[17] These or other school- or teaching-related course emphases and discussions helped college coursework come across to students as more practical. Chrischiana and other students knew they could not anticipate all they might need to know in the future in order to teach elementary school—that they needed more than "elementary-level everything." Some mentioned, for example, not being able to predict what kinds of questions children might ask. But "college-level" content in and of itself mostly did not contain any particular value for preservice teachers.

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[17] Interestingly, neither the syllabus nor class discussions in *Math for Elementary Teachers* focused explicitly on what kids learn in schools. However, preservice teachers did, for example, work through problems and activities from actual middle school mathematics curriculum materials on a regular basis both in and outside of the course. My interest at present is only on Chrischiana and other students' experiencing of courses as having, or not having, particular emphases or importance.

In the above transcript, Chrischiana provided examples of some questions courses might address to help her make connections between college-level content and her future in teaching. Among many other students, Emma and Samantha also talked about and compared the relevance of their courses to their futures:

> I see more of a purpose behind MATH 1055 and 1056 [the *Math for Elementary Teachers* sequence] versus MATH 1021 [*College Algebra and Trigonometry*] and 1022 [*Calculus I*] because in these classes you're actually learning how to teach children different math skills whereas in the other math classes you're doing trig and calc, which you will *never*—or *I* will never use again in my life. I'm not going to be an engineer. I'm not majoring in physics. I'm going to be teaching kindergarteners what blue and yellow is, you know? (Emma, junior)

> I think, like the biology—I mean, there's no way you're going to be teaching kids about the digestive system in all the detail that we did….I just think that it was almost a waste….I learned a lot, yes. It was valuable to me. It was educational or whatever. But at the same time, like how is it going to help me in five years? It's just really not. The geography class was a huge waste of my time….I don't even remember what I learned in there now and it's only been…a year. But there's no way you're ever going to use that in your teaching. What else did I take? The calculus—it was pointless. Because I mean, what are you going to use calculus for when you're teaching kids? You know?….I mean I'm sure there are reasons behind it. Maybe I just don't know them yet….I just think a lot of it was a waste, honestly. But, you know, you do what you got to do. (Samantha, sophomore)

With rare exception, preservice elementary teachers did not see much point to taking courses if they did not determine those courses as helping prepare them to teach or as otherwise related to their personal interests.[18] How and whether students defined course content as important to teaching depended on the potential they identified in the content, or that the program helped them identify, to be adapted for use in elementary school classrooms. Students did not expect some courses to be useful beyond the one semester timeframe of their enrollment given, for example, that they had no plans to go into fields like engineering or physics.

[18] Students had few, if any, available credit hours to select electives matching their personal interests outside of teaching.

The preservice teachers in my study almost always described core curriculum courses as having little relevance beyond the term of their enrollment. Students described core curriculum courses overall as having limited structured or explicit connections between them, or to students' in-major courses, or to students' futures. Although these courses represented a broad range of content that had potential relevance to teaching, students viewed the courses as isolated from their career interests and having little potential usefulness in their future work with kids. Whereas students identified some course material with professional work in fields like engineering or physics, they mostly did not identify the material with work in elementary schools. None of the information made available to students by faculty (coming from many different departments and usually with no ties to teacher education), texts (generally written by content-area experts and not for the purpose of teacher education), or peers (placed in similar situations as they were) gave students particular reason to believe some courses or their content had significance for them beyond the end of the term—whether for their future teaching or otherwise. In other words, nothing else in students' college careers moved those courses to have immediate significance.

Meredith, a student in the graduate Elementary Education program, had completed her undergraduate major in a science-related field. Similar to the way Samantha commented about not remembering what she learned a year ago in geography, Meredith suggested of her entire undergraduate program: "Honestly, in [this semester's] kindergarten [field placement],…in my experiences so far, I feel like I've forgotten all my [undergraduate major] stuff. It just complete-, that part of my brain is so shut off." Meredith described having a strong background and interest in mathematics and science

and looked forward to teaching mathematics and science classes in her future elementary school classroom. But she also indicated, "Like the math or science classes I had [in college]—I do not see them connecting anything to teaching elementary. No. [Laughs] I don't see the connection personally." What made Meredith identify undergraduate major course material as relevant in the past (e.g., her previous plans to work in a science-related field) did not make that same material relevant to her in her present or future. We might think of Meredith's characterization of course material as "forgotten" as representing how that material did not have any structured or clearly identifiable relationships with her (new) future in elementary school teaching. Similar to how Meredith's courses from her science-related major were "forgotten," so too was most content from core curriculum courses "forgotten" by students.[19]

Thus far, I have focused on core curriculum courses (and for Meredith, courses from a different major) as among those that students generally described as irrelevant to them and related to nothing in particular from other activity in their lives or their futures. This suggestion for core curriculum courses in my research is similar to Nespor's (1994) suggestion for management courses. Compared to physics program courses, which were

[19] My description of "forgotten" makes use of suggestions made by Nespor (1994) and Star (1995) and also ties back into my use of the term "relevance." Using some language from actor-network theory, Nespor explained:

> Drop a student or a physicist or a manager on a deserted island without their tools and colleagues and the questions of what they "know" and in what sense they've "learned" are rendered moot. Since learning and knowledge are not properties of individual actors we cannot speak of someone having "learned" differential equations or financial ratios unless they're moving along a trajectory that at least periodically re-assembles the distributed or networked actor in practice-relevant configurations. (p. 11)

Related to this, we might consider whether the course material was "really" forgotten by also addressing Star's challenge to "raise the concept of 'really' to the status of rigorous, reflexive inquiry and ask: *Under what conditions does the question get raised*?" (p. 11). We might ask what makes academic content either "relevant" or "forgotten."

organized in sequence and part of a time frame extending across courses and years, Nespor described management courses as fragmented in time, limited to a 15-week semester time frame, and not constituting a network. He explained how "the courses didn't build upon or relate to one another, and classwork consisted of brief, discrete tasks" (p. 85). Such an explanation of most material from most core curriculum courses was also typical from the students in my study. Unless courses, or particular course activities, had clear or explicit ties to others or to the teacher education program or teaching, students almost always classified those courses or activities as irrelevant to their futures. Their relevance to students had limited extension beyond the scope of the course and semester.

Producing Value and Relevance of Coursework and Fieldwork

Although much research across disciplines has addressed the impact of methods courses and other subject-matter specific work on preservice teachers' general pedagogical and subject-specific knowledge, beliefs, and practices (Borko & Putnam, 1996; Clift & Brady, 2005), very little research has given attention to how students identify relationships and produce coherence between courses and field placements taken as part of the teacher education program. My research provides some insight into the ways students did these things as they shaped program meanings. The previous section explained how preservice teachers viewed core curriculum courses as having little relevance to their futures in teaching. In the next part of this chapter, I describe how for the preservice teachers, the various overlapping program emphases, structures, and processes they identified helped to coordinate ways that they assigned and reassigned the value and relevance of program-based coursework and fieldwork and the program in

general. To conclude the chapter, I use these discussions to reveal certain limitations of popular ways of defining and researching preservice teachers' learning and teacher education program coursework and fieldwork relationships.

Undergraduate and Graduate Program Courses and Connections

Students sought and found purposes and value to in-major courses that they as a whole did not find in core curriculum courses. In many cases, graduate students described common ideas and philosophies to be shared by faculty across courses or across the entire 5-year program.[20] Emily explained:

> Emily: [In] all my classes [laughs], undergrad and graduate.…All our teachers seem to share, like, the same philosophy on, you know, student-directed learning, you know, integration of subjects, constructive guidance and discipline. Um, gosh what are some of the other ones? [Pauses 6 seconds] I should know all these. But I mean just certain things, like, like if I would ask somebody else in my major, you know, what are your views on, you know, discipline? I'm sure they would spit out the same thing as me. You know, just because our classes all use the same texts and stuff that kind of support…that philosophy. But I mean I think it is good. I mean it's research-based, you know? And we've got the research to support it. But it's just very kind of idealized. I mean it's not bad at all. I like it very much. It makes you strive to be the best teacher ever. But then, you know, you have to kind of find the meeting point between the reality of the school system and then your philosophy as a teacher. I don't know.
>
> Laura: That's very interesting. [Emily laughs.] No, that's great. That's very helpful.
>
> Emily: Because, yeah, I'm sure if we all, if everybody in our major wrote…what our philosophy of learning was, then I'm sure they would all be very much the same.
>
> Laura: …What about philosophies of teaching math? What would you say would be people's views on that?
>
> Emily: Investigative approach! [Laughs] I'm pretty sure. The investigative approach. You know, a problem or game as the introduction. Not worksheets over and over. Not just writing a problem on the board showing kids how to do it and then having them practice it. It would be more of a just, you know, giving them a task and then having them use

[20] Students pulled some of these "philosophies" together during the graduate program. Some sophomores and juniors, for example, did not describe quite as strong of a connection between courses as graduate students, looking back, generally described.

> something, use their math skills. You know, not say, "Use this to solve it." But kind of them thinking for themselves, "Okay, what do I need to be able to solve it?" It's more meaningful, I think. More engaging, more thought provoking. Investigative approach. [Laughs]

Students' descriptions of program coursework highlighted ways that courses shaped their learning partly by having clear individual relations and relevance to elementary school teaching and also partly by having things in common with other courses. From overlapping content and ideas, graduate students came to identify particular things communicated to them across much of the 5-year program—such as how Emily named "student-directed learning," "integration of subjects," "constructive guidance and discipline," and the "investigative approach" (Baroody, 1998). A central topic of the next chapter, but introduced in Emily's comment from above, is how students also constructed the relevance for these "idealized" philosophies by positioning or testing them with the "reality" of school systems. We might view students as attributing to the program certain kinds of meanings and value through their ongoing identifications of certain kinds of "meeting points" between the program and schools. The meeting point Emily identified between the reality of the school system and her philosophy as a teacher can perhaps be thought of as helping her define the program's relevance in school systems.

With the NCTM (1989, 2000) providing much of its guidance, the current reform movement in mathematics education supports a shift in the nature of mathematics instruction toward a more problem- and student-centered approach in which students conjecture, test, and build mathematical arguments. Teachers represent providers of opportunities more than providers of knowledge. The term Emily used for mathematics instruction called the "investigative approach" came from and was used and described

extensively in the *Math Methods* course textbook, *Fostering Children's Mathematical Power* (Baroody, 1998), from which Paul assigned most in-class assignments and homework. The text's author Baroody, and also Paul, described the "investigative approach" to be an NCTM *Standards*-based (1989) approach. In an interview, Paul summarized the approach as "inquiry-based and activity-based and interdisciplinary and interconnected." Paul usually referenced and supported Baroody's "investigative approach" several times during each class meeting and drew comparisons and contrasts to "skills," "conceptual," and "problem-solving" approaches.[21] Paul regularly provided recommendations for teaching based on the "investigative approach." In *Math Methods*, from their use of the Baroody (1998) course text and their work with Paul, graduate students gained familiarity with the "investigative approach." Graduate students also understood the "investigative approach" to be the recommended instructional philosophy for mathematics.

Specialized philosophies and language. Students in the graduate program developed shared ways to communicate program emphases. Like Emily, Marian expressed that all students in the graduate program developed the same teaching philosophy:

> I think a lot of girls in the program, pretty much everybody, has the same basic philosophy—that they want a child-centered classroom with lots of, like, inquiry-based activities. I kind of wonder what it would be like to have gone to a different graduate program, or to a different school completely. The program at Our University just has a very definite philosophy that runs through every class.

Many students indicated that courses and faculty in the five-year program communicated clear and consistent child-centered and inquiry-based recommendations for teaching.

[21] Paul used these terms in similar ways to their incorporation in the Baroody text.

To illustrate relationships students made between various courses and course philosophies in the program in general, I use a set of field notes from an evening I spent with several *Math Methods* students (Wendy, Jamie, Emily, and Bobby) as they completed a group homework assignment at Wendy and Jamie's apartment. Everyone had mostly completed the assignment individually before the meeting, but had left gaps where they had questions. At the one hour meeting, students shared and tried to come to agreement on answers to each homework question. Toward the meeting's end, the group went to Wendy's room. Emily used Wendy's computer to type up one brief part of their assignment as group members made suggestions for what to write. Within a minute or two everyone spread out and chatted to each other as Emily continued. I wrote the field notes that follow about the last few minutes of the group's meeting immediately after leaving the apartment:

> Wendy and Renae stood a couple of steps back and started talking to each other. I heard them saying that they had never seen the "investigative approach" in action. I turned to talk to them. Wendy mentioned that the exception was in Paul's class [referring to him teaching *Math Methods* by modeling a similar approach]. Renae commented that they were college students, though. She said that of course college age students could do it, but wondered whether second graders could do it. Wendy said it wouldn't work in her school [referring to her field placement in Lewiston County] because she has to follow *Everyday Math* in the same way her [cooperating] teacher does.[22] Wendy mentioned that she knows investigative is what Paul wants. They mentioned again that they had not seen the investigative approach in action. Renae said she wished they could see Paul using the approach with a second-grade classroom. I asked if they had seen any videos of that kind. They both said they had. Renae said she always wonders about those, though. She said the students always act perfect and answer all the teacher's questions. Wendy agreed. I asked if they specifically talked about the "investigative" approach in any of their other courses. They told me that they didn't use that term, but they talked about the same idea. Wendy mentioned that they talked about "hands-on." [She moved her fingers as if illustrating quotes around these words.] Renae said they talked about the inquiry-based approach in their science class.

[22] Incidentally, Renae was also in a Lewiston County field placement using the *Everyday Mathematics* (UCSMP, 1997) curriculum materials.

During the 1990s, in response to the ongoing movement and with federal funding support from the National Science Foundation, numerous sets of *Standards*-based (NCTM, 1989, 2000) curriculum materials spanning preK-12 education were generated. The elementary school *Everyday Mathematics* curriculum materials (UCSMP, 1997) referred to by Wendy represent one such set of materials emerging from this effort.[23] Students treated the "investigative approach" as a program-recommended instructional approach that they could compare to what they observed in school classrooms and to how they might want to teach in the future. Wendy and Renae's suggestions regarding the "investigative approach" depended in part on their experiences of how resources—such as *Everyday Mathematics*—were made available and used in their field placement classrooms.

Preservice teachers commonly determined the meaning and value of their own learning in college classrooms in relation to children's learning in school classrooms or at times to their own past experiences with schooling. Further, they and many other preservice teachers identified similarities between ideas they learned for teaching math and ideas they learned for teaching science. Marian explained about the program:

> We've gotten a lot of inquiry-based, child-centered instruction, which is great….It's such an exciting thing to be able to not do worksheets, but have the children, like, discover things on their own. That's something that I've found has been true in *all* the classes, especially math and science classes. The one thing kind of frustrating is that it seems like it would be really hard to implement every day, to have inquiry-based with manipulatives. Sometimes you just need to do direct instruction. They don't really seem to like direct instruction too much in the

[23] *Mathematics in Context* (National Center for Research in Mathematical Sciences Education and Freudenthal Institute, 2001) and *Connected Mathematics* (Lappan et al., 1991-1997), both used in the *Math for Elementary Teachers* course, likewise emerged as part of this reform effort, but I will not be focusing on those materials here since they do not add as much to this particular discussion.

> program. It's very, like the children should just explore and learn, like through exploration.

Marian later added:

> For the most part, we get the same message in every class. It's kind of, like, beaten down your, shoved down our throats a little bit. It gets kind of redundant.

Little doubt existed among the graduate preservice teachers I spoke with about how the program hoped they would approach instruction in their future classrooms—and across content areas. Seemingly, the program's messages about child-centeredness and inquiry came across clearly and strongly to all of them. Students could use these discourses with relative ease. According to students, the program—and methods courses in particular—emphasized the importance of incorporating "inquiry-based, child-centered instruction," and sometimes to the point where such an emphasis came across as redundant. Students generally viewed these strategies to represent the program's recommendations, regardless of the classrooms or schools of their current placements or the kinds of schools where they might eventually teach.[24] Further, what students learned in the program generally came to be represented for them by these consistencies between particular course ideas.

Similar and repeated teaching-related messages in multiple courses helped students shape a program-related "view" or "philosophy" of teaching. Close conceptual connections between some courses extended the time frame for the relevance of those courses and course ideas. For example, students almost always indicated these ideas and strategies as being important ones for them to try to use in their own teaching. Overlapping course emphases helped coordinate what students could reflect on and "see"

[24] It is these kinds of generalized strategies for "good" teaching that I later refer to as "context-independent."

in classrooms and thereby also became a mechanism for students to evaluate their ongoing or future work in schools. As I continue to explore in the next chapter, this mechanism further helped students to evaluate program relevance, such as how Marian offered that certain things would be "really hard to implement every day." Marian's explanation above shows how she experienced repeated program recommendations to conduct inquiry-based instruction with manipulatives and to help children learn through exploration rather than through direct instruction. This repetition also shaped how Marian defined the program in general.

Several graduate students coming from undergraduate backgrounds outside the ECE program pointed out the extent of their peers' familiarity with program-based and specialized ways of talking and thinking, and how this was a background they did not share. Meredith explained of the graduate Elementary Education program:

> Meredith: It's been [pauses 4 seconds] very different from [my undergraduate science-related major]….In the beginning, there were so many new terms and so much new stuff….It was just like, "What's going on? Like how come they know all these terms and stuff?" I felt like there was little intro for me there. I was just kind of, like, thrown in….But they definitely all had similar backgrounds…
> Laura: Can you give me an example of the terms?
> Meredith: Well I remember in one class we talked about Piaget and Vygotsky and those people….Everyone seemed to know their principles…And the professor kind of glazed over it. And then a KWL chart.[25] They're like, "Oh yeah. We know what that is." And I'm like, "What are these *things* [her emphasis]?"….And SWBAT or whatever, "The Student Will Be Able To"….There are all these terms that they were just so comfortable using or whatever.

Tom (1997) posited one of the common criticisms of teacher education to be "directionless education courses…multidirectional, with each teacher educator blazing a

[25] KWL charts are often used for reading instruction and have columns related to (1) what I KNOW, (2) what I WANT to know, and (3) what I LEARNED (Ogle, 1986).

separate trail toward whatever destination that instructor views as embodying a well-prepared teacher (Kagan, 1990)" (pp. 52-53). This was not the case for those in-major undergraduate and graduate courses talked about most often by the preservice teachers in this program. Students discussed teaching using language learned at least in part in the five-year program and unfamiliar to students like Meredith who entered the program later in their college careers. Graduate students described how courses' generally consistent overall messages were "ingrained" in them or even, "shoved down their throats a little bit."[26] Looking across a number of programs, Goodlad (1990) and colleagues similarly noted that methods courses at the elementary level generally included repetition and communicated several overlapping and relatively well-known approaches to teaching.

Coordinated Coursework and Fieldwork Relationships

Field experiences represent a very widely accepted component of the teacher education experience (e.g., Feiman-Nemser & Buchmann, 1985; Guyton & McIntyre, 1990). Goodman (1985) described that the preservice teachers in his study considered field experiences to be "the fundamental substance of professional education" (p. 44). In this section, I address how various forms of coordination between sophomore and junior year coursework and field experiences helped to shape students' ways of making meaning out of those experiences. I do not focus here on graduate students' experiences because I spend much of later sections, as well as the next chapter, describing graduate students' ways of determining the meaning and value for these and other program experiences as they looked back on their 5-year program.

[26] Emily, a graduate student, used the term "ingrained" (see ch. 4). The second quote is from Marian (included in more detail earlier in this section).

***Sophomore year*.** Most sophomore preservice teachers enrolled in *Math for Elementary Teachers* in fall 2004 were also enrolled in four or five additional courses. These included core curriculum courses, such as biology or history, and in-major courses. As part of one of their in-major courses (either *Middle Childhood* or *Principles of Interacting with Children and Parents*[27]), they spent two or three hours per week in a preschool or elementary school classroom, participating mostly as observers or teachers' aides. As I mentioned previously, sophomore ECE students taking *Math for Elementary Teachers* that fall had not completed a field placement the previous year. The sophomore year assignment represented their first field placement given by the program. When I asked Samantha, a sophomore taking *Middle Childhood*, to tell me about what she did in her field placement, she explained:

> I'm assigned with a fourth-grade class and I go for two hours every week….I go on Monday morning. And basically I just sit there and I observe the children and I help them out….There's reading time….I usually just pick a group, like the intermediate group or the lower group, and I just sit there and I read with them and help them with bigger words. And they have worksheets they have to answer, like comprehension things. And some of them need help with that. So basically I just, it's like a tutoring thing kind of, I guess. And, I mean, it's interesting….It's good to get into the field and just get experience, because so many people that I talk to who are at other colleges, you know, just don't do anything with children until their junior or senior year.

At field placements, preservice teachers sometimes observed from classroom sidelines and sometimes did things such as tutor groups of children or walk around the room during class to help answer children's questions. Few, if any, taught whole class lessons. Samantha had an opportunity in her field placement to work with children in

[27] Each fall, half of the ECE sophomores took *Middle Childhood* and half took *Principles of Interacting with Children and Parents*. In the spring, they switched to take the other. Juniors in ECE all enrolled in *Observation and Assessment of Children* during fall semesters.

small groups and help them do things like read and complete worksheets. These activities did not have direct relation to what she was doing in any of her courses, but they did have relation to her plans to teach. They provided Samantha experience with children that some of her peers at other universities did not share at that early stage in their teacher education programs.

Some preservice teachers mentioned how early field experiences offered opportunities to reflect on or question whether they wanted to continue to pursue teaching careers. Several students in my study, like Samantha, referred to the provision of early field experiences as an advantage of this program compared to others. Goodman (1985) similarly suggested that a few of the preservice teachers in his study mentioned early field experiences to make their Elementary Education Program better than others in that state. Some students I spoke with who were planning to teach, but who had different undergraduate majors—such as in Interdisciplinary Studies [IDST]—spoke about the early field placements of early childhood education [ECE] majors and wishing they had those same experiences:

> A lot of them are talking about how for ECE they have to have [field placements], which I kind of wish I did so I could finally get my foot in the door and kind of learn more things. But I guess I'll learn it when I go to grad school. I just kind of wish I was put in that program so I could experience other things the undergrads are experiencing before they go into their masters. (Jackie, sophomore in IDST)

Students in IDST generally mentioned hearing few details of ECE students' experiences in field placements, yet believing these experiences would have been helpful to their own preparation.

Faculty teaching the ECE courses *Middle Childhood* or *Principles of Interacting with Children and Parents* almost always asked students to write reflections or journals

based upon each field placement observation. Such a requirement has been popular in teacher education, with journal writing suggested as a useful tool for preservice teachers to record their reactions to schools, classrooms, teachers, and students (Cole & Knowles, 1993). Course assignments in the program I studied required students to address topics such as what particular children were doing or how the classroom was physically arranged. Samantha explained the expectation also that students relate field observations to coursework:

> In the field study we have to, like every week we fill out a little sheet and we use different developmental, like cognitive learning, you know, theories…We have to use that and write a paragraph every week that we go. And see how we saw those things displayed in these children that we were watching.

Although students could also define activities in other ways, these types of course requirements provided one particular lens or mechanism that students had to use when observing and defining activities in their field placements—or at least when later journaling about their observations. Sometimes courses required very specific focuses for observations, and sometimes they did not. Emily, a graduate student, addressed this when she spoke about ways the program could be improved:

> I mean the field placements are great. You can't get any better than that, just having experience. So more field placements you can do, and more structured observations. A lot of times in undergraduate school, I thought when I was in the field placements that I wasn't exactly sure what I was looking for. In some classes, they'd say, "Okay, on this day, look at this. Look at how the seats are arranged..." They tell you to evaluate. And the other days, you just kind of sat there and listened to the teacher. And you're like, "Oh, hum de dum." So I think just anything more specific to look for to help kind of guide our thinking while we're in the classroom would help. I did get that in some.

Like Emily, every student I spoke to described some advantage to having field placements and spending time in school classrooms, and regardless of where they carried out those field placements. When these sophomore year courses provided students with

observation guidelines, these guidelines helped to direct students' attention and follow-up journal writing to particular aspects of schools or classrooms rather than to others.

Junior year. Some of the students taking *Math for Elementary Teachers* in fall 2004 were juniors, and I spoke with several about their experiences (refer to Table 1). Like sophomores, juniors in ECE also enrolled in both core curriculum and in-major courses. One main scheduling difference related to field placements. Coordinated with the juniors' *Observation and Assessment of Children* course was a field placement in the Child Development Lab (or "lab school") for four hours each week. As previously mentioned, lab school grounded its philosophy in social constructivist theory, and specifically, lab school incorporated the Reggio Emilia approach.

Preservice teachers participated in lab school as teachers working under "head teachers," and were expected to make use of the Reggio Emilia constructivist philosophies (e.g., emergent curriculum ideas, constructive guidance and discipline) supported in lab school. Head teachers offered preservice teachers ongoing feedback for their teaching in the recommended ways. The undergraduate ECE program organized very close relationships between this course and lab school. For example, the *Observation and Assessment of Children* course met at the lab school, and the lab school's head teachers also helped teach the course and lead discussions.

Similar to how *Middle Childhood* and *Principles of Interacting with Children and Parents* required students to make particular associations between their coursework and ongoing field placements, the junior year *Observation and Assessment of Children* course required students to attribute course-related meanings to lab school and vice versa. Unlike sophomore year early field experiences, which were not selected for any

particular conceptual relationship with program philosophies, the course and lab school were based on the same philosophies, used the same child development and constructivist discourses, and required students to observe and use practices aligned with those discourses. Together, the course and lab school assigned for preservice teachers particular language to particular instructional practices and activities. They also provided context specificity to students' discussions and experiences given how groups of preservice teachers all worked with the same group of preschool-age children and lab school head teachers helped teach the course.

Kristy, a junior, explained the difference for her between lab school and previous field placements and how experiences and discussions moved "hand-in-hand" between the lab school and the *Observation and Assessment of Children* course:

> Kristy: In past years, it was mostly observation. We weren't really involved in the classroom. Like we weren't actually the teacher. But this year, it's different. The class and the field study go hand-in-hand. So we kind of discuss things in our class about what's going on in the classroom with different students—you know, different problems that we see or things that we can help with. And then we apply them in the classroom. So we actually get to do it, which is different than what we've been doing in the past.
>
> Laura: Can you give me an example of what you mean?
>
> Kristy: Well for the girl I'm working with,[28] we have, like, group meetings in our classes. And all of us as teachers meet and we discuss how we can get her involved in the classroom, because she doesn't speak English, so she's very disengaged from the other students. So we try and develop strategies and come up with ways that we think…she would be more comfortable…to get her engaged with her peers. So that's what we use our group time for.

As Kristy's comment suggests, students in lab school worked together and with the lab school's head teachers to help each other develop strategies for helping children. Faculty

[28] Each of the preservice teachers carried out a study of one child over the course of the semester, eventually meeting in a parent-teacher conference with that child's parents and submitting them with a case story of their work.

expected these strategies also to be consistent with Reggio Emilia and constructivist ideologies. In previous placements, students' learning in fieldwork depended on reflections detached from direct work with children. In contrast, lab school gave students more substantive roles in children's activity. Students placed in lab school received ongoing reminders for how to use the ideas, language, and skills they also learned in lab school and in the *Observation and Assessment of Children* course.

Connie, a junior, further described the *Observation and Assessment of Children* course, commenting on how she saw coordinated and overlapping emphases of the course and lab school as giving her shared experiences she could discuss with peers:

> For about the first hour, we go into the [lab school] classroom that we actually teach in and we meet with the head teacher of that class. And we are able to discuss things that we've noticed in the class—things that work, things that don't work, problem areas that we found, cool things that we've noticed, interests that we've picked up on….And I think that's really neat because, like, in the other field placements, like we don't really have a chance to talk with the teacher about the kids or really to anybody else because we're all typically in different classrooms….With this we're able to talk to each other because we all observe the same things.

Because groups of students all taught together in the same preschool classroom, they came to know the children and their experiences well, or at least to a much greater extent than in the previous year's placements. Students learned about the children and the children's learning not only through their personal experiences in lab school but also through hearing stories from other preservice teachers and from lab school's head teachers that included those same children.

The above descriptions help suggest how knowledge moved[29] between lab school and the *Observation and Assessment of Children* course. For example, among other overlapping emphases described above, the same faculty participated in both, and both took place in the same classrooms (i.e., the lab school classrooms). Also, faculty allowed and encouraged preservice teachers in the course to share stories about their work with children in the lab school and to ask each other questions about their interactions and teaching there. In this way, children also helped move knowledge by having an explicit presence not only in lab school, but likewise in the *Observation and Assessment of Children* course. Closely coordinated explicit and consistent relations and shared discourses between *Observation and Assessment of Children* and lab school produced conditions for all preservice teachers to identify similar philosophies and to learn to make certain associations, or define certain relationships, between their coursework and fieldwork. The program's child-development and constructivist Reggio Emilia "philosophy" *were* the "practices" of lab school (cf., Britzman, 1991; Burbules, 1993; Rouse, 1987; Turnbull, 2000).

Similar to how students used the term "investigative approach" to summarize good mathematics instruction, students used terms such as the "Reggio Emilia approach" and "constructivism" to broadly summarize lab school emphases as well as emphases of the undergraduate program in general. Veronica, a graduate student, explained, "In undergrad, it seemed like we went with the Reggio Emilia approach….It's really all

[29] I draw most heavily upon Nespor's (1994) use of the concept of knowledge movement, which takes into consideration the production and maintenance of power structures in the world. Challenging the ways that Callon (1986) and Latour's (1987) accounts of mobilization ignore perspectives of those at the margins, Nespor fits actor-network theory with "a more general geographical conception of knowledge construction that allows for the existence of worn landscapes as well as flows" (p. 15).

about creative-based and child-based…Curriculum is whatever [children] want. It's totally child driven." Alena explained of the undergraduate program, "I got this strong feeling that they were saying that behaviorism is wrong. Behaviorism, never do that, you know?...Always be constructivist…That was a major theme throughout the program—constructivism."

In professional development school literature and teacher education literature in general, close conceptual relationships between coursework and fieldwork have been suggested as important (e.g., Burstein, Kretschmer, Smith, & Gudoski, 1999; Goodlad, 1990; Holmes Group, 1986; Sandholtz & Wasserman, 2001; Tom, 1997; Winitzky, Stoddart, & O'Keefe, 1992). Between child development laboratories and lab schools, close relations have been typical:

> What students read about, question, discuss, and experience in the college classroom, they then apply in the laboratory classrooms….In turn, the students' observations and analyses of their experiences become part of the data that the laboratory teachers use in projecting and planning their curriculum. (Rowan & Barbour, 1999, p. 42)

Gilbert (1999) proposed that lab school curricula reflect theoretical foundations based on, among other things, a constructivist, Reggio Emilia approach. Further, Gilbert proposed that inquiry and reflective decision-making strategies be both practiced in lab schools and embedded within early childhood teacher education programs. Rowan and Barbour indicated that for the child development center [CDC] in their study, the aim was to link theory and practice. They described how "the teachers, college students, and faculty members…have been involved in the study of the Reggio Emilia approach to early childhood education….The mode of collaborative activity has permeated the life of the CDC" (p. 43).

Research has generally indicated that tightly integrated programs with extended clinical preparation interwoven with coursework on learning and teaching help to produce and retain more effective teachers (Darling-Hammond, 2000). In mathematics education, research has suggested that collaborative, supportive contexts for innovative instructional practice make it more likely that teachers will enact instructional practices that the program considers to be desirable (e.g., Borko et al., 2000; Clift & Brady, 2005; Mewborn, 2000; Steele, 2001; Vacc & Bright, 1999). My research similarly suggests close coursework and fieldwork relationships to support preservice teachers' learning of program ideas.

Although some students liked lab school and the ideas it supported more or less than others, or described it in different ways as more or less relevant to elementary school teaching for a number of different reasons,[30] the students I spoke to about lab school—both juniors currently in lab school and graduate students who had previously participated in lab school—almost always described lab school as a significant learning experience in the teacher education program. The fact that they interacted with children and that they could also clearly see the relationship between the *Observation and Assessment of Children* course and their close work with children in lab school represented widely popular explanations by students for why this was the case. The next section includes perhaps the most important discussion related to lab school, suggesting some of the ways students later assigned new relevance, and irrelevance, to lab school after moving into later coursework and field placements.

[30] Later sections include discussions that describe some of these distinctions.

Time and Placement Differences

The limited time students sometimes spend in early field experiences [EFEs] as well as "pressure on regular classroom teachers to follow official instructional programs and time schedules, and lack of university involvement in EFEs" (Goodman, 1985, p. 46) have together been suggested to give students little opportunity in early field experiences to reflect on teaching experiences or experiment with curriculum and instruction. In my study, sophomore year early field experiences mostly did not integrate preservice teachers into the preschool or school networks of their placements (e.g., into what happened in other classrooms, into children's lives, into state or school politics or curriculum decision making) due in part to the brief time that students spent in those placements. However, for many students near the beginning of their programs, these early field experiences did offer them their first opportunity to think about and involve themselves in school teaching while also being students in the teacher education program. Early field experiences allowed the preservice teachers to interact with preschool and elementary school teachers and children and provided them access to observing in schools.

As they transitioned through the 5-year program, and as they spent more and different kinds of time (e.g., mentoring or teaching compared to observation and note-taking) in field placements, students produced different kinds of meanings for and associations between program experiences. Preservice teachers' evaluations of lab school experiences depended not only on what they did in lab school, but also on how they determined they could use those same program-supported ideas elsewhere.

Connie, a junior, had some experience with state curriculum standards while taking *Middle Childhood* during her sophomore year and simultaneously observing in a second-grade field placement classroom. In *Middle Childhood*, one course assignment required that students create a lesson plan corresponding with a particular topic from the state curriculum standards. Connie had talked to the cooperating teacher at her field placement about her lesson plan assignment and the curriculum standards she was addressing. Expressing concerns for the relationship between the preschool lab school and her plans to teach elementary school, Connie referred to her ongoing lab school placement as a "child-focused, child-led classroom." Connie indicated she didn't "fully understand how to implement the way that they do it [in lab school]" with older kids, explaining that it would be difficult to follow kids' interests in the future (referring to lab school's focus on child-centered and emergent curriculum) because of state curriculum standards and having to teach certain things at certain times in schools.

In view of requirements to address standards and to maintain curriculum schedules in elementary schools, the emergent curriculum approach for lab school had no straightforward application or relevance for Connie in elementary school classrooms. This was similarly the case for Marian, a graduate student looking back at her lab school experience. Marian explained:

> It was emergent curriculum. So all our lesson plans and stuff were based on kids' interests at the time. And nothing was the same from year to year or day to day even…. It's so different from public schools in that respect. Because now I'm in a situation where my teacher's like, "Oh, we're going to do Language Arts curriculum straight from the book. We're going to do *Everyday Math* word for word from the book." Like she uses the script from the *Everyday Math* Teacher's Manual when she teaches.

For Marian, the experience in lab school of having to create curriculum and adapt lessons to address kids' changing interests represented a sharp contrast to her elementary school experience with, for example, the *Everyday Mathematics* (UCSMP, 1997) curriculum materials and her view that they provide scripted details and structures for mathematics lessons.

The preservice elementary teachers taking *Math Methods* in fall 2004 were all in the second semester of the three-semester graduate program. During the previous semester (their first in the program), they had enrolled in two or three methods courses (e.g., *Science Methods*, *Early Literacy*) and two or three additional courses (e.g., *Issues in Teaching*, *Instructional Technology*). They did not have field placements during that time. In fall 2004, all graduate students took one or two other courses (such as another methods course or a *Teacher as Researcher* course or an *Elementary Issues Seminar*) and also had field placement assignments in elementary schools in either Lewiston County or Bremont City.[31] These were students' final field placements prior to student teaching.

Each week, graduate students spent two full school days and two half days in their field placement classrooms. Program guidelines required the students to plan and teach at least five lessons during the semester. Most students taught many more lessons than required, and some taught lessons on a daily basis. The *Elementary Issues Seminar* course provided time during most class meetings for students to discuss fieldwork, and the course required students to submit reflective journals based on fieldwork. Weekly course seminars were offered on field-related topics such as child abuse, technology,

[31] During the fall semester of my fieldwork, half of all graduate student preservice teachers were placed in Lewiston County and half were placed in Bremont City. The following semester, they would be switched to the other location for their student teaching, with the program suggesting these switches to be in the interest of diversity.

mathematics and science teaching, classroom management, and blood borne pathogens. Since approximately half of the graduate students had already taken a seminar the previous spring, the other half was enrolled in the *Elementary Issues Seminar* that fall.

Valerie, a graduate student, had a kindergarten field placement in Bremont City at the time I did my research fieldwork. She described the use of a rewards and punishments behavior modification points system in her elementary school, where students who lost few or many points received rewards or punishments accordingly. Valerie's kindergarten field placement was in an open classroom (only three walls; open to the hallway on the fourth side), and she described needing to keep children quiet so as not to disturb other teachers and classrooms. Referring back to her experiences in lab school from her junior year, Valerie characterized the lab school's approach as "very, very constructivist." She described how, unlike her current field placement, lab school did not use behavior modification strategies, but instead pulled children aside to talk things out with them.

Valerie described thinking the lab school's approach to addressing children's behavior got to the root of the problem compared to a rewards and punishments points system. However, she also referred to difficulties in lab school with disciplining children and having behavior problems. Valerie indicated that too frequently parent-teacher meetings were called when she thought using other behavior management strategies might have avoided these meetings. Valerie added of lab school, "It's almost like they're trying to use this *ideal* method, and it's not so ideal for every child." One problem Valerie had with lab school's structure was how the schedule often changed and how children could choose not to participate in activities. She also explained:

> I wasn't a huge fan of lab school….Preschool is not my cup of tea....I think the structure was awful because there really wasn't any. And so we're learning these

> things that I didn't think were very relevant to what we were going to do when we teach in the public school…. Then the lessons I created I probably won't really use them again, because they were for the younger age.

Valerie contrasted her view of the absence of structure in lab school with how in kindergarten "you have a set structure and that is just the way it is." Because of this, she questioned whether children in the lab school would be prepared for a public kindergarten. For Valerie, and for students in general, things like social structures, curriculum planning and requirements, and ages of children in lab school and elementary school contributed to how they could (or could not) extend program-supported knowledge and ideas from lab school into other placements. The more different these things were or that students defined these things to be, the less they believed what they learned in lab school had relevance to elementary school teaching.

I described in the previous section how program-coordinated structures and conceptual frameworks allowed for knowledge to easily move between the *Observation and Assessment of Children* course and lab school. If we think of close relations between that course and lab school as helping establish among preservice teachers a particular, program-related knowledge (e.g., about the Reggio Emilia approach), then comments like some of those above indicate how students sometimes could identify little use for that program-related knowledge in other field placements or their futures in teaching. As I have noted, different social structures, curriculum, children, faculty, and so forth acted to produce limitations on the relevance of the ideas about teaching that students learned about in the program to their work in other classrooms. The differences students identified between their lab school and other program activities led them to re-evaluate their learning in lab school.

This disconnect was problematic in the teacher education program because it served to define the lab school approach, and also elementary teachers' uses of school texts like *Everyday Mathematics* (UCSMP, 1997), as in some ways flawed or irrelevant in particular situations or places.[32] Students "learned" different things when participating in lab school than they learned when looking back on lab school from later placements. They shaped and highlighted new and different meanings to constructivist program ideologies, making different kinds of knowledge important and relevant. For example, Valerie's attempt to apply lab school knowledge to her ongoing field placement in an elementary school and to related behavior management issues produced a certain kind of irrelevance[33] to lab school's structure as well as the "*very*, *very* constructivist" [my emphasis] label Valerie applied to lab school. I suggested in the previous section that program "philosophy" could not be distinguished from "practice" between the course and lab school, but the above discussion illustrates how this was less the case for program "philosophy" and the "practices" in other field placements or students' anticipated future classrooms.

Program Sequencing and Students' Roles in Field Placements

Most courses that students took in the teacher education program had no direct or program-organized relationships with fieldwork. How and whether students evaluated relevancies of these other courses in terms of their learning in field placements, and vice versa, varied widely and depended largely on how much time students spent in the field and what they did during that time. For example, students taking *Math for Elementary*

[32] Chapter 4 returns to and expands the idea of produced flaws.
[33] I am referring to the irrelevance Valerie suggested of lab school's structure to public school teaching.

Teachers rarely talked about the course in relation to their work in the field. Students almost always assigned relevance to *Math for Elementary Teachers* by talking about its relationship to their own pasts in elementary school classrooms or to *distant* futures in teaching. Samantha explained of the content in that course, "It's review in a way. But it's also good because I'm going to need to know that, you know, in *five years* [my emphasis] when I'm teaching math class."

There were a number of reasons that students defined some course information to be important to their futures in teaching in general but not important in any particular way to their ongoing work in field placements. First, since they attended field placements on the same day(s)[34] and times each week, whether they observed mathematics depended on school or classroom schedules for content area teaching. Second, students rarely participated in instruction other than sometimes walking around the room to help individual children with questions. Third, preschool placements generally had no set "mathematics" periods other than something like "calendar math" when things like time and the days of the week were discussed.[35] These circumstances of limited participation in mathematics-related activity provided little possibility for mathematics-related knowledge to move between the *Math for Elementary Teachers* course and early field experiences. Coursework had no immediate potential for application, but students did envision themselves using at least some course material in the future.

As they transitioned through the 5-year program, the different relevance students shaped for courses and field placements, and the different learning needs they shaped for

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[34] Some of the students doing 3-hour/week field studies went for $1\frac{1}{2}$ hours on each of two different days—usually Tuesdays and Thursdays.

[35] Ethridge and King (2005) indicated calendar math to be a common, if not a universal practice, in early education classrooms.

themselves, depended in part on students' present or past roles in field placements and on the ways the program provided for these placements to help students build on program ideas. Alena, a graduate student, explained undergraduate and graduate coursework in relation to her work in field placements and to her learning:

> Alena: I felt it was more theory in my undergrad than applications now in grad. And I remember feeling frustrated sometimes in my undergrad work where I couldn't really relate what I was learning to what I was doing.
> Laura: Given the courses you were taking at that time?
> Alena: Yeah.
> Laura: Can you talk more about that? Like how those things were related or not related?
> Alena: …If I were ever talking to students in my undergrad fieldwork, when I was helping students, I was still prone if I were helping them reading…to saying, "Just sound it out. Sound it out." And that was my only response. And the kids got frustrated and they didn't know and I didn't know any other strategies that I could ask them to help them understand….Now that I learned in Content Literacy and Early Literacy that I've been [able to] say, you know, "Oh, okay. Let's try to break this word apart." And, you know, "What can you recognize?...What does this part of this word mean?" You know? Just I've learned more strategies in my graduate coursework that looking back I'm sure I could have used. I'm glad that I'm learning now because I'm in the classroom now full time and I need to.

I mentioned that some preservice teachers looked to distant futures when taking undergraduate coursework or spending time in early field experiences. But for Alena, helping children read and also having some difficulties in knowing how to help them understand made her look at her future differently than did most other preservice teachers in early field experiences. Whereas preservice teachers mostly observed and thought about teaching *eventually*, Alena was already teaching on occasion. Given her role in the field, the need to know specific strategies for helping specific children learn to read became immediate and important. Alena defined the things she later learned in the graduate methods courses *Content Literacy* and *Early Literacy* as those things she needed

to know in her earlier placement. She re-considered what she might have done in her past placement and in turn also shaped the value and possible uses of the methods courses.

A point about how new and different meanings got applied to program activities can also be made by looking at what students said about lesson plans they had created in *Math for Elementary Teachers* and *Math Methods*. Aleesha, a graduate student in *Math Methods*, described relations between that course and the *Math for Elementary Teachers* course, explaining how graduate students are "in a different place" in relation to their futures:

> We used to do lessons [in *Math for Elementary Teachers*] and we would get in groups. There were like 3 or 4 in a group and we would teach a lesson to the class. And we would bring our supplies and do it as if these [other preservice teachers] were our students and so on and so forth, and I feel like that was really a good start for us because we hadn't really been doing lessons in any of our other classes and of course we hadn't done it with math. So that was fun and it was nice to see that math could be fun. I like math personally, that is like my favorite subject. But, you know, you always wonder how you are going to relate this to kids or how to get on the kiddie level or whatever. But as far as this class [referring to *Math Methods*] goes now I feel like its more the same thing except I feel we are in a different place now since we are actually in the classroom now almost full-time.

Occasionally undergraduate course activities—such as the *Math for Elementary Teachers* lesson plans Aleesha referred to—helped students construct images for or raise questions about their distant futures in teaching in a generalized version of a future classroom.[36] Creating and teaching a lesson as sophomores gave students entry into their futures in teaching in a way perhaps not provided by other courses they were taking and also not generally required by early field experiences. Students taking *Math Methods* in the fall often gave different kinds of meanings to similarly defined tasks by evaluating them in terms of particular classrooms and their work with particular children with

[36] Several students indicated that the *Math for Elementary Teachers* course was the only undergraduate course that offered them opportunities to create lesson plans.

particular needs. Aleesha and other graduate students were in "a different place" in graduate school, now that they worked with particular children. This meant that the "same" kinds of mathematics activities in *Math Methods* did not have the same value for students as they did in *Math for Elementary Teachers*.

Generally speaking, courses helped mediate what students could experience, think, and learn in field placements and how they could construct the relevance of courses and field placements to their futures. Further, the nature and organization of field placements and students' roles also helped students re-define courses. In other words, what students learned in courses and field placements was not fixed. Instead, students often identified new "learning" from courses or field placements as they reviewed past experiences—such as how students negotiated new meanings for lab school once they entered elementary school placements.

The question of whether it matters where methods courses are located or positioned within the teacher education curriculum has received very little attention in educational research (Clift & Brady, 2005). My research provided some indication that course positioning, combined with how the program assigned field placements, did help shape at least the immediate relevancies and value students constructed for their program-related work. Bobby, a graduate student, had taken *Early Literacy* the previous semester (focused on grades PK-2) with no field placement and in fall 2004 was taking *Content Literacy* (focused on grades 3-5) and involved in a fourth-grade field placement. His student teaching placement would be in one of grades K-2 the following semester. He explained about these courses and his field placement:

> I haven't really experienced [yet] a reading level where I would use the *Early Literacy* techniques. I'll probably do it next semester. But the *Content* [*Literacy*]

> stuff, I mean…every time I come out of that class, I have the biggest grin on my face [Both laugh] because I'm like—and that's a Wednesday at like 8:00 after it's been a long day. Just because I'm like, "Now I can't wait to get into school tomorrow and try some of these different things that I've learned."

Bobby's view of the techniques he learned about in *Content Literacy* as usable (perhaps even the next day) gave relevance and shaped his attitude to the course. He made the course important by determining it applicable to his teaching. Bobby's identification of *Content Literacy* as useful to his field placement also shaped his attitude toward the field placement.

I must explain that when I use the term "attitude" here or elsewhere in this dissertation, I am not implying that students "had" a particular attitude toward courses or that Bobby had, for example, a context-specific attitude toward teaching reading in his field placement school. I am referring to attitudes not as something in the mind or situated, but as produced by the ways students could or did connect and position themselves and their experiences (cf., Star, 1995). Bobby's bringing of his work in schools into the *Content Literacy* course produced a value in the course that the *Early Literacy* course did not share. Up to this point, *Early Literacy* had less relevance for Bobby because he did not see it as applicable to his grade-level-specific work in present or past field placements. That relevance could change for Bobby the next semester in his K-2 placement, in turn shaping for him different attitudes toward these courses.

Veronica, a student in the second semester of the graduate program, also took the *Math Methods* course in fall 2004 while completing a field placement and like other graduate students had not been assigned a field placement the previous semester. She explained about her undergraduate and graduate field placements and methods classes:

> Our first semester in grad school, we just took classes. I really enjoy my field placement this semester now because I'm not the girl that sits in the corner of the classroom any more. I'm integrated in the classroom. In undergrad, we observed and we didn't really participate….Now [in the field], everybody knows who I am. I walk around. Last semester I started getting frustrated because we were writing all those lesson plans and were doing all these unit plans and things and it just felt like I was doing all this make-believe work that I wasn't going to use. But now it feels like—like my methods class, I wish I were taking my methods class, all of the methods classes, the math methods, the science, social studies. I wish I were taking those now with my field placements so I can use some of those things in the field.

Some students described how the program's sequencing of courses and their timing and relationships with field placements played an important role in making program experiences seem realistic and important. Students could evaluate course experiences in relation to their ongoing fieldwork. Veronica and other students almost always saved copies of lesson plans they or classmates created for courses, regardless of how far along they were in the teacher education program, and whether they felt "make-believe" or not. Veronica gave different meanings and applied different attitudes toward writing lesson plans in her methods courses depending on whether she deemed assignments relevant "outside" those courses. Simply having at the same time both (1) methods courses and (2) field placements where they spent many hours observing or participating in instruction for those same content areas could create for students an importance to courses and course assignments. As I address further in the next section, this was the case whether or not methods course professors explicitly helped students construct particular relationships between coursework and fieldwork.

Students sometimes explained how they hoped they could eventually adapt and use the lesson plans they had written in coursework for their teaching—much like Ms. Savant's practice of taking methods course tasks and adapting them for her own

classroom and students in Borko et al. (2000). Lesson plans and other assignments and course resources could transition in meaning from "make-believe" to having a particular value when students identified, or were helped to identify, their potential utility in ongoing or future work in school classrooms. When students participated in activities that made certain past activities important, they gave new meaning and shaped different attitudes toward those past experiences. At that point, whatever notebooks, course texts, or other course materials students might have saved from previous semesters became useful to them, and possibly for the first time. Talking about methods courses and her field placements, Valerie explained:

> I don't even realize how much I use some of this information from the methods classes until all of a sudden you are planning something and you remember, "Oh that was a really good idea, I am going to try that." Otherwise, you get all of this information in class and you don't feel like it it's going to be helpful. You know, I am like, "I don't know when I would ever use this," and then something will come up and you go "Oh, that was in that book let me go get that out and look."

All of the students I spoke with described saving almost all course materials they thought they might one day be able to use for their teaching—and often without any real sense for whether or how those materials might eventually become useful to them. In addition to lesson plans they or their classmates had written and shared in classes, what students saved typically included many books and notebooks from the undergraduate and the graduate programs.[37] Several also kept track of web sites that they had found or that faculty had recommended to them for lesson ideas and information on state and national curriculum standards. Valerie even maintained a file cabinet with many course materials she had held onto over her years in the program, and especially in the graduate program.

[37] Mostly when they did not save books from courses in their major, they explained this to be because they needed the money.

She described cleaning out her binders and pooling her resources by theme. For example, Valerie described sorting out "electricity" and "magnetism" themes for science and "Mali," "Jamestown," and "Civil War" themes for social studies. Valerie and other students' keeping of particular course materials provided them with access to looking back at and using material once they later identified a particular relevance of that material for their work with children in field placements or for their future teaching.

How Courses Were Taught

Kristy, a junior, had taken *Math for Elementary Teachers II* the previous semester with instructor Jill Raney[38] and in fall 2004 took *Math for Elementary Teachers* with Marisa.[39] I asked Kristy to describe the two courses and their relation to each other:

> The first one [referring to *Math for Elementary Teachers II*] was mostly geometry….We didn't do a lot of activities….Most of it was assigned problems from the book, and they weren't children's books like we use in the class now [referring to *Math for Elementary Teachers*]. So it was a little difficult to get an understanding of what children are actually doing [in schools]. I had a hard time with that. I had a hard time understanding how we were learning how to do these things as college students, but we didn't learn how to apply that to younger children. And in this [*Math for Elementary Teachers*] class, I feel like we do a lot of group activities…that you can use with your children and you get to use the books that the children will be using.

According to some students,[40] Jill usually explained mathematics ideas in *Math for Elementary Teachers II* as students took notes. She might then ask students to work through problems mostly coming from a text written for college courses preparing elementary teachers to teach mathematics (Billstein, Libeskind, & Lott, 2004). The fall 2004 course with Marisa used NCTM *Standards*-based (1989, 2000) middle school

[38] Jill Raney was a full-time mathematics instructor in the Mathematics Department.
[39] Content focuses did not overlap, and about a quarter of the students took these courses out of sequence.
[40] I did not observe Jill's *Math for Elementary Teachers II* for my research.

mathematics curriculum materials *Mathematics in Context* (National Center for Research in Mathematical Sciences Education and Freudenthal Institute, 2001) and *Connected Mathematics Project* (Lappan, et al., 1991-1997). In the *Math for Elementary Teachers* course with Marisa, students worked through activities from these and other course materials in groups at their tables and usually without explanations from Marisa. Working through assigned problems "as college students" in Jill's class did not have the same value for Kristy as doing "what children are actually doing" in Marisa's class. For Kristy, for example, the choice and use of texts in these courses contributed to the different meanings she assigned to the doing of mathematics problems and to how she defined the relevance of the course to her future.

Theories for how people learn have contributed to recommendations for courses to provide opportunities for preservice teachers to learn about teaching in ways consistent with these theories. Particularly popular in recent years has been the suggestion that what is learned cannot be separated from how it is learned (e.g., Brown, Collins, & Duguid, 1989; Bruner, 1990). In mathematics education, for example, teachers' personal lack of familiarity with learning mathematics content in ways that correspond with NCTM *Standards*-based (1989, 2000) visions of change has been popularly suggested as a barrier to achieving reform (e.g., Cohen & Ball, 1990; Cooney, 1988; NCTM, 1989; National Research Council [NRC], 1989). Related to this, in 1989, the Mathematical Sciences Education Board recommended, "Since teachers teach much as they were taught, university courses for prospective teachers must exemplify the highest standards for instruction….Prospective teachers should learn mathematics in a manner that encourages active engagement with mathematical ideas" (NRC, pp. 65-66). Regarding

teacher education in general, Fosnot (1989) proposed, "Teacher candidates themselves ought to be immersed in an environment where they are engaged in questioning, hypothesizing, investigating, imagining, and debating" (p. 21). Providing teachers with models of alternative ways to think about teaching and learning has been proposed as potentially helping them to better conceptualize program recommendations or to integrate theory and practice (e.g., Stover, 1990; Wilson, 1987).

Often based upon suggestions that teachers teach much as they were taught (e.g., Howey, 1996; Korthagen & Kessels, 1999; Tom, 1997), modeling has been an important concept and widespread practice in teacher education in recent years (Grossman, 2005)—where faculty use those instructional approaches they support preservice teachers to similarly use in school classrooms. In his suggestions for redesigning teacher education programs, Tom (1997) listed faculty modeling of programmatic emphases as the first of five conceptual principles. Further, NCATE (2002) recommended that faculty model best professional practices as part of its six unit standards comprising a broad conceptual framework for teacher preparation. In the program I studied, students and faculty alike reported the regular use of modeling in graduate methods courses as well as, for example, in lab school. These instructional methods contributed to students' learning and to the relevance they attributed methods courses to their futures. Bobby explained the following about his learning in graduate courses and his future in teaching:

> I think the main theme that they've been teaching us [in graduate courses]…is to get the kids actively engaged, active learning….You don't want to sit up there and lecture 30 minutes about a history topic. You want to do something that gets them going…and really stimulates their mind and helps them tap into their background experiences and knowledge and everything. And going into the entire program, I would have never thought that was important. You know? For the most part, my classes have traditionally been lecture, read this chapter, do the vocab words or whatever, quiz next week. You know? And doing that, like *seeing* that—like the

> science class. I mean the first couple weeks we learned basic electricity, like fourth-grade electricity. But we did it in a manner where we were told to think about what we know about electricity already and this and that. And we were able to come to the conclusion about five other topics just by what we'd learned on electricity because we were all actively involved in it. And that right there just made me open my eyes. I mean I better understand electricity now than I *ever,* ever understood it! So that sold me on it, basically right then and there….I want to do that as much as possible. I know it's difficult, like in terms of time management and resource management…[and] in terms of what your students are going to pick up and what they don't…and we adjust it to make it work….Basically that's how I want to be.

It has been increasingly common for methods course instructors to work to find ways to engage preservice teachers in contexts for learning different from typical school settings (Clift & Brady, 2005). In the program I studied, students described, and I also observed, that methods courses immersed students in tasks that provided them experience with ways of learning that program faculty also recommended they use with children. In a sense, how students contextualized those courses or course experiences represented what they learned and could apply from the program. Bobby used his ways of learning in science class to bring into consideration and re-examine how he had learned in past classrooms mostly involving lecture. Putting previous understanding of electricity side-by-side with his new understanding of electricity (and other topics) gave value to the ways he had learned about electricity in graduate school and helped shaped an attitude that he wanted to do something similar when he became a teacher.

Nespor (1994) suggested from his research with an undergraduate management program that "*how* courses were taught seemed to make little difference to how students thought of them" (p. 86). But in teacher education, the instructional approaches used by faculty have direct significance to students' futures by being a main emphasis in the curriculum and a recommended approach to teaching. For example, in teacher education,

how courses are taught might *be* the message faculty hope to communicate (e.g., Grossman, 2005; Russell, 1997). Earlier in this chapter I described how students created close connections between some courses by identifying similar ideas expressed by faculty, texts, or otherwise. I also indicated that the networks students formed through these connections acted as a mechanism for them to describe and evaluate the relevance of other program- and teaching-related experiences. At least to some extent, the ways certain courses were taught—such as graduate methods courses—also had relevance by being consistent with the program-based philosophies built up by students. Further, how faculty taught methods courses also corresponded with the language students continued to develop in the program for talking about good teaching.

Like Bobby, many students wanted to eventually use as a teacher the types of instructional approaches they were learning about and participating in as students. Many graduate students described how by participating as students in modeled settings they were learning some of the "best" ways to teach these subjects. For example, having already mentioned about how her science and social studies courses were "based on inquiry learning" and having described how methods professors for those courses were "teaching you like you're supposed to be teaching your kids," Veronica suggested of *Math Methods*:

> Paul is not standing in front of us and saying, "Okay, this is this new subject that…I'm teaching you guys so you'll just know." He's saying, "I'm going to show you this. This is the way that you can teach your students." He shows us kind of in the way that he would show his students, too. I've noticed that. Like he'll give us a problem and we have to figure it out on our own, too, kind of inquiry-based content. But yeah, I just feel like I'm not learning more about any of these subjects [themselves], more…how I can teach it the best.

Students identified different emphases in courses depending partly on how faculty helped them to do this, either through the faculty's selection of course activities or through how they carried out those activities in class. Paul's positioning of students to participate in activities in a way they could then teach children—such as in ongoing field placements—helped students negotiate particular meanings for methods course activities. Veronica identified the solving of a mathematics problem not just as learning mathematics, but also as learning how to teach mathematics. What is relevant to my research is not the modeling itself as an instructional strategy, but how it contributed to and helped students understand the program emphases and discourses and how it helped define program-based ideals for students for "good" teaching.

Students and Faculty

Students' access to people—to university faculty, to each other, to teachers, and to principals—helped mediate what they could learn and whether they gave particular knowledge relevance in their courses and field placements. Because I focus in chapter 4 on students' diverse experiences in elementary schools, here I only address ways that teacher education program faculty and other students in the program contributed to students' experiences. Veronica explained of *Math Methods*:

> Veronica: I would probably like a time in the class to talk about and to get Paul's opinion—because it seems like he knows so much about teaching math in general….Some of the times I leave our class, I'm like, "Oh, that was great to learn."…But sometimes I'm like, "Well we probably could get a lot more out of just, like, having a discussion one day for like 30 minutes about what goes on in our classroom." Because we could see
> Laura: In the field placement class, you mean?
> Veronica: Um hum. To see what everybody else is thinking about. Because when he mentioned [sic.] games, I was like, "There's games in *Everyday Math*?" [Both laugh] Like I didn't know that. Because my kids do worksheets.

Veronica and other preservice teachers wanted Paul to help them identify relationships between their *Math Methods* course and field experiences, and as Veronica suggested in her reference to the *Everyday Mathematics* (UCSMP, 1997) curriculum materials, to help them also learn new possibilities for the field that they might not observe or learn about while in the field—such as if their kids do worksheets from *Everyday Math*, but not games.

For undergraduates taking *Math for Elementary Teachers*, field experiences typically had little direct connection to their class work. But for graduate students taking *Math Methods*, students could, and often did, look more directly at how particular coursework activities and instructional approaches could be applied in their present field placements or to their futures. Paul helped students identify possible uses of program knowledge in schools by making reference to and describing similarities between the "investigative approach" (Baroody, 1998) in his course and the philosophical underpinnings of the *Everyday Mathematics* materials used in Lewiston County.[41] Partly because they wanted the course to have relevance in their *particular* field placements, some students wanted to hear even more from Paul.

Just as students used faculty as resources to help them make sense of course activities and field placements, they also used each other. A segment of my field notes from a visit to *Math Methods* helps to illustrate this. The topic of the day was fractions and the link between concrete and symbolic notations. For the first half hour of class, students worked mostly silently and individually on questions asking them to compare fractions using inequalities. Paul then led a discussion about these questions, also offering

[41] Chapter 4 describes Paul's participation in *Everyday Mathematics* professional development for teachers in Lewiston County.

suggestions for how to help kids compare fractions and do fraction addition without telling them how to do it. Next, Paul asked students to work in groups at their tables on several different mathematics "investigations" from their Baroody (1998) textbook. I took the field notes included below when students had just begun to work in their groups. Most students had their individual sets of *Fraction Tiles* on the tables where they worked:

> I sat at the table with Angie, Veronica, and Aleesha. Angie said that when her kids [in her field placement] take the state standardized tests, they won't have *these*—holding up and waves all the green *Fraction Tiles*. Veronica said no, but that they could draw pictures of the tiles. Veronica and Angie talked about what students have to learn about fractions. Paul wheeled over to them to ask how it was going. They stopped talking about their field placements and talked to him about the fraction questions.
>
> …After wheeling my chair around the room to other tables, I wheel back to the table and sit next to Aleesha. I hear Veronica say something about how "We're not trusting math. We're *investigating* math." [Veronica was referring to the "investigative approach" emphasized in the Baroody text and by Paul] Angie responded, "Even though I've trusted math for 22 years." Veronica mentioned that kids don't understand what $\frac{1}{2}$ means. Angie and Veronica started laughing as Angie mentions that Ms. Cooper [Angie's last name] took $\frac{1}{2}$ of your lunch and then $\frac{1}{2}$ of that. She said if she told kids that, that then they'll learn fractions! Angie said she loves the guidelines, but not the standardized tests. She commented that kids need a foundation.
>
> Paul came back to our table to talk to the students about measure up/divvy out. Then he left. Angie said she's still confused and that this is overload. She said she wants a nap. All the tables continued working on the problems Paul had written on the board for them to do from the Baroody book….Angie said that her headache got worse when she started this problem. Aleesha began helping Angie and Veronica with one of the problems. They said they didn't understand what she was saying and commented about her needing to explain it better because she needed to be able to do that for her teaching too.

Class continued with students working on questions from the Baroody text, such as on constructing an area model for $2\frac{2}{3} \times 1\frac{1}{2}$.

Understanding students' engagement and experiences with mathematics-related tasks and activities required knowing more than how Paul or the course texts defined

those tasks and activities for students (cf., Miettinen, 1999; Moll, Tapia, & Whitmore, 1993; Weade, 1992). It required knowing something more about students' lives and work outside of those courses and about how they brought those things into the classroom. For example, students' references to state curriculum standards or standardized tests or other issues schools were part of were not uncommon. In *Math Methods*, students often talked to others at their table about the appropriateness of the academic content they were learning for the grade level of their current field placement where they spent approximately 20 hours each week. At times, they also questioned whether the kids in their school classrooms would respond to similar types of activities or whether those activities would hold kids' attention. All of these discussions took place regardless of any suggestions made by Paul or the course text about the focus of activities.

Similar to Schulz and Mandzuk's (2005) observation, students in my study wanted more opportunities to talk to each other about their work in the program:

> Aleesha: It would be nice to have that this semester, a kind of outlet to talk about teaching [sic.]…*or* it should be incorporated into the classroom and leading things back to it. Because there are so many times even in here [referring to *Math Methods*] where I'm thinking, "Oh! I did this with my kids in math!"….You know, I want to talk about it. But you can't really do that=
> Veronica: =playing with blocks[42] or whatever.

The field notes I shared from *Math Methods* indicated how during some course activities, students made time to talk about the course in relation to their field placements or to what the kids in these placements did in mathematics. Students raised these discussions while working in groups at their tables on tasks assigned by Paul—such as while "playing with blocks." Students' assignments of relevance and value to coursework and fieldwork

[42] This is a general reference to manipulatives used in the *Math Methods* course.

depended in part on whether they had opportunities to discuss the significance of various program activities with other students or with faculty.

One graduate student, Jennifer, pointed out that there was little or no other time or place in the program where students all saw each other and could have these conversations. She also explained her need to talk to classmates about mathematics teaching in her field placement:

> Every time we have a break [in *Math Methods*], we'll try to talk about actually teaching math to our kids—and things we've noticed and stuff like that. And half the time, [Paul] will come along and cut us off and be, like, "Have you finished doing this?"…And it's like, this math problem is not going to help me teach my kids better. I need to talk about teaching math to kids…We're multi-tasking….Like if we just finished part of [a problem] and we're taking a 30-second break to say, "Oh guess what? You know, I was teaching this math thing, and I noticed the kids were doing this."

Students talked to and learned about from each other various possibilities for how particular course content (such as a methods course lesson plan) might or might not be useful in real schools. As suggested by Jennifer, they also relied on each other for information and advice about how to use course ideas in their field placements and future classrooms. Students' field placements helped them evaluate their coursework by giving them a particular lens through which to view course activities. The next chapter addresses how students' diverse field placements likewise helped them evaluate the program in general, and how the program helped students make sense of their work in field placements. First, I summarize main points raised thus far and I describe a number of issues related to these points.

Discussion

In this chapter, I addressed some of the ways students identified and summarized overlapping teaching-related ideas in the 5-year program. For example, I explained how

similar emphases and philosophies across courses and lab school helped shape students' learning and their ways of defining the program by providing them with a shared program-based philosophy and language for talking about teaching. Similarly referred to and modeled instructional practices, among other things, further helped mobilize selected program knowledge to make it relevant across courses and beyond the 15-week semester to students' futures. Students learned and could use certain program-related ways of talking or thinking about good teaching for wherever it might be that they would eventually teach.

Students were connected and connected themselves to teaching in different ways by how they contextualized coursework and fieldwork. I have suggested in this chapter some of the ways the making of linkages across program activities was coordinated—such as by closely aligned coursework and fieldwork, students' roles in the field, the timing of methods courses and field placements, explicit suggestions of links (e.g., by instructors), students' conversations with peers, and so forth. I have indicated that how students performed program contextualizations helped to shape their attitudes and the meanings and relevance they assigned to their experiences.

To summarize, thus far I have described:

- how preservice teachers generally did not identify, and were not helped by faculty to identify, the applicability of core curriculum courses to other courses or to teaching.
- how unless courses, or particular course activities, had clear or explicit ties to others or to the teacher education program or teaching, preservice teachers almost always classified those courses or activities as irrelevant to their

futures. Their relevance to preservice teachers had limited extension beyond the scope of the course and semester.

- how program "philosophies" gave preservice teachers a discourse for describing both coursework and fieldwork in the program and teaching in general. This helped coordinate how preservice teachers made sense of program activities.
- how collaborative and supportive relationships between coursework and fieldwork supported preservice teachers' learning of program ideas. Similar and repeated messages across the program extended the relevance of program ideas for students and communicated to them what they should or should not do in their teaching.
- how the amount of time preservice teachers spent in field placements and what they did during that time contributed to their ways of assigning and reassigning meaning and relevance to courses and to course activities.
- how courses' positioning in the curriculum helped to shape their relevance, and more generally, how preservice teachers shaped and re-shaped their own learning, attitudes, and the relevance of program components as they moved through the program and participated in new kinds of field placement roles.
- how the ways courses were taught contributed to and helped preservice teachers understand the program emphases and discourses. Further, faculty's modeling of program objectives helped define and communicate program-based ideals for "good" teaching.

- how preservice teachers wanted more opportunity to talk about their work in the program, and how their assignments of relevance and value to coursework and fieldwork depended in part on whether they had opportunities to discuss the significance of these things with each other or with faculty.

To introduce this chapter, I described how most research on teacher learning stems from cognitive and situative perspectives, and how research typically examines preservice teachers' prior beliefs, knowledge, and attitudes, changes in the measures of these constructs in association with program coursework and fieldwork, and connections between stated beliefs and teaching practices (e.g., Borko & Putnam, 1996; Carter, 1990; Clift & Brady, 2005). Further, Clift and Brady (2005) indicated that many of the studies in their review of methods courses and field experiences "purported to examine belief change without moving beyond one course to learn more about how beliefs are shaped and reshaped by practice" (p. 334).

Although much has been gained from research examining teacher learning in such ways, such research also overlooks certain aspects of how preservice teachers learn in teacher education programs. This section helps to describe limitations of studying what and how teachers learn by focusing almost exclusively on things like their "beliefs" or "knowledge" in or across particular "contexts" or in relation to "practice," such as college mathematics or mathematics methods classrooms and field placements or the first year of teaching—as is common in research.[43] In my study, students' differing and context-

[43] I have suggested Ensor (2001) and Peressini, Borko, Romagnano, Knuth, and Willis (2004) to be related examples. For example, Peressini et al. applied a situative perspective on learning to the process of learning to teach mathematics, "trac[ing] prospective teachers' belief and knowledge growth over time, and examin[ing] how these beliefs and knowledge about mathematics play out in practice" (p. 74).

specific descriptions of program ideas and their meanings helped to raise possible limitations of practices of almost exclusively questioning in research on teacher learning, for example, whether preservice teachers' conceptions change and are sustained over time and into the first years of teaching (e.g., Ambrose, 2004; Borko & Putnam, 1996; Clift & Brady, 2005; Steele, 2001). My study highlights the need to look additionally at what and how students shape and produce the meanings and relevance of teacher education coursework, fieldwork, and the program in general and then also to think about what and how to contribute to the ways in which they make connections between their various experiences.

Thus far, teacher education research has given little attention to students' experiences other than those included in particular pairs of coursework and fieldwork (Clift & Brady, 2005). Further, research has given little attention to how preservice teachers produce those experiences and their relevance by linking them to others across space and time. I referred earlier in this chapter to research by Ebby (2000) and Mewborn (2000) examining preservice elementary teachers' ways of connecting mathematics methods coursework to a particular field experience. There are some similarities and some differences between suggestions I make and ones Ebby made, so I start from hers to better explain and clarify my own.

In Ebby's (2000) research, attention is given to how students tied together and learned from particular groupings of coursework and fieldwork "in a teacher education program that consciously aimed to integrate these two contexts" (p. 71). Ebby described the relationship between learning in the university and learning in fieldwork to be

bidirectional. From ethnographic case studies with three preservice elementary teachers, she suggested:

> The preservice teachers were not simply translating theory they had learned from the methods course into action in the fieldwork classroom, but neither were they experiencing coursework and fieldwork as two separate "worlds" (Feiman-Nemser & Buchmann, 1985). Rather, through their experiences as learners in one context, they developed new perspectives on themselves, others, and the discipline of mathematics that helped them learn from the other context. (p. 93)

Ebby suggested her research to point to the need to reframe methods course goals to be not about developing new knowledge and beliefs but about "developing habits of mind to learn *from* the classroom" (p. 93). She suggested the need for methods courses to focus on how to learn from fieldwork.

Ebby (2000) emphasized that methods courses and faculty should try to help preservice teachers develop particular habits of mind that they can use to help them also learn in fieldwork. My study points additionally to how teacher education faculty might try to learn more from preservice teachers. Specifically, faculty might benefit from knowing more about the coordinating mechanisms helping to shape students' ways of making connections and distinctions across program experiences and to their futures. In my research, the ideas students learned about in courses helped them bring particular past or ongoing experiences into the present to re-frame and create new meanings and relevance (cf., Miettinen, 1999; Moll, Tapia, & Whitmore, 1993; Weade, 1992). Comparing, for example, (1) close conceptual relationships between the junior year *Observation and Assessment of Children* course and lab school and (2) relationships between those two experiences and preservice teachers' other field experiences or their futures, we can see that it was not just that learning in one place helped preservice teachers learn in another. I have tried to show that what preservice teachers learned

extended beyond what could be identified by any two particular experiences or over any given timeframe.

In my study, preservice teachers produced the program partly through their ways of contextualizing coursework and fieldwork, and the program was produced for them partly through the ways coursework and fieldwork were paired and assigned. I aimed throughout my research and writing to look at how students related particular coursework and fieldwork activities to other activities. This chapter has shown some of the ways that students used various activities across and outside of the teacher education program to help them analyze and shape new coursework and fieldwork experiences. The field notes from the *Math Methods* course provided one illustration of how this kind of shaping depended in part on students' ongoing work in their field placements. Students simultaneously also re-wrote past experiences in new ways, such as illustrated in part by graduate students' comments that evaluated in different ways their junior year lab school experiences after having moved into elementary school placements. Further, the types of connections students made and how they made them shaped their attitudes and the meanings and relevance they assigned to program experiences. For example, the close connections between early field experiences and some particular courses helps to show how when course requirements directed students to attend to particular details of field placements, what students observed and thought about in the field had at least some correspondence with those things.

Research across disciplines has suggested that preservice teachers "resist coherent [teacher education program] messages when they find it difficult to engage in recommended practices" (Clift & Brady, 2005, p. 331). This is similar to how Cole and

Knowles (1993) described preservice teachers' images of teaching, "frozen in time and context" (p. 459), to often "shatter against the hard realities and complexities of schools, classrooms, and day-to-day teaching" (p. 459). However, the idea that students "resist" messages or that images "shatter" could not adequately explain my research data. Students did not "accept" or "resist" messages, but instead defined and (re-)characterized the relevance of selected program messages to those fieldwork activities in which they were participating or had participated. For example, as I have suggested for the students in my study, what was relevant and brought to their attention or used by teachers in one way in lab school was not relevant in the same way elsewhere. Lab school and elementary school classrooms differed in important ways—such as in how schools had fixed curriculum and sometimes also disciplinary structures and in how teachers needed to address state curriculum standards. Given this, elementary schools helped coordinate the relevance of lab school by requiring (or not requiring) students to draw upon different kinds of knowledge and skills than had been emphasized and applied in lab school.

Producing the Teacher Education Curriculum and Its Relevance

A wide range of work has been conducted to examine preservice teachers' ways of making connections across and extending from various experiences in teacher education programs; however, little of this research extends across entire programs. The research of Goodlad and colleagues (1990) represents a large-scale project looking across many programs, also including to some extent a focus on the students' ways of experiencing programs.[44] For example, Goodlad suggested that preservice teachers have

[44] Others include Britzman (1991), who focused on student teachers' experiences, and Segall's (2002) study describing students' graduate education program experiences.

an orientation to the practical, and he provided descriptions for ways they separated out things like foundations courses from their more explicitly practical experiences.

The separation of foundations coursework from other courses and field experiences has been common in teacher education; it has generally been the case that foundations courses do not receive explicit or substantial attention at other places in the program (Goodlad, 1990; Villegas & Lucas, 2002). Related to this trend, in Ginsburg's (1988) research, for example, "issues concerning social class, race/ethnicity, and gender inequalities…really did not receive sustained, indepth treatment except during three class sessions devoted to 'multicultural education' during the first semester of the program" (p. 175). Similar to in these studies, in my research, foundations courses did not appear to constitute a substantive part of the closely related ideas that students used to describe and evaluate the program and their teaching-related experiences. Preservice teachers in my study rarely brought up issues from foundations courses when discussing overall experiences in the teacher education program.

My research does not imply that all students made the same associations between program experiences; it does, however, show many similarities in the manner by which students summarized program-supported views. I have described how students learned program-based ways of talking about teaching. The discourses students used came mostly from the child development and teaching methods emphases of the programs. In talking about courses communicating overall similar "inquiry-based" or "child-centered" ideas, preservice teachers tended to talk about their undergraduate Human Development courses

(other than the *Adulthood and Aging* course,[45] which given its focus on adults was pointed out by some students as not pertaining much to their futures), their methods courses in the graduate program, and their *Math for Elementary Teachers* course sequence from their undergraduate programs. Felicia, a graduate student, noted, "We had a couple of math courses that did a lot with strategies. But other than that, we didn't have really any strategy classes in undergrad."[46]

The organization and construction of relationships between courses and course ideas helped to coordinate their relevance. Students' associations of the "investigative" approach in mathematics with "inquiry" in other subject areas or with the program's overall philosophies served to produce in the "investigative approach" a different type of meaning or relevance to teaching than it might have otherwise had for students in a program with directionless[47] education courses. As I have suggested, these overlapping emphases in the 5-year program created for students a lens through which to observe, reflect on, and evaluate their various fieldwork experiences in schools.

There have been calls for teacher educators to consider more closely the ecology of field experiences (Zeichner, 1985), programs in general, and the learning-to-teach process (Wideen, Mayer-Smith, & Moon, 1998). Hollins and Guzman (2005) indicated that often researchers do not address how particular courses or community-based field

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[45] The *Aging* course was listed as a core curriculum course for students in the ECE program, not as one of their required Early Childhood courses.

[46] Many students commented about the *Math for Elementary Teachers* courses being two of their only undergraduate courses that modeled the types of instruction the program promoted. Students occasionally made similar references to courses such as *Music for Elementary Teachers* or *Physical Education for Elementary Teachers*, but might suggest they did not see themselves teaching these subjects as much as other subjects—like math, language arts, social studies, and science.

[47] This comment goes back to Tom's (1997) suggestion of common criticisms of teacher education.

experiences fit into teacher education programs as a whole. My research lends support to Hollins and Guzman's position that this type of narrowing of focus, which decontextualizes courses and field experiences, limits how deeply we can understand their significance for preservice teachers. For example, it would be impossible in my research to suggest whether or how a particular foundations course contributed to students' learning without recognizing the relative isolation of the knowledge from that course from the rest of the program. Additionally, it would be impossible to suggest whether or how an individual methods course contributed to students' learning without knowing that close conceptual relations existed with other methods courses and that students likewise identified these ideas closely with topics emphasized in the undergraduate ECE program. Further, as I show in the next chapter for mathematics education, particular program-based ideas about teaching moved in different ways through different schools and school districts.

The relationships preservice teachers identified between various coursework and fieldwork activities seemed to act in some ways as a coordinating mechanism for defining and evaluating their experiences. In my study, certain components of the teacher education program shaped a set of ideas that built upon one another and that students conceptually merged as they generalized the program. The program "enrolled" (Callon, 1986; Nespor, 1994) preservice teachers into particular kinds of disciplinary networks by helping organize similar and generalized ways for them to talk about and participate in teaching. The ways that this teacher education program "enrolled" preservice teachers helped them to learn to use particular program ideas as frames of reference to shape particular kinds of identities for themselves as teachers or particular ways to think and

talk about teaching. In other words, the preservice teachers used certain sets of inter-connected program ideas to produce general understandings of the program and its recommendations to them for their teaching.

Although research on individual courses and field placements has been, and continues to be, both popular and valuable, it cannot help us see things such as how preservice teachers produce their understandings of program emphases as a whole or how they assign and re-assign what is practical about certain program experiences as they move through their coursework and their various field experiences. Discussions in this chapter begin to highlight the potential for new insights that might accompany a move beyond an almost exclusive research emphasis on studying preservice teachers' learning by looking at particular courses or coordinated course and field placement arrangements or by studying preservice teachers' changing "beliefs" in a particular course or paired course and field placement. In my study, to the extent students looked at the relationship between their *Observation and Assessment of Children* course and their work in lab school, their work in each might be considered "practical" because the same ideologies and instructional practices were supported in each. But on the other hand, what it meant for experiences to be practical differed when students looked at how course and lab school activities related to their future work in elementary schools. For example, I mentioned that some students questioned how or whether they might be able to apply some of what they were learning in their future elementary school classrooms.

Seemingly, a need exists for teacher educators to expand research horizons and insert the important questions of whether, where, and under what set of circumstances certain kinds of teacher education program ideologies or experiences might become or be

considered by preservice teachers to be “practical” or “relevant” to their work in particular diverse field placements or to teaching (cf., Nespor, 1994; Star, 1995). In chapter 4, I further point to how teacher educators might gain from considering not only how those instructional practices supported in particular courses prepare preservice teachers for particular placements, but also how they link preservice teachers into school networks in general. I show some of the ways preservice teachers analyzed and evaluated program experiences in relation to their fieldwork in different graduate field placements. I further describe how program and school relationships helped shape preservice teachers’ learning and attitudes toward the program and teaching and how these relationships also had socio-political significance.

Chapter 4 Connecting the Program and Schools

In chapter 3, I described ways preservice teachers gave meaning to particular coursework and fieldwork. I also looked across university and program coursework as a whole to describe ways preservice teachers connected, or did not connect, courses or course ideas to produce particular meanings and relevance for the teacher education program that represented and defined their learning. This chapter addresses how graduate preservice teachers' experiences in the program and the connections they made between their various experiences likewise helped them produce the program's different relevance in different classrooms, schools, and school districts. I describe how the preservice teachers were positioned in and positioned themselves in *particular* kinds of relationships with school practice. That is, I explain students' attempts to trace program-based ideas into "real" school practices and highlight place-based differences in how they accomplished this. Further, I suggest how the program's relations with schools and students' ways of shaping and assigning relevancies to program- and school-related experiences had socio-political significance.

This chapter describes and distinguishes between some of the ways the program and graduate students moved knowledge between program experiences, and in particular, to different schools or school districts with varying racial and ethnic diversity, financial resources, discipline policies, and so forth. I first introduce recommendations that have been made for teacher education programs to address and support multiculturalism and diversity, also describing this graduate program's assignment to preservice teachers of field placements in a diverse grouping of Lewiston County and Bremont City elementary schools.

Demographic Trends and Teacher Education Program Responses

According to the 2005 National Center for Education Statistics [NCES] report, *The Condition of Education*, as total school enrollment in the United States has increased, the percentage of public school students considered part of a racial or ethnic minority group has also increased while the percentage of White public school students has decreased. Although school enrollments have become increasingly diverse, incoming teachers remain predominantly non-Hispanic White, middle-class, monolingual females having limited experience with students of backgrounds different from their own (Green & Weaver, 1992; Hollins & Guzman, 2005; Zumwalt & Craig, 2005).

Sharp demographic divides between children and teachers have contributed to widespread suggestions that teacher education programs face pressing and long-term needs to address cultural gaps and to prepare teachers to teach children of diverse racial, ethnic, and social class backgrounds or in urban schools (e.g., Banks & Banks, 2001; Gay, 2000; Irvine, 2003; Ladson-Billings, 2000; Nieto, 2000; Sleeter, 2001; Villegas & Lucas, 2002). Recommendations for ways to make teacher education programs more responsive to multiculturalism, diversity, or social justice issues almost always advocate infusing these issues in all aspects of programs and even across whole universities. However, the prominence of these topics across entire programs has been little observed in teacher education.

A more common response than widespread changes to such calls from teacher education programs has been to add on diversity or multiculturalism courses and leave the rest of the program intact (Hollins & Guzman, 2005; Villegas & Lucas, 2002; Zeichner & Hoeft, 1996). Since the 1970s, various diversity ideologies have been applied

in courses designed to meet teacher education program diversity requirements. For example, White cultural deficit theories (e.g., Bereiter & Englemann, 1966) focused on hope and advocacy and the sympathies of the White middle-class have dominated in some programs and coursework and have also influenced teacher education research agendas (Sheets, 2003). However, numerous teacher educators and programs have challenged cultural deficit models as reinforcing stereotypes. Yeo (1997) faulted the great majority of teacher education programs as "a sustaining part of urban education's cycle of failure" (p. 127), suggesting that assimilatory multiculturalism strategies serve to reinforce stereotypes, reproduce understandings of minority and urban deficiency, and dissuade minority students from entering teaching. Some educators and programs have instead supported, for example, the need for teachers and teacher educators to question their own assumptions and to produce pedagogy that is both culturally sensitive and locally appropriate (e.g., Cochran-Smith, 1995; Ladson-Billings, 1999, 2000; Nieto, 2000; Sheets, 2003; Sleeter, 2001). Such pedagogies aim to challenge the status quo and the acceptance of White experiences as a normative standard.

Like coursework, field placements also represent one of the main ways teacher education programs address multiculturalism and diversity concerns (Hollins & Guzman, 2005). For example, in many cases, field placements serve mainly to provide students with exposure to and observations in classrooms (similar to the case for sophomore year placements in the program I studied), or the placements might have closely coordinated relations with coursework (similar to students' junior year lab school placements). But other times, opportunities such as community-based field experiences and student teaching placements in urban schools have been assigned to help preservice teachers

become more aware, understanding, and accepting of diverse student populations (e.g., Burant & Kirby, 2002; Canning, 1995; McCormick, 1990). Cook and Van Cleaf's (2000) research suggested that candidates completing their student teaching in an urban school felt better prepared to address children's multicultural needs and to work with parents in multicultural and multiethnic settings than those candidates completing their student teaching in suburban or rural schools. Hollins and Guzman similarly and more generally summarized that relocation for field experience in urban schools can help teacher candidates learn about students from diverse backgrounds as well as about urban school conditions. These results seem to suggest positive outcomes of urban or multicultural field placements in teacher education. However, as was also the case for multicultural coursework, questions have been raised regarding whether urban or multicultural field experiences might at times fail to challenge, or might even reinforce, racial or cultural stereotypes (e.g., Burant & Kirby, 2002; Sleeter, 2001; Tiezzi & Cross, 1997).

This Program's Response

In the teacher education program I studied, during their fifth year, half of the preservice teachers completed field placements in Lewiston County surrounding the university and half completed placements in Bremont City (population approximately 100,000; located about 45 miles from the university). In the interest of all preservice teachers having diverse experiences, beginning in the 2003-2004 academic year, everyone switched school districts for their student teaching placements in the spring semester, either from Bremont City to Lewiston County, or vice versa.[48] They also switched grade levels, completing one of their placements in a grade K-2 classroom and

[48] In prior years, some of the students went to Lewiston County for the entire year and some went to Bremont City for the entire year.

one in a grade 3-5 classroom. Some faculty indicated these switches to be partly a reflection of NCATE's emphasis on diversity.[49] Elementary Education faculty member Dr. Norene Joseph, also a supervisor of student interns and student teachers, described the new strategy:

> The reason why we ask our students to be in one context one semester and be in another context another semester is very important….I think a lot of us have felt like our students aren't prepared to teach in the changing diversity of schools in this day and age. And I think we felt like socioeconomic status, inclusion [programs in] schools, and racial and ethnic diversity, second language issues—I mean there were all these things that we didn't feel like our students were getting enough of.

In previous years, some students were placed in the county district and some in the city district, and students completed their entire graduate internship at the same school. Dr. Sandy Carothers explained:

> We always had the two programs—one in Lewiston County, one in Bremont City. But not all our students had the city, or a more diverse experience. And so I think primarily the driving goal or what was behind the drive to do that, to switch them, was NCATE….We had our students in diverse [settings] in Lewiston County, but they were more rural….I think it seems to help students to have that experience in the city [too].…Most of our population [is] White middle-class females at the age of 24, maybe 23, just coming straight into the master's program….I think that's problematic too….Their understandings of diversity or understanding children from anything other than their own context is very difficult for them.

As the above summary also indicates, such a population of preservice teachers has been somewhat typical in teacher education (Green & Weaver, 1992; Hollins & Guzman, 2005; Zumwalt & Craig, 2005). The provision of an urban field placement in the program I studied represented one of this program's concerted attempts to prepare students for diverse schools—and an attempt of the kind that has not been unusual among U.S.

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[49] The NCATE (2002) Standard for "Diversity" states, for example, that students need experiences that "include working with diverse higher education and school faculty, diverse candidates, and diverse students in P-12 schools" (p. 29).

teacher education programs in general. Like initiatives at other universities, these diverse field experiences appeared to be more of an add on rather than integrated across the program as a whole (Burant & Kirby, 2002; Canning, 1995; McCormick, 1990).

In addition to field placements in diverse schools, according to Valerie, some seminars accompanying field placements and student teaching also addressed issues of diversity and multiculturalism—such as by requiring students to read about African American culture and ways of interacting and to discuss "characteristics of lower income families and how they have a lack of resources." Valerie explained differences between preservice teachers' experiences in Bremont City and Lewiston County and commented in general that "less people felt like their teacher was a model in Bremont." I asked her about what kind of preparation she had received in the program to help her deal with the kinds of differences and difficulties she described observing across placements. She explained:

> I think this is one of the weakest areas of the program…We have met with Chris…He was the principal at Cooper Elementary up until last year…And he does a lot of work with Ruby Payne and the "culture of poverty" stuff.[50] So we had him come in and speak. [The program] gives you all of this information to try to help you. I think mainly it's to help you understand…with all of the readings and discussion, about the different classes and cultures.

Similar to Valerie, Jean explained how seminars sometimes addressed the dynamics of different schools and kids' backgrounds. She explained how seminars sometimes pointed out how some children come from affluent families. For example, in

[50] Ruby Payne's "culture of poverty" framework describes poverty as a lack of resources—both financial and otherwise—and suggests that "hidden rules" govern behavior in different social classes (Payne, 1996). Payne's work has been widely popular among school administrators and in multicultural education classes (see http://www.ahaprocess.com). Recently, her framework has also received criticism as a conservative reframing of poverty that avoids questions related to class privilege and education policy (Gorski, 2005, 2006).

Lewiston County, sometimes the professors' kids "have all of the supplies and resources at their hands." Then other kids come from "very low rural families that don't have all the supplies, just low resources and may not come to school knowing everything they need to know." Jean explained how the program, through seminars, indicated things related to kids' background and home life of which they had to be aware.

Mathematics in the Program and in Schools

Focusing on mathematics education, in this section, I give attention to how the program's relationship with schools differed between Lewiston County and Bremont City, and how these differences helped to coordinate the ways students understood and evaluated both the program and their work in schools. One important way that mathematics-related knowledge moved between the program I studied and some schools was through the *Everyday Mathematics* (UCSMP, 1997) curriculum materials. For example, these curriculum materials were discussed in the *Math Methods* course and also used in Lewiston County elementary schools. This section communicates some details of mathematics-based relationships across coursework and fieldwork in the graduate program, focusing in particular on organized relationships between the program and Lewiston County. I use this discussion to begin to detail the socio-political considerations for teacher education I have referred to several times in my writing.

Background Details

At the university where I did my fieldwork, a mathematician in the Mathematics Department, Dr. David Nelson, worked together with Paul on a teacher enhancement project funded from 2000-2005 for almost $2.9 million by the National Science

Foundation.[51] This project involved the provision of professional development and support for curriculum implementation for all 629 teachers who taught mathematics in the 27 elementary schools of the two participating school districts. Lewiston County, which adopted the *Everyday Mathematics* curriculum materials, was one of these two districts. David and Paul worked closely with Kathy Willis on this project. Kathy was Lewiston County's mathematics supervisor and also sometimes taught *Math Methods* in the summer. In fall 2004 when I was carrying out my fieldwork, elementary teachers in Lewiston County had been involved in professional development related to this grant for several years. No similar professional development efforts were underway in the Bremont City school district, or at least not for mathematics.

Moving the Standards Through the Program (and Through Lewiston County)

In many sessions in his *Math Methods* course, Paul referred in various ways to the *Everyday Mathematics* curriculum materials and his views of their design or merits or to the NCTM *Standards* (1989, 2000). Paul often commented about the use of these materials in Lewiston County elementary schools or about potential advantages to children's mathematical experiences and understandings when using these materials. He told students that the theoretical ideas underlying the *Everyday Mathematics* curriculum materials paralleled those underlying the activities students participated in using the "investigative approach" in the *Math Methods* course—which, as I described in the previous chapter, students also related to program emphases in general. In his class, Paul described *Everyday Mathematics* as a scripted curriculum and an investigative curriculum and suggested that many lessons start with a problem that the kids then explore. He also

[51] This project recently received an extension.

emphasized the importance of the games in *Everyday Mathematics*, indicating that games helped children learn their basic skills. When students in the *Math Methods* course learned various strategies for doing mathematics—such as by using alternative algorithms when studying multiplication—Paul sometimes suggested that children who used *Everyday Mathematics* in Lewiston County also learned these same strategies. As a contrast, never during my observations over the course of the semester did anyone—preservice teachers, faculty, or others—refer to the instructional materials in Bremont City, *Silver Burdett Ginn Mathematics* (Fennell et al., 2001) by name or discuss the use of those materials or their conceptual underpinnings.

The program and Paul's relationship with Lewiston County provided a common bond among the preservice teachers and the cooperating teachers in their field placements. Dr. Norene Joseph explained:

> Everybody knows that Dr. [Paul] Dalton is involved in the *Everyday Math* training. So the teachers always make a joke about that…a nice joke. Like, "Oh, you have Dr. Dalton for class," you know, "well we had him for a workshop." And so they feel like that's a connection.

Even when preservice teachers described how their cooperating teachers often did not teach in those same ways that Paul recommended to them, the preservice teachers still indicated the *Everyday Mathematics* materials to help them identify the program with schools. From their experiences working with Paul and either teaching with or reviewing and discussing the *Everyday Mathematics* materials, respectively, Lewiston County cooperating teachers and the preservice teachers in this program typically had shared familiarity with Paul's, and also with the NCTM's, recommendations for good mathematics teaching. Veronica described her cooperating teacher to use the materials "totally differently" from what Paul advocated, but she still explained, "That's [referring

to *Everyday Mathematics*] what we do in Lewiston County, so when Paul talks about *Everyday Math*…I know exactly what he's talking about and I can correlate." Professional development workshops created an overlap between the program and Lewiston County schools, and whether or not cooperating teachers implemented the various recommended instructional strategies.

The use and reference to the *Everyday Mathematics* materials in schools and in Paul's course positioned the materials as a tool to help students reflect on and analyze mathematics instruction according to NCTM *Standards*-based ideas. For example, Donna indicated that her Lewiston County cooperating teacher was generally very traditional in her teaching and typically would work through and explain each page of math problems with the children, also asking them questions such as, "How do you think you would do this?" or "Do you know how to do this?" Donna contrasted this with both what she had seen more recently from her cooperating teacher[52] and with what she also planned and did when she taught lessons at this field placement:

> The past couple lessons, I've seen more of her letting the kids take a little bit more control…I'm seeing her having them figure out how to do problems, like when we did place value….I was sort of happy to see her doing that because that's I guess more like the *Everyday Math*. That is where the investigative approach is. So when I looked through the lessons she had given me out of the *Everyday Math*, I was like, "She doesn't do that!" [Laughs] So I was like, "Well I'm going to do it." And it seemed to go over pretty well.

Donna explained that the *Everyday Mathematics* books used the investigative approach Paul described and that they also mimicked what she and other preservice teachers were learning in the *Math Methods* course. She explained that even though her Lewiston County cooperating teacher typically used a more traditional approach to mathematics

[52] Donna did not suggest any particular reason for the differences she observed in her cooperating teacher's instruction.

teaching, the cooperating teacher also allowed her to teach her lessons however she wanted.

The discussions of *Everyday Mathematics* and the investigative approach as well as the professional development relationships with Lewiston County helped organize space and time in particular ways for preservice teachers. By helping students to analyze their fieldwork experiences using a particular, program-based lens, these relationships helped to move the NCTM's *Standards*-based (1989, 2000) reform recommendations through Paul's class and through Lewiston County's school classrooms. Like Donna, students could and did interpret and evaluate cooperating teachers' instruction in relation to what Paul and the *Everyday Mathematics* curriculum materials suggested to them regarding good mathematics instruction.

Although discussions of the NCTM *Standards* (1989, 2000) were not common in Paul's class, discussions of the "investigative approach," which Baroody (1998) and Paul linked to the *Standards* and to teaching with *Everyday Mathematics* in Lewiston County, were very common. Eight of the thirteen preservice elementary teachers in Paul's course had field placements in Lewiston County that semester, and they commonly talked about these curriculum materials or about mathematics teaching in field placements in relation to how Paul taught his course. Little whole-class discussion took place about these materials, and comments to the whole class usually came from Paul. From students, I mostly heard about the materials or their relations to Paul's course in interviews or at their tables during small group work. Other students, who would be in Lewiston County the following semester for student teaching, also learned about and discussed these ideas.

Additional Standards and Curriculum Relations (with Lewiston County)

Further support for the movement of *Standards*-based (NCTM, 1989, 2000) knowledge between the university's elementary teacher education program and Lewiston County schools was provided through two different 3-hour course meetings of the *Issues in Elementary Education* graduate seminar during the fall 2004 semester. Approximately half of the fifth-year Elementary Education students were enrolled in the seminar course. Four of Paul's students were among them, three of whom had placements in Lewiston County. Lewiston County's Kathy Willis led these sessions and Paul was available during both sessions and worked together with Kathy to provide general support and assistance. I attended and took field notes at both mathematics sessions.

When Paul introduced Kathy, he explained that all students would be working with *Everyday Mathematics* in Lewiston County—either at present (the semester prior to student teaching) or during their student teaching. Kathy explained to students how the *Everyday Mathematics* series is used in all K-5 classes in Lewiston County and that gifted classes in Bremont City also use these materials.[53] She conjectured that students would see these materials used more often in the future. Kathy explained how she wanted students to have an overview of the *Everyday Mathematics* program.

During this first of the two mathematics sessions, students spent most of their time in small groups participating in an "*Everyday Mathematics* Materials Scavenger Hunt." They looked through the curriculum materials to do such things as: find certain kinds of activities, identify the philosophy of the materials, find games used in particular

[53] This was the only reference I ever heard regarding the use of *Everyday Mathematics* in Bremont City. Seemingly, none of the preservice teachers I worked with had field placements in one of the Bremont City classrooms using these curriculum materials.

units, identify math messages, identify alternative algorithms or games in particular lessons, identify goals for lessons or across the year, and find lessons addressing particular state standards. Following this, Kathy led a discussion reviewing scavenger hunt topics with the class. Students occasionally also asked Kathy questions about the materials or teaching with the materials, such as how parents reacted to these instructional approaches or whether the design of the materials matched the content on state standardized tests.

Three of the four students I sat with throughout most of this class session had field placements in Bremont City. All three mentioned during their class conversations that they liked *Everyday Mathematics* better than the books they were currently using in their field placements.[54] One of these students, Alie, described as a reason that her Bremont City books show children how particular computations are done and then the children do those same computations. She described how children do not use manipulatives in her current field placement classroom, and that they only look at one way to do mathematics problems. Alie contrasted this with how *Everyday Mathematics* has children do mathematics problems multiple different ways, how the mathematics problems are not all the same, and how the materials encourage children to use manipulatives. Another of these students, Ann, mentioned that she might have seen some of the same activities they were reviewing in Kathy's session also in Paul's class—which she had taken the previous semester.

Near the end of this first mathematics session, related to standardized testing, Kathy explained that people in Lewiston County had looked at correlations between the

[54] Bremont City used *Silver Burdett Ginn Mathematics* (Fennell et al., 2001).

curriculum materials and the state curriculum standards across grade level and found most standards to be addressed many places in this spiraling curriculum. This explanation by Kathy also related to something Paul occasionally mentioned about how teachers mostly received professional development support for how to use the materials and were then told that kids would learn what they needed for the state standardized tests at the same time since the *Everyday Mathematics* series included that information. Referring to her mathematics teaching in the semester prior to student teaching and to limited emphases on standards, Alena commented, "My [cooperating] teacher is great about that. She doesn't put much stress on [the standards]. And I think the [*Everyday Mathematics*] book pretty much follows [the standards] anyway…I don't think about standards when I'm doing this. You know? I'm just following this book."

Most preservice teachers placed in Lewiston County indicated rarely giving direct attention to the state curriculum standards for their mathematics teaching.[55] During her student teaching in Lewiston County, Emily explained:

> Well, for the social studies I take the curriculum framework from the Department of Education's website, and it basically lists the essential skills and understandings the kids should have for each [state standard]. So I plan my lessons according to that and I create lessons that would teach those…But the *Everyday Math*, you know, I don't worry too much about making them align to the [state standards] because this is something the school has adopted, and it does align with the [state standards].

[55] I would not suggest the same regarding teaching in other content areas since I did not get as much of that type of information from students. Students referenced state curriculum standards for placements in both districts, and with greater emphasis in some schools or classrooms or even for some subject areas than others. My suggestion is particular to mathematics instruction in Lewiston County and at least partly relates to the professional development recommendations teachers received for the *Everyday Mathematics* materials.

This explicit limited emphasis, in general, on mathematics curriculum standards for mathematics in Lewiston County schools is notable in current times of standards and high-stakes standardized testing.

In the class meeting following the scavenger hunt session in *Issues in Elementary Education*, Kathy led a second session requiring preservice teachers to work in groups and then present to the whole class their work on alternative algorithms for addition and subtraction—such as algorithms for partial sums in addition, column addition, trading with base 10 blocks in subtraction, and left-to-right subtraction. She mentioned how alternative algorithms were one of the main features of *Everyday Mathematics.* Kathy gave the preservice teachers various recommendations related to teaching and commented that the bottom line was to find a mathematical algorithm that kids understand. She recommended how they would not want kids to memorize alternative algorithms any more than traditional algorithms. Kathy further mentioned that alternative algorithms are good for children struggling with mathematics and explained that if preservice teachers' student teaching placements were in Lewiston County, then they would be using those alternative algorithms in their teaching. Kathy indicated that the county's professional development for teachers—which she, Paul, and David Nelson together coordinated for their National Science Foundation project—specifically advocated against having children focus on memorizing algorithms. Teachers were especially encouraged not to focus on algorithms when children were first being introduced to mathematics topics or concepts.

Socio-Political Tracings of the Program to Schools

Felicia had taken *Math Methods* the previous semester and was a student in *Issues in Elementary Education* in fall 2004. In her description of working with Kathy in the mathematics seminars and hearing more about the use of *Everyday Mathematics* in the Lewiston County mathematics program, she explained:

> It was neat to see how some math programs are set up and just the different components,[56] but if you're not going to be teaching around here or in a place that uses *Everyday Math*, it's kind of irrelevant because it might be great stuff, but if you're in a system that you do something else, then you're using something else. There's not really a whole lot of choice there….I liked the class we took last week [referring to the second mathematics *Issues in Elementary Education* seminar] a lot better. I thought it was a lot more relevant. She pulled stuff out of it that we can actually use whether we use *Everyday Math* or not.

The various uses and discussions of *Everyday Mathematics* helped students define the relevance of the materials' NCTM *Standards*-based instructional emphases to some schools or placements more than others, and generally more to Lewiston County schools participating in coordinated change efforts with the university and using those materials. Students' contextualizations involving these curriculum materials did not necessarily extend beyond Lewiston County or other districts using those same materials and were not necessarily connected to futures beyond ongoing or upcoming field placements. Regardless of the potential merits of the curriculum materials, or the ways they might be used in certain schools, according to Felicia, familiarity with their components might prove "irrelevant" outside of school districts using those same materials.

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[56] At Kathy's seminars, students reviewed and completed activities from the *Everyday Mathematics* (UCSMP, 1997) materials across K-5 grade levels, including the teacher's guides, math journals, and other related resources. Kathy also described two major features of these materials to be the games and the alternative algorithms.

Thus far in this chapter, I have been mostly emphasizing mathematics education relations between the program and schools. Issues of *how* and to *where* students identified potential utility in interrelated and program-supported instructional ideas and practices are critical to consider and raise questions about. That is, we might ask what kinds of place-dependent relevance program ideas have for students. In my research, regardless of whether students had placements in preschools or in elementary schools in Lewiston County or Bremont City, they almost always described limitations to the program's relevance in schools. However, as I have begun to indicate to be the case, and not only for mathematics, students generally described closer philosophical connections between program coursework and Lewiston County classrooms and schools (and to lab school) than between program coursework and Bremont City classrooms and schools.[57] What I intend to emphasize from the types of discussions I raise in this chapter are not distinctions between these particular districts themselves, but the range of students' experiences in field placements and of relations between field placements and the program given how school curriculum and instruction are not politically, socially, or economically neutral.

Looking Across Placements and School Districts

Referring to the program's previous year's (2003-2004) attempt at having graduate students switch districts between fall placements and student teaching in order to offer them field experiences in both Lewiston County and Bremont City, Dr. Sandy Carothers explained:

[57] This was of course not universally true, although it was a popular generalization among students. Donna's experiences, noted later in this section, represent one example where this generalization is inconsistent.

> The contexts in Lewiston County are not as diverse as they are in Bremont City. And I think the feeling is from both the Teaching Center and maybe even higher up at the dean's level that all the student teachers have to have those experiences in diverse contexts….I think the problem we have is that we have students who don't want to be in the inner city experience. What happened last year was somewhat of a downward spiral in the fall with some of the students perceiving or starting to blame the schools…for their own difficulties in being able to connect with those children. It was like it was [the children's] problem, their fault, you know, "I don't want to teach necessarily in these kinds of schools, so why am I here?" You can get into some of those issues and that's a real problem….We want to avoid the blaming and change their perspectives or hopefully influence them to change...to think about those situations and the children in a different way.

Sandy explained that the program wanted to influence preservice teachers to avoid blaming children and schools for their difficulties in connecting with the children.

Elementary Education program area leader Dr. Rebecca Stoller described the previous year's process as being "somewhat of a disaster." I asked Rebecca what was disastrous about it and she explained differences she had learned about from various faculty and graduate students in the graduate students' experiences and expectations across districts:

> In the fall, half the students were in Bremont, half the students were in Lewiston County. But they all came together once a week for a seminar….And as I understand it, what was happening in that seminar was that the Lewiston people were saying how wonderful it was and how much they loved it and how much they loved their teachers and it just sounded like being in heaven, and that people in Bremont were somehow making it—it just sounded horrible. It sounded like they were in hell. The children were horrible. They behaved badly. The teachers didn't have control. The sort of curriculum they were being asked to teach by and the pace at which they were…expected to teach…[it] had gotten so it was too standardized tests-driven and too boring for the children and they couldn't do anything creative. And so, I mean, all of these Lewiston people were listening to the Bremont people, and they started to dread going to Bremont, which is where they're going to have to do their student teaching. And all the people in Bremont are like, "Oh boy. I can't wait 'til next semester!" And so then when they made the switch….I think it's the self-fulfilling prophecy. They were so set about [how] it would be so horrible, that naturally when they got there, they found it. And they hated it. And I mean we ended up having some really bad situations down there….I just pray that it doesn't repeat itself.

Earlier in this chapter, I included transcripts from interviews with Dr. Norene Joseph and Dr. Sandy Carothers that summarized the graduate program's aim to give preservice teachers greater access to diverse classrooms having differences in things such as social class distributions and race or ethnicities. When comments such as Rebecca's from above are considered in parallel with these race and social class differences across preservice teachers' field placement schools and districts, then distinctions made by preservice teachers between "wonderful" and "horrible" urban, suburban, and rural placements hold a clear social and political significance. For example, these kinds of comments raise questions such as what implications these types of characterizations, labels, or attitudes that students produce toward teaching in particular schools might have for diverse, multi-ethnic schools or for urban education in particular. How can teacher education programs most effectively work against the production of such characterizations? What kinds of proposals or recommendations from the literature might prove advantageous to draw on in this regard?

Related to Rebecca's general suggestion of differences between students' experiences across districts were some parallel suggestions made by students. During her student teaching in Lewiston County, and the semester after she had completed a graduate field placement working 20 hours/week in Bremont City, Emily explained:

> I wouldn't want to do my student teaching in Bremont City. I am glad I did it in Lewiston County just because I don't think that I would have had the freedom to do what I wanted to do…Everything I needed to teach, I don't think that my teacher would have given over the control of the classroom as easily.

The idea that different field placements reinforce teacher education program ideas in different ways is certainly not new for teacher education (cf., Borko & Putnam, 1996). Like Emily, many students in the program I studied indicated that the investigative and

inquiry-based ideas they learned about in the program did not receive the same kinds of support in each of their diverse placements. In turn, students assigned the program different place-specific relevance in different schools and classrooms. The previous discussions of particular program and school relationships for mathematics instruction and related to the *Everyday Mathematics* (UCSMP, 1997) curriculum materials in Lewiston County also help illustrate this point.

Donna had two roommates also in the Elementary Education graduate program, Ann and Erin. While completing a field placement in a Lewiston County elementary school in the semester prior to her student teaching, Donna explained about differences she and her roommates had identified between their experiences. She also described her concerns for moving from that field placement to Bremont City for her student teaching the next semester:

> My two roommates are in Bremont City, and they talk a lot about…some of the teachers' expectations….I'm just worried about the teaching styles….I can't speak for all of them, but they're more—very direct. It's I guess a culture issue—very direct in their teaching….Whereas in Lewiston County I felt like they shared a lot of the same beliefs that Our University emphasizes in education. I felt like it was easier for me to do what I wanted to do. My cooperating teacher was like, "Oh, do whatever you have to do. Just get it done." She was real flexible, and I don't know if I'm going to have that same amount of flexibility next semester [for student teaching in Bremont City]. I know a lot of schools are also pushing for that accreditation, too, in Bremont City. So the culture of the school is something that's a concern of mine, and the styles of instruction.

Donna's concern for flexibility in her student teaching is not unusual among preservice teachers. For instance, Beck and Kosnik (2002) suggested "flexibility in teaching content and method" (p. 90) as an important component of a practicum placement for the preservice teachers in their study. Although particular schools in both Bremont City and Lewiston County had been either very successful on statewide

standardized tests in recent years or faced accreditation warnings or difficulties of various sorts, there did exist substantial district-wide performance differences. In tested grades 3, 5, and 8, for each of the years 1998-2002, and for all subject areas tested, with only three exceptions, all Lewiston County division summary averages exceeded the corresponding averages in Bremont City.[58] Like Donna, some preservice teachers identified or conjectured accreditation concerns related to No Child Left Behind [NCLB] policy[59] to contribute to their cooperating teachers' instructional choices and thereby also to shape field experiences as a whole.

Generally speaking, in my study, things like school accreditation issues, different school or classroom cultures, and different instructional approaches were treated by or acted for students to limit their flexibility to teach in the ways they wanted or that the program supported. Students learned about these differences on their own simply by observing in classrooms or talking to their cooperating teachers about classroom or school rules and norms, and they also heard about them from one another and at times from faculty. Donna worried that she might not have the opportunity to try out the kinds of recommendations the program made for teaching when she moved into her Bremont City classroom.

I should make the perhaps obvious point that despite generalizations students sometimes offered regarding differences between placements in Lewiston County and Bremont City schools, students' individual experiences of course varied depending on the

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[58] This information was available from the state education department's web page. The tested subject areas were English, mathematics, history, and science in all three grades, and additionally computer/technology in grades 5 and 8 and writing in grade 8. The three exceptions were for two years of eighth grade history and one year of eighth grade writing.

[59] Details available at http://www.ed.gov.

school and classroom of their placement. For example, as it turned out, the following semester during her student teaching, Donna described herself to have a similar teaching style as her cooperating teacher in that Bremont City kindergarten classroom. She indicated how the cooperating teacher for her student teaching believed in hands-on learning and in getting children involved in what they were doing. Donna explained how this was much like the program had been teaching her and other students to do. She explained that the Bremont City school where she was completing her student teaching was fully accredited in 2004-2005 and suggested that children's passing of the state standardized tests the previous year had put less pressure on her and other teachers to teach strictly to state standards. Donna indicated that she tried to make her student teaching in Bremont City "investigative" and also tried to incorporate the games from *Everyday Mathematics* with the kids.[60] She looked to extend what she learned in the program to schools and to see how the program-based "philosophies" or "beliefs," such as described in chapter 3 and produced by overlapping emphases in courses, could be played out in school classrooms.

After moving from her graduate field placement at Eastridge Elementary in Bremont City to a Lewiston County student teaching placement at Cooper Elementary, Valerie described how she thought, "From Bremont City now to Lewiston County, everyone in general had a much better experience in Lewiston County, because the girls

[60] As I have indicated, Bremont City's adopted mathematics text materials were not *Everyday Mathematics*, but *Silver Burdett Ginn Mathematics* (Fennell et al., 2001). Donna regularly reviewed Bremont City's curriculum framework for her instructional planning, and she pulled many of her resources from the internet. In fall 2004, two of the five elementary schools of preservice elementary teachers Bremont City field placements were fully accredited. The other three elementary schools had received warnings regarding their accreditation.

that are in Cooper Elementary with me were also in the same school in Bremont City and they all seemed to say they had a much better experience." Valerie described her impression that cooperating teachers in Lewiston County were more helpful and more of a model for them and could provide them with more resources. She described that she enjoyed her field experience in Bremont City, but that the student teaching environment in Lewiston County was "more pleasant." Valerie further explained how in her Cooper Elementary student teaching placement, there were less severe behavioral problems and more support from the principal. Related suggestions, such as of having to address more behavioral problems in urban schools, have not been uncommon among preservice teachers. For example, in Gilbert's (1997) study, almost half of participants said they would not teach in an urban school. These participants believed a traditional "basic skills" curriculum was necessary in urban schools due to pupils' disruptive nature and lack of literacy, and further, violence was the primary association preservice teachers made with urban contexts.

As Valerie mentioned, the resources that either were available at field placements—or that preservice teachers believed were available—contributed to how some preservice teachers could use program ideas in schools. Alena emphasized resource availability as contributing to changes in her instruction between her fall placement and her student teaching. During the fall semester prior to student teaching, Alena's placement was in a Lewiston County classroom, and she worked in Bremont City for her student teaching. I visited Alena's classroom once in the fall and observed her teach a mathematics lesson. On that day, Alena used base 10 blocks to help children learn addition and subtraction. Each table of students had a box or two of base 10 blocks to

share and use, some of which Alena had borrowed from other teachers. Alena held the children responsible for doing regrouping of the base 10 blocks and keeping written track of this process in groups at their tables. She provided very little explicit instruction. In an interview during her student teaching, Alena explained:

> Laura: So now I saw how you taught math in your class last semester.[61] How would you compare the kinds of things you are doing [this semester]?
> Alena: This time I think it's more like direct instruction just because…supplies-wise I know last year I had all of these boxes [of manipulatives] that I could borrow from other teachers, and my teacher had some….There was more of it for my kids to use. But this time I feel like we don't have that many that I can give the kids. You know, okay…[last semester I could tell them] "You do this part of it," kind of thing. Like, "Experiment on your own and find out an answer."…There aren't enough supplies [this semester] to go around for that. So that is a major problem. That is why I think [I am] having to do a lot of direct instruction. I don't know how engaged they are when I am doing just a direct instruction kind of lesson. Because that was one of the things last semester….Kids got to…figure it out for themselves…in group work. It worked well.

Different economic resources and social dynamics at field placement schools helped coordinate different kinds of field experiences for preservice teachers where certain kinds of instruction seemed more or less possible.[62] When schools such as Alena's had limited financial resources or manipulatives, in some sense, this teacher education program's recommendations proved invalid and preservice teachers faced a problem of how to adjust instruction accordingly. The final section of this chapter points out some ways that

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[61] I had visited Alena's field placement only this one time in the fall and only for a one-hour math lesson. I also interviewed her twice during the fall semester, but I know little about how Alena taught mathematics in general and do not mean to imply she always used similar approaches.

[62] References in this document to details of and differences between school placements—such as their diversity, financial and other resources, accreditation pressures, disciplinary policies, school size, cooperating teachers' instruction, and so forth—are based on students' identification of and commentary on these things and not necessarily on actual details and differences of these kinds across placements.

students classified differences and also linked them back to the teacher education program.

Producing "Contexts" and Flaws

Alena taught often in her field placement during the fall semester prior to student teaching. For example, she taught mathematics almost every day. For her, moving from that school placement in Lewiston County to her student teaching placement in Bremont City was a major transition. Students described the program's occasional address in readings and discussions (such as in graduate issues seminars or student teaching seminars) of such things as classroom management or poverty issues,[63] or suggested they had been asked to write multicultural lessons. However, many undergraduate and graduate students alike expressed similar concerns as Alena's below. They sometimes divorced their "philosophy" (often tied to the program's networked discourses) from how they might have to teach in *some* schools.[64] During her student teaching in Bremont City after her previous field placement in Lewiston County, Alena explained:

> Bremont City is really [state standardized test]-oriented. I mean they kind of have to be. And last semester [sic.] Wright Elementary [in Lewiston County] was very relaxed…. School size makes a big difference. Wright was 200 kids. Here [in Romley Elementary in Bremont City] it's 700 kids….In my classroom right now there are more kids who need special services and who need somebody to be there for them….Last year it wasn't that big of a concern….It comes off negative, but Bremont City is a lot more discipline oriented, like behavior management oriented….Wright was more…community was a strong part of it….I guess that is what that school needs to do to function….Romley Elementary is going through a

[63] E.g., Students learned about Ruby Payne's work on the "culture of poverty."

[64] Brouwer and Korthagen (2005), referencing Dann et al.'s (1978) "discrepancy experiences," suggested that "teachers experience a rift between idealistic notions developed during teacher education programs, on the one hand, and pressure from schools to rely on traditional patterns of behavior, on the other" (p. 155). I interpret things from a less neutral perspective of difference—looking in terms of rifts between the "ideal" and the "real," but in terms of curriculum networks with different political and social extensions.

> lot of changes construction-wise, and they have no playground….Kids [sic.] have no free time basically, you know, recess.…I am having more bad behavior [that I] have to change….I have to adapt myself more to this classroom, like not [my] philosophy, but to change the way I do things here more so than I did at Wright.

Alena described every minute to be planned out at Romley Elementary, where children talked and socialized very little during the day. She explained how her cooperating teacher considered talking in class or out of turn to be a behavioral problem, and how her principal maintained a presence in the school's hallways and similarly expected all teachers to closely monitor student behavior. Alena indicated that at her previous placement in Wright Elementary in Lewiston County, children did not fear or view as bad a visit to the principal's office since everyone loved the principal. On the contrary, Alena described a visit to the principal's office in Romley Elementary to mean business. She explained how she and other student teachers placed at Romley sensed and talked about a lack of classroom community there and described children becoming bored given they had every minute planned out and no time to talk and share their stories. Together, the student teachers at Romley contrasted this school norm with their learning in the teacher education program:

> We all were talking about that because I guess it's just the way all of us have been through this program and we understand how important it is to be…like the teacher and the children have to be one unit, you know, together…[Here], the kids have no break, you know? They come in and then they are expected to do work. Our principal makes them have silent lunch sometimes so they can't talk and eat. And then they come back to class and they are expected to work again.

Alena described silent lunches to be times where children were supposed to absorb everything they had learned during the day.

In chapter 3, I indicated that the relationships students identified between particular coursework and fieldwork activities acted in some ways as a coordinating

mechanism for defining and making sense of various course or field placement experiences. That is, program emphases served to highlight certain resources or processes for preservice teachers to look (or hope) for in schools—such as for mathematics manipulatives, or for children to be "one unit." However, as Alena's comments help to illustrate, sometimes these resources were unavailable or preservice teachers identified broadly different processes taking place in schools, such as different orientations toward "behavior management" compared to "community." "No breaks" and "silent lunch" raised new or different kinds of context-specific concerns than content area methods courses, or the program as a whole, had specifically taught preservice teachers to critically question or analyze—other than perhaps in an occasional seminar.

I would like to suggest that the program-based philosophies developed by and for the preservice teachers helped to coordinate context-specific meanings and relevance for program components and further to construct certain failures of the kind where either (1) schools interfered with the accomplishment of program objectives or (2) program objectives proved unrealistic for schools. Program coursework, and also preservice teachers, often defined good teaching in terms largely independent of preservice teachers' work in any particular school. Alena's distinguishing of "the way I do things" from her "philosophy" in one urban school helps point to the separation of program and school concerns that many preservice teachers experienced. I listened to and tried to understand preservice teachers' reasons for making these kinds of distinctions. As I have been suggesting, the kinds of distinctions preservice teachers described as seemingly most problematic generally regarded how certain placements had more limited connections with university emphases (e.g., *Everyday Mathematics* used in Lewiston County but not

in Bremont City), or fewer financial resources, or a more diverse population of children, or greater accreditation pressures, or a more authoritarian principal, and so forth. As a result, program suggestions treating instruction as generalizable across school placements, or context-independent, tended to marginalize urban or diverse schools and classrooms, or schools having more limited financial resources, as viable places to engage in program-recommended practices for good teaching.

Student teachers' focus on things like classroom and behavior management have been suggested repeatedly in teacher education programs as "custodial" in nature and a pressure associated with teacher socialization (e.g., Hoy & Woolfork, 1990). For example, Moore (2003) referenced classroom management as one of three "procedural concerns" focusing preservice teachers' practicum experience prior to student teaching.[65] She explained her research to reveal in preservice teachers' teaching, "a lack of emphasis on curricular aspects that we thought we had emphasized [in the program] such as reflective practice, use of teaching through student inquiry, or recognition of constructivist learning theory" (p. 38).

Discussing the control of knowledge in classrooms, McNeil (1986) looked at studies addressing the questions, "What kinds of knowledge do schools make accessible?" (p. 158) and "How is school knowledge a product of the ways of knowing students encounter in school?" (p. 158-159). Based on her research, McNeil suggested that classroom management is not a technical skill but instead interconnected with how both knowledge and ways of knowing are made available in school: teachers' "patterns of knowledge control were…rooted in their desire for classroom control" (p. 159). Related

[65] Moore (2003) referenced time management and teaching expected lessons as two other procedural concerns of preservice teachers during practicum.

suggestions serve to question the ways that classroom management, for example, with seemingly limited ties to various interrelated program courses, discourses, and practices, at times was produced as independent from content-area teaching in my research.

I am not interested in concerns regarding classroom and behavior management as "custodial" problems for teaching. Instead, my interests are in questions such as whether and how teacher education programs might at times produce (perhaps unintentionally) divisions between their own concerns and the concerns of schools and between schools with different kinds of financial resources. Specifically, I am interested in knowing what social, political, and economic costs are associated with teacher education programs' selection and support for particular kinds of context-independent content and instructional strategies. What price might we be paying when we consider "behavior management" or things like social foundations coursework as almost entirely independent of content-area curriculum or teaching philosophies? What costs can be associated with not helping preservice teachers to critically analyze and address the social inequities and injustices around them?[66]

I suggested in the previous chapter that the relationships between certain program courses and discourses acted as a coordinating mechanism for students' program experiences. But these were relationships not readily traced into or linked up with the political, social, and economic networks that schools were a part of.[67] The types of distinctions students constructed between program ideas and schools served at times and in different ways to produce the program as flawed for being ideal, or in teachers as

[66] See, for example, Apple (1992) and Gutstein (2006), who point out the NCTM's failure in this regard with the *Standards* (1989, 2000) documents.
[67] See Nespor (1997) for discussion of schools as intersections of various networked relations.

flawed for using practices other than inquiry, or in schools for emphasizing standardized test scores, or in preservice teachers themselves for their difficulties in doing what they described the program to be recommending. To the extent that some field placements were more aligned with the program emphases, the produced flaws were context-dependent and politically and socially charged. Critical interpretations of political and social difference were limited in the program discourses and practices students used to represent the program. As other students pointed out, Emily explained, "We need a class on just classroom management, *just* classroom management." It was common for preservice teachers to talk about needing to know more about these types of "context" issues *so that* they could teach in the ways they wanted to teach.

Like Alena, whose experiences I described in some detail to introduce this section, all of the preservice teachers had certain ideas about teaching that they hoped to make use of in the future as teachers. Further, they generally attached these ideas to the ideas they described learning about in the program. For students in this program, schools acted partly as contexts against which to measure their ideas about practice and the program. Conversely, the program and program philosophies acted as contexts for preservice teachers to evaluate school policies and teachers' instructional approaches in schools. Preservice teachers seemed to be searching at times for how to make use of program ideas for teaching. They assessed program relevance according to the results of these searches.

During an interview with Wendy, we discussed where she thought she might teach in the future and I asked her whether it would matter to her what schools were like in comparison to what the program supported. She explained:

> I don't feel like any school is really going to be like our program. My sister [who graduated from this same program] was telling me how idealistic it is and she said when you get out in the classroom, the stuff that we've learned….a lot of it is thrown out the window. I mean I still believe in inquiry learning and all that...and investigative and all that stuff. But as in discipline policies and not getting rewards and punishments….I don't think there's any school that doesn't do that, except for maybe some weird private schools. I don't really know….I think Lewiston County might be pretty close to some of the principles that we learned, but not really either because it depends on your teacher. I mean my teacher was very direct instruction, and that's everything that we learned against.

I heard many comments similar to Wendy's, describing a sense of disconnect between what students learned in the program and what they anticipated for and saw in particular schools. When students related field placement experiences back to what were learning in the program—such as "child-centered," "inquiry," and "investigative" instructional practices—in a sense, these "best" and modeled practices represented the program and acted as a frame of reference for interpreting fieldwork. Wendy defined sharp contrasts between the program's recommendations and her observations of school policy and classroom instruction.

Several students talked to me about being prepared by the program, mostly through multiple field placements and related seminars, to teach in any number of different types of schools. Along similar lines, Cook and Van Cleaf (2000) suggested field placements in urban settings to help student teachers feel more prepared to work in multiracial and multiethnic settings. However, some schools might better allow students to teach in program-supported ways than others. When students identified particular differences between the program and schools, or between the program's and schools' various expectations and concerns, students had to choose between program recommendations and school norms and expectations. Meredith's comment below helps illustrate how when students wanted to engage in program-recommended practices, such

criteria seemed to set up some schools as contrary to the program or as places where students might find it difficult or confusing to work:

> The way the school is run, they want everything to be quiet…I'd be upset if I was in that kind of school—teaching. Because I would feel very frustrated about what I *could* do…And I think that the program has showed me how it is important to have inquiry learning and…how important it is for kids to discuss things and teach them how to work in groups and teach them how to do all these things. They really have built that, put that in my head. And then to get in this school [in Bremont City] was like, "Whoa! This is so different from what we learned. I don't know what is going on here."

Meredith's placement was in an urban district and in a school struggling to succeed on NCLB-related state standardized tests. At the time of our interview, Meredith had been at this placement for over two months, and typical among students, Meredith wanted to relate what she was learning in the program to what she was experiencing in a real classroom. But students observed some schools or school classrooms to incorporate closer approximations of program emphases than others. The mismatch between Meredith's expectations for how she wanted to teach and the ways she believed it possible to do this in her current urban placement produced frustration for her. She also explained:

> At my elementary school, their philosophy on education is very different from what they teach at Our University, and even than what I'm guessing is done in Lewiston County. It's just very authoritarian at the school I'm at.

Although Meredith described the program to prepare her to teach in an authoritarian school, she also indicated that she did not want to teach at "that kind of school." Meredith described herself as being inspired by hearing in her graduate courses about different strategies and many good ideas for getting children excited about learning. She explained how she would like to plan a lesson like those she had learned about in courses, but that she had never seen the kinds of things she learned about in the program in a school

classroom. Meredith described as one problem with her kindergarten field placement classroom the fact that it was an open classroom where children needed to remain quiet. Meredith suggested these kinds of expectations for a quiet classroom to "go against everything that I think is developmentally appropriate for kindergarteners."

Positioned in different kinds of socio-political geographies, certain classrooms and schools sometimes gave students the impression that it was not possible to engage in the kind of work they wanted to do. Students often described program-based criteria for good teaching in their explanations of why this was the case. Particular schools or classrooms might be labeled as being certain kinds of places (e.g., authoritarian) where preservice teachers might not want to be; others were more compatible with university recommendations. These classrooms and schools were thereby produced as being constraints (or supports) for program-recommended practice (cf., Nespor, 2002). Especially considering the predominantly White, middle class background of most preservice teachers (Green & Weaver, 1992; Hollins & Guzman, 2005; Zumwalt & Craig, 2005) and the stratification of mathematics curriculum, instruction, course-taking, and achievement by social class and ethnicities (e.g., Anyon, 1980; Bowles & Gintis, 1976; Knapp & Woolverton, 1995, 2004; Oakes, 1990; Oakes, Joseph, & Muir, 2004; Secada, 1992; Sztajn, 2003; Tate, 1997), a question I have raised is whether such a process might contribute to the marginalization of urban or under-funded schools, in particular, as viable places to engage in "good" teaching.

In my study, the usefulness of program recommendations varied widely for students according to *where* they were placed and whether and how particular schools or

school districts supported, or seemed to support, those recommendations. Emily explained:

> One thing all our courses just stress [is] the integration of learning and stuff, which I think is good because it aids knowledge transfer and it helps kids do the same thing in different contexts and apply the same skill strategies in different contexts….But then when you get into the school system, you've got a lot of kids being pulled out by specialists….Our school [in Bremont City] is very blocked off. Like this is your reading—and it's basal readers and their school bought them so they have to use them….Then you've got your math and then you've got your science or social studies.…I think my teacher could integrate it. Like…reading I mean, you can do anything—any subject area in your reading time, instead of using just the basal readers, round robin reading. But I don't know. I've heard…the school's putting a lot of pressure on the teachers to do it that way. I guess because they're not accredited and they just are feeling a lot of pressure to teach that way? I'm not really sure why they do it. But…I wonder, like, if I were out and if I got a job at that school, how my philosophy, the philosophy that's been ingrained in my head through this program, like how it would mesh with theirs, and how you resolve those issues.

Certain relationships between the program and schools provided explicit support for program ideologies (such as Paul's discussions of and Lewiston County's use of the *Everyday Mathematics* curriculum materials). Certain facets of schools—such as "blocked off" curriculum (where the program often supported interdisciplinary instruction), basal readers, or the pressures of accreditation and accompanying emphasis on state standardized tests—created circumstances where preservice teachers had to re-evaluate either their own "philosophy" or the utility of the program as a whole.

In talking to me about their plans or concerns for future teaching, students almost always made connections of some kind back to their experiences in program coursework or fieldwork. As I have indicated, for example, some students described closer connections between program ideologies and Lewiston County schools (e.g., with *Everyday Mathematics*), or questioned, as did Emily, how to deal with differences they experienced between program and school practices or ideas. Program-related

"philosophy" or "best" practices as a dominant frame of reference,[68] while used by students to contextualize some fieldwork activity, had limited utility for students' drawing of close relations between program and school activity. For Emily, such a focus, "ingrained" in her head through the program, produced "issues" that she would need to "resolve" if she were to take a job at that school. Further worth noting is that those same schools where ingrained, program-supported "investigative" and "inquiry" practices receive the most support might also tend to be those same types of schools preservice teachers attended when growing up.[69]

> I feel like now that I've been in Bremont City, then my next class [in Lewiston County] will be really easy….I don't even think that's because I've gotten one [placement] out of the way. I think [it's] because Bremont City was just such an eye opener for me for the type of kids that I was dealing with and just the issues that were going on from day to day….Lewiston County reminds me a lot of the area I want to teach in….I feel like it's a very similar playing field…like that's where I'm more comfortable….Bremont City just—it's inner city. I've never dealt with an inner city situation before. I didn't go to school in an inner city. And I want a school much more like in [sic.] Lewiston County. It's just what's comfortable and what you're familiar with. (Valerie)

During her student teaching the following semester in Lewiston County, Valerie maintained the difficulty of teaching in Bremont City for her, compared to in the county. She explained, for example, how her Bremont school used a "very direct method of management," and as I have mentioned, how she and other student teachers discussed generally having a better experience in the county than in the city. Valerie suggested

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[68] This is admittedly a generalization that I am making to address popular ways that students made connections, but it is *not* intended to suggest that there is some single and shared frame of reference working all the time. Students' ways of talking about things were unique and always dependent on what it was they were talking about or being asked to talk about.

[69] I do not know the extent to which this was the case for the students I worked with. I did ask many students about their past experiences in schools, but I know little about how they might have defined those pasts to be similar to or different from schooling they observed or participated in during their field placements. Valerie represents an exception.

having to be “almost mean and strict” in her Bremont classroom in order to be more effective with the children, and found this kind of teaching to be more difficult for her to carry out. Urban or inner city contexts might not feel as comfortable to Valerie or other students as the more familiar or “more pleasant” Lewiston County contexts.

Zeichner and Gore (1990) suggested of future research in teacher socialization that more attention is needed “to the ways in which race, social class, and gender mediate the socialization process and establish socialization patterns for particular groups of individuals who teach in particular kinds of schools” (p. 341). My research adds to this discussion by raising the question of whether or how preservice teachers’ eventual choosing to teach in particular kinds of schools might be partly coordinated by the ways in which things like diversity and social issues get produced as part of teaching’s “context” rather than as integral to teaching itself. It is worth investigating how teacher education programs do, or might be able to, encourage students to move along career trajectories in these diverse and under-funded schools—regardless of which types of schools students personally attended.

Discussion

I indicated in chapter 3 how a current popular emphasis across disciplines in teacher education research has been on “beliefs” and their relation to “practices” (e.g., Borko & Putnam, 1996; Carter 1990; Clift & Brady, 2005). I also described how research has suggested that preservice teachers “resist coherent [teacher education program] messages when they find it difficult to engage in recommended practices” (Clift & Brady, p. 331). I gave examples of research based on cognitive and situative perspectives, such as in describing Peressini et al.’s (2004) interpretation from a situative perspective of Mr.

Hanson's very different instructional practices between student teaching and his first year teaching "as an interaction between his developing professional identity and the affordances and constraints of these two settings" (pp. 82-83).

If we view facets of a teacher education program's "irrelevance" in schools almost exclusively as failures of teacher education programs, or as the result of various "affordances and constraints" of schools, or as problems of preservice teachers' "resistance," we treat program ideology as independent of what happens in particular schools. That is, we treat ideology and content-area teaching methods as something preservice teachers should be able to learn and more or less directly transfer into any classroom of choice in any rural, suburban, or urban school. Through such a line of thinking, we identify educational and research problems to be ones of *teachers*, *teaching*, and *teacher education programs*—or of the training and testing of teachers—as though each of these act as independent agents and alone can accomplish "equity" (cf., Cochran-Smith, 2004a, 2004b).

Such a placement of teachers and teacher education programs at the source of educational reforms has been popular in recent years of increasing emphasis on standards.[70] For example, the widely cited *Teaching for America's Future* (NCTAF, 1996) report indicated, "A caring, competent, and qualified teacher for every child is the most important ingredient in education reform" (p. 3). That report emphasized the development and assessment of teachers' knowledge and skills as a centerpiece for achieving America's goals. With underlying assumptions typically being that standards

[70] Examples of these reports include *What Matters Most* (National Commission on Teaching and America's Future [NCTAF], 1996), *Teaching Certification Reconsidered* (The Abell Foundation, 2001), *No Dream Denied* (NCTAF, 2003), and *Teaching at Risk* (The Teaching Commission, 2004).

can be universally applied and good teaching can be identified and described in similar ways for classrooms anywhere, as currently conceived, standards-based reports and agendas generally depend on a despatialized view of teaching.[71] They encourage assumptions that reforms can occur "within" teacher education programs or by focusing almost exclusively on instructional improvement in methods courses "in" disciplines (cf., Cochran-Smith, 2004a).

My research is relevant to ongoing discussions highlighting potential limitations of these types of assumptions (e.g., Beyer, 2002; Cochran-Smith, 2004b; Delandshere & Petrosky, 2004; Gruenewald, 2003) by describing ways that preservice teachers' learning involves much more than what takes place in particular courses or field placements or even in a teacher education program in general. Largely overlooked by standards-based emphases in teacher education, and also by cognitive and situative research perspectives, is attention to *place* and to the socio-political geographies of schooling. Very little attention is given to teacher education programs' different kinds of relationships with schools, and further, to how different groups are positioned differently in relation to knowledge and its movement (cf., Nespor, 1994).

Important questions raised in my study were how and why preservice teachers characterized certain emphases of the teacher education program as more useful in certain classrooms as compared to other classrooms. For teacher educators or teacher education programs, what might be the implications, in general, of place-specific and transitioning relevancies of teacher education programs of the kinds I have described? At times,

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[71] For example, Delandshere and Petrosky (2004) suggested that "national professional and accreditation standards…at the core of the teacher education-based reform, have also objectified and codified teaching, which presumably makes it possible to compare teaching performances across contexts, schools, and states" (p. 9).

various school or classroom differences, differences in funding, and so forth that preservice teachers encounter in schools, get treated as teaching's "contexts." I suggested this to be the case in my research. Generally speaking, it might be helpful to ask how programs' conceptual emphases and their relations with various urban, suburban, and rural schools serve to help preservice teachers take note of and analyze various differences and also inequities or injustices. How does, or might, teacher education help to position preservice teachers in different socially-, politically-, and economically-important ways to schooling and perhaps also to their futures? Further, since teacher education programs do not operate independently from broader national, state, and local politics and policies, how might we continue trying to identify and pursue the kinds of broader social and political analyses that might help us learn how to move "equity" beyond rhetoric (cf., Apple, 2004; Cochran-Smith, 2004b; Lipman, 2004; Nespor, 1997)?

Chapter 5 Final Considerations

The purpose of this dissertation has been to describe and situate some of preservice teachers' ways of experiencing one 5-year elementary teacher education program in the United States. I addressed the questions of how preservice elementary teachers characterized relationships between teacher education program components, how those characterizations varied or changed, and how preservice teachers constructed the value or relevance of those experiences to teaching. Much of what I did in this dissertation was to describe and explain some of the ways that the teacher education program was produced by and for the preservice teachers and also how preservice teachers used the program as they moved between coursework and fieldwork and talked about teaching. For example, I described how students integrated and generalized ideas from the *Standards*-based (NCTM, 1989, 2000) "investigative approach" (Baroody, 1998) and modeling in the *Math Methods* course with other inquiry ideas and modeling in science, social studies, and language arts methods courses, ideas from previous *Math for Elementary Teachers* courses, and child-centered and constructivist ideas from their undergraduate program. I described how these main program emphases provided a discourse for students to reflect on and evaluate their work in various diverse field placements and also teaching in general.

In this dissertation, I have shown how the program-based philosophies developed by and for the preservice teachers coordinated context-specific meanings and relevance for program components. I suggested that program emphases also helped to construct failures of the kind where schools interfered with the accomplishment of program objectives or program objectives proved unrealistic for schools. I also suggested that by

largely treating instruction as context-independent, program recommendations tended to favor middle-class White children and to marginalize urban or diverse schools and classrooms, or schools having more limited financial resources, as viable places to make use of these recommendations for good teaching. Further, I posited that whereas teacher education research, and particularly mathematics teacher education research, has commonly examined relations between preservice teachers' "beliefs" and their "practices" (e.g., Ambrose, 2004; Borko & Putnam, 1996; Clift & Brady, 2005; Steele, 2001), such an emphasis gives little attention to *place* or to the coordination of a program's relevance in schools or to teaching. Related to this, I added to questions that have been raised regarding certain tendencies to focus educational change efforts on teachers, teaching, and teacher education programs with sometimes limited explicit corresponding socio-political emphases and analyses.

Organized and Produced Place-Based Program Relevance

Although chapters 3 and 4 addressed different issues, I partly used them to pose similar arguments that I use in this chapter to continue raising questions and possible implications for my work. First, among other discussions in chapter 3, I described how collaborative and supportive contexts between coursework and fieldwork supported preservice teachers' learning and use of program ideas. For example, I described how closely coordinated explicit and consistent relations and shared discourses between the *Observation and Assessment of Children* course and lab school produced conditions for all preservice teachers to identify similar philosophies and to learn to make certain associations between their coursework and fieldwork. I indicated that the program's

child-development and constructivist Reggio Emilia "philosophy" *were* the "practices" of lab school (cf., Britzman, 1991; Burbules, 1993; Rouse, 1987; Turnbull, 2000).

Perhaps most importantly in chapter 3, I also described things like social structures, curriculum planning and requirements, and ages of children in lab school and elementary school as contributing to how program-supported knowledge and ideas could or could not be traced from lab school into other placements. In other words, the relevance of lab school ideas to teaching in general was not fixed. I suggested that students sometimes could identify little use for certain program-related, or lab school, knowledge in other field placements or for teaching. I explained how different social structures, curriculum, children, faculty, and so forth acted to coordinate the relevance of the ideas students learned in the program about teaching to their work in other classrooms.

In chapter 4, I shaped a similar argument. First, I described mathematics-based relationships across coursework and fieldwork in the graduate program. For example, I described Paul's references to the NCTM *Standards*-based (1989, 2000) *Everyday Mathematics* (UCSMP, 1997) curriculum materials in the *Math Methods* course and the university's professional development relationship with Lewiston County schools regarding use of the *Everyday Mathematics* curriculum materials. Then, I described preservice teachers' generalizations that closer relationships existed between the program and Lewiston County schools than Bremont City schools.

I suggested that things like school accreditation issues, different school or classroom cultures, and different instructional approaches were treated by or acted for students to limit their flexibility to teach in the ways they wanted or that the program

supported. These things helped students produce new and different kinds of place-based relevance (or irrelevance) of program-based criteria for good teaching. I posited that these criteria used to describe or evaluate good teaching also served to set up program recommendations in greater contrast to certain socio-political school geographies than to others. I indicated that most often, students contrasted inquiry-based or constructivist program ideas with the practices of those schools having greater racial and ethnic diversity, more limited financial resources, greater accreditation pressures or emphases on standardized tests, stricter policies regarding student behavior, and so forth. These kinds of characterizations of program relevance to diverse or under-funded schools and classrooms clearly raise considerations for teacher educators.

Additional Issues and Questions to Consider

Perhaps most important about any research are the questions that it helps to raise. I have aimed in this dissertation to raise many questions related to my research. To conclude, I compartmentalize several related issues and questions for teacher educators, researchers, and policy-makers to consider.

Teacher Education Program and School "Fit"

Alongside questions of how to most effectively prepare teachers to use standards-based "best" practices in schools, teacher educators have questioned whether coursework and fieldwork do or should "align" or "fit" in vision and purpose with teacher education program objectives or licensure requirements (e.g., Borko et al., 2000; Goodlad, 1990; Mewborn, 2000; Sands & Goodwin, 2005; Tom, 1997) or whether students might at times learn as much or more from classrooms that do not match program ideals (e.g., Ebby, 2000; Peressini et al., 2004). For example, within a partnership-based teacher

preparation program with schools, Sands and Goodwin studied whether, in professional development school environments, clinical teachers' classrooms "provide teacher candidates with opportunities to observe their clinical teachers model and proficiently practice the kinds of knowledge and skills that are required of teacher candidates in order to earn their teaching license" (p. 819). Sands and Goodwin described results to be encouraging for most domains.

One important concern regarding teacher education programs' interest in questions of "fit" has been what such interests might imply for urban schools. For example, given that many classrooms in urban districts might not be used for student teaching placement if philosophical compatibility served as the main criterion for selection (cf., Zeichner, 2002), it is important to ask who an emphasis on good program and school "fit" might marginalize. The concept of "fit" implies a goal of pairing up contexts. However, if we draw on the parallel arguments I summarized above from chapters 3 and 4, this highlights certain limitations of research that does not address how students produce and then re-produce the program's relevance in the various diverse schools and classrooms where they teach.

Smith (2004) described of our experiences of the world, "No amount of observation of face-to-face relations, no amounts of analysis of commonsense knowledge of everyday life, will take us beyond our essential ignorance of how it is put together" (p. 32). My point here is not to argue against potential merits of carefully selected placements or professional development school relations, but instead, simply to note reasons for continually evaluating the socially and politically value-laden nature and function of all that we do. I am indicating the possibility that no amount of careful

selection or emphasis on preservice teachers' reflection on coursework and fieldwork might be enough—regardless of the extent of the availability of particular types of placements in any given region.

Research questions and interests related to "fit," or to the "affordances and constraints" of particular classroom settings on teachers' developing professional identities (e.g., Peressini et al., 2004), do tell us something about students' learning in or across particular classrooms. However, and as also referred to in the previous chapter, they are limited in how they can help us understand place-based program relevancies. Further, they are limited in how they can reveal teacher education programs' socio-political positioning with regard to these inequities and injustices, or programs' roles in reproducing or working against these inequities and injustices.

Choices of Theoretical Framework, Research Questions, and Methods

In chapters 1 and 2, I introduced the networks-based and spatiality-focused theoretical ideas I drew upon for my dissertation study. I indicated that I made use of these and related ideas because they best helped structure a way for me to address my research interests while also deliberately and explicitly attending to my view that the world operates in socially-, politically-, and economically-integrated ways. I described working from a view that to understand (mathematics teacher education) activities, we must understand how they are connected to and shaped by others across space and time, and that further, the ways activities are connected and shaped and how knowledge moves between activities could never be independent of broader global issues (cf., Nespor, 1994).

Some researchers have pointed out the lack of a robust theoretical framework for research in mathematics teacher education and teacher education in general (diSessa, 1991; Eisenhart, 1991; Lubienski, 2002; Mewborn, 2005). The time is ripe for considering additional research possibilities—and particularly possibilities that are socially and politically sensitive and concern themselves with social justice and equity issues. The following suggestion by the NCTM Research Committee (2005) represents a position of the kind that has become increasingly popular in educational literature:

> For researchers to contribute more fully to equity, we may need to break with tradition, expand boundaries, and cross into fields outside mathematics education *and* outside education….The complexity of teaching and learning, and its intersection with equity and social justice issues, demands more than the narrow confines that any one field can provide. (p. 96)

The challenging of academic boundaries has potential advantages in educational research because "as Bourdieu reminds us, it is the ability to 'trespass' that may lead to major gains in our understanding" (Apple, 1999, p. 165).

Nespor's (1994) recommendations for redesigning the aims of educational research—which he constructed by combining ideas from fields such as anthropology, social studies of science, and geography, among others—offer one of a number of potentially useful resources for those of us in teacher education to draw from and build upon in future research endeavors. Nespor's use of actor-network theory and his attention to spatiality seemingly offers unique potential and significance for educational research, especially in current times of high-stakes education and emphases on "best" practices. Admittedly, these ideas are somewhat new to me, and they are also very difficult to employ in research. As I have mentioned, my work should not be thought of as an example of a study carried out within the framework summarized in chapter 1, but only

as being informed by these ideas. Interested readers must begin with original sources rather than with my own work for a clearer understanding of these theoretical ideas and the kinds of research methodologies they imply. I recommend Latour's (2005) *Reassembling the Social: An Introduction to Actor-Network Theory* as an informative resource for learning about actor-network theory.

Mathematics Education and the NCTM Standards

For many years now, various forms of classroom or knowledge management, instruction, opportunities, and so forth, have been suggested as stratified across social classes (e.g., Anyon, 1980; Bowles & Gintis, 1976; Knapp & Woolverton, 1995, 2004; Moses & Cobb, 2001; Oakes, Joseph, & Muir, 2004; Secada, 1992; Tate, 1997). Among other things, content and pedagogies weak or lacking in cultural relevance for some students or stemming from Eurocentric perspectives (e.g., Asante, 1991; Atweh, Forgasz, & Nebres, 2001; Delpit, 1995; Ladson-Billings, 1995; Lubienski, 2002; Rodriguez & Kitchen, 2005; Tate, 1995) have been offered as contributing to race and class divisions in access to knowledge. As a discipline, mathematics, "often regarded as the most abstract subject removed from responsibilities of cultural or social awareness" (Boaler & Staples, in press, p. 32), has additionally been associated with such stratification. Stinson (2004) referred to mathematics as "(re)produc[ing] and regulat[ing] racial, ethnic, gender, and class divisions" (p. 9). Referring to how mathematics has served as "gatekeeper," Stinson questioned how mathematics might become "an inclusive instrument for empowerment rather than an exclusive instrument for stratification" (p. 8).

Schoenfeld (2002) summarized mathematics education research to indicate generally positive results associated with *Standards*-based curricula compared to more traditional curricula:

> (a) On tests of basic skills, there are no significant performance differences between students who learn from "traditional" or "reform" curricula.
> (b) On tests of conceptual understanding and problem solving, students who learn from "reform" curricula consistently outperform students who learn from "traditional" curricula, by a wide margin.
> (c) There is some encouraging evidence that reform curricula can narrow the "performance gap" between whites and underrepresented minorities. (p. 16)

Partly because of research results such as these, as a mathematics educator, I have largely maintained a personal view of the NCTM *Standards*-based (1989, 2000) reforms as an improvement over more traditional curricula and as possibly also beginning to combat inequities. However, regardless of any potential advantages of NCTM *Standards*-based curricula in comparison to traditional curricula, a number of educators have also suggested limitations to *Standards* documents—among them, educators such as Apple (1992), Gutstein (2006), Gutstein and Peterson (2005), Lubienski (2002), and Secada (1996).

Based on her study, Lubienski pointed out how lower socio-economic students "did not experience the feelings of empowerment from whole-class discussions and open-ended problems" (2002, p. 119) that standards-based reformers might anticipate. She explained how the sociocultural lens she used in her work helped her to see the hidden culture-laden assumptions embedded in particular kinds of instructional approaches and in the NCTM *Standards* (2000). Among other important issues and challenges Lubienski called for mathematics educators interested in equity to consider was the following:

> When we understand ways in which a particular discourse differs from students' more familiar discourses, we must be prepared to grapple with dilemmas about

> whether the discourse we are promoting is inherently valuable as an end in itself or is simply an arbitrary, value-laden means (perhaps a relatively White, middle-class means) to an end. (p. 120)

Lubienski's (2002) criticism of *Standards*-based reforms (NCTM, 1989, 2000) focuses largely on multicultural considerations of discourse and the NCTM's general oversight of such considerations. Others have focused more on the absence in the *Standards* of a critique of societal inequities (e.g., Apple, 1992; Gutstein, 2003, 2006). For example, Apple (2002) explained:

> One searches in vain among the specifics of what teachers should know for a substantive sense of social criticism and for a more detailed understanding of the complex and contradictory roles that mathematical knowledge may play in an unequal society. (p. 100)

Related discussions of how, in addition to deepening students' understanding of academic content, mathematics educators might more deliberately challenge social inequities and injustices have been limited. However, we might learn from works of authors such as Frankenstein (1989, 1995), Gutstein (2006), Skovsmose (1994), and the numerous authors who proposed and provided related examples in the edited text, *Rethinking Mathematics: Teaching Social Justice by the Numbers* (Gutstein & Peterson, 2005).

My research, by pointing out some of the place-specific relevancies of teacher education program knowledge—such as knowledge about the "investigative approach" (Baroody, 1998) and the *Everyday Mathematics* (UCSMP, 1997) curriculum materials—helps raise additional questions for mathematics education. With *Standards*-based (e.g., NCTM, 1989, 2000) and despatialized reforms mathematics education recommendations for change as they are, when we work to help preservice teachers to learn to enact certain visions for "good" teaching, *where* do we prepare them to do this? Unknowingly, in what ways might we be supporting the very educational inequities we task ourselves to

reduce,[72] or helping to move the "best" teachers to have interest in the "best" schools? How might we work to help students define and understand relations between their mathematics coursework, their coursework in other disciplines, and their fieldwork in diverse, multi-ethnic, and often under-funded schools? How might those of us who are mathematics educators more deliberately address the fact that different schools lend different degrees and kinds of support to such initiatives? How can we make sure we give sufficient attention to the social, political, and economic issues helping to coordinate mathematics curriculum and instruction in diverse schools? Such questions and concerns have relevance extending beyond mathematics to other disciplines.

Indexing Context: Multiple Frames of Reference

As indicated previously, in education, we sometimes treat classrooms and schools as contexts for good teaching or for reform rather than as part of the reforms themselves (cf., Nespor, 2002). But with any fragmentation of curriculum or limited reference to its politics, we can overlook such things as the sense of connection to the power relations and structures being produced and in which teachers and students always participate, the kinds of things educators might need to be critical of if we want to take on social injustices, or how kids are being socially positioned for their presents and futures.

I find Massey's (1993) suggestion regarding place helpful in providing a visual of preservice teachers' engagement in school classrooms: "If one moves in from the satellite towards the globe, holding all those networks of social relations and movements and communications in one's head, then each place can be seen as a particular, unique point

[72] "The Equity Principle" is the first of six principles for school mathematics contributing to the vision of the NCTM *Standards* (2000). Other principles refer to curriculum, teaching, learning, assessment, and technology.

of their intersection" (p. 66). My descriptions of some of the place-specific, and socially and politically interconnected, comments made by preservice teachers highlight certain ways that preservice teachers, and their work in field placements, are embedded in social relations extending far beyond the scope of their ongoing activities (cf., Smith, 1999). Any such embedding of relations provides reason for programs to consider including broad attention to socio-political school geographies, to coursework and fieldwork relations, to produced program relevancies, and so forth.

Ongoing educational reforms tend to emphasize a de-contextualized pedagogy—"a kind of generic education for 'anywhere'" (Gruenewald, 2003, p. 646). An important question is what and whose political and social purpose does the production of "context" serve? As I have been suggesting, for mathematics teacher educators, teacher educators in general, and teacher education programs, it seemingly remains important to direct attention to how and to what our work is linked. Having awareness of and giving attention to the ways in which students define and shape program relations might help us to contribute to program relevance. We can learn how to help preservice teachers to index "context" in particular ways or to question more critically the differences that they observe across field placements. In mathematics education, worth considering are questions of what can or should be mathematics teacher educators' roles in helping integrate curriculum and "context" (e.g., foundations topics, classroom management) into program emphases and instruction and to consider *place*.

Suggesting a multiplicity of ideologies and educational agendas to be elaborated and served under the standards umbrella, Apple (1992, 2001) suggested, "Of crucial importance is the question of whether our students in teacher education programs will be

prepared to understand the ideological and political restructuring that is going on all around them?" (2001, p. 195).[73] My research raises the question of how mathematics teacher educators and teacher educators in general might support more substantive contextualizations of program coursework to schools everywhere. How might we help preservice teachers use multiple (e.g., beyond inquiry or best practices), and more socially, culturally, and politically connected (e.g., beyond immediate and specific practical activity), frames of reference for tracing relations across coursework and fieldwork and for thinking about academic content, teaching, and their futures (cf., Smith, 1987, 2004)? Further, how might we continue learning about how preservice teachers shape and re-shape program meanings and relevancies?

Closing Remarks

I hope that the kinds of discussions, questions, and considerations I have included in this dissertation have proved informative to readers and have helped to produce for each of us a greater interest in learning and researching more about how our individual and joint work with preservice teachers extends beyond the particular course or field placement assignments for which we are responsible. Perhaps most importantly, I hope this work has provoked the asking of many additional new questions, especially where those questions invite a socially and politically integrated examination of our day-to-day work as teacher educators and researchers.

[73] Apple (2001) refers to issues of "competition, markets, and choice on one hand and accountability, performance, objectives, standards, national testing, and national curriculum on the other" (p. 184), suggesting his view that they actually reinforce each other as well as conservative educational positions.

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Appendix A Program Checklists

Human Development Checklist
Early Childhood Education Option (Undergraduate Program)[74]

University Core Curriculum:
- Freshman English (6 credits)
- European Civilization OR Ancient History (6 credits)
- HD Childhood and Adolescence (3 credits)
- HD Adulthood and Aging (3 credits)
- Biology and Biology Labs (8 credits)
- College Algebra and Trigonometry (3 credits)
- Calculus I (3 credits)
- Creativity and Aesthetics (3 credits)
- World Regions (3 credits)
- Professional Perspectives (1 credit)
- Professional Seminar (1 credit)

Total Core Curriculum Requirements: 40 credits

Early Childhood Education
Required Early Childhood Courses:
- Middle Childhood (3 credits)
- Principles of Interacting with Children and Parents (3 credits)
- Observation and Assessment of Children (3 credits)
- Family Relationships (3 credits)
- Early Childhood Curriculum and Program Planning (5 credits)
- Crises and Stresses of Families and Children (3 credits)

Required Pre-Professional Courses:
- Social Foundations of Education (2 credits)
- Introduction to Special Education (3 credits)
- Psychological Foundations of Education (3 credits)
- Senior Field Experience (3 credits)
- Physical Education for Elementary Teachers (3 credits)
- Music for Elementary Teachers (3 credits)
- Instructional Technology (3 credits)

Total Early Childhood Education Requirements: 40 credits

Academic Concentrations:
Science:
- Physical Geology and Physical Geology Lab (4 credits)
- Physics and Physics Lab OR Astronomy and Astronomy Lab (4 credits)

[74] Course names have been edited to preserve the anonymity of the university.

Mathematics:
Math for Elementary Teachers (4 credits)
Math for Elementary Teachers II (4 credits)
Introduction to Statistics OR Statistics for the Social Sciences (3 credits)
Social Studies:
Human Geography (3 credits)
U.S. History (3 credits)
Principles of Economics (3 credits)
English/Language Arts/Communication
Teaching Composition (3 credits)
Children's Literature (3 credits)
Literature for Adolescents OR Public Speaking OR Other Approved Course (3 credits)
Total Academic Concentration Requirements: 37 credits
Total Free Electives: 4 credits
Total Credits Required for Graduation: 121 credits

Elementary Education Checklist
(Graduate Program)

Theoretical Foundations (3 credits)
Psychological Foundations (3 credits)
The Education of Exceptional Children (3 credits)
Early Literacy (3 credits)
Content Literacy (3 credits)
Math Methods (3 credits)
Science Methods (3 credits)
Social Studies Methods (3 credits)
Field Studies (6 credits)
Internship in Education (9 credits)
Graduate Seminar: Reflections on Elementary Teaching (3 credits)
Graduate Seminar: Teacher as Researcher (3 credits)

Two Electives to be Selected from:
Assessing Student Learning (3 credits)
Schooling in American Society (3 credits)
Advanced Educational Psychology (3 credits)
Elementary School Curriculum (3 credits)
Use of Microcomputers in Education (3 credits)
Language Literacy and Culture (3 credits)
Problems of Adolescents (3 credits)
Instructional Technology (3 credits)
Issues in Elementary Education (3 credits)
Schooling and Diversity Graduate Seminar (3 credits)
Research on Assessing Student Achievement (3 credits)

Total Credits Required for Graduation: 51 credits

Appendix B Institutional Review Board Approval

All materials sent to the Institutional Review Board [IRB] at Virginia Tech are included in the pages that follow. Course names and other identifying information have been changed. This research received expedited approval by Virginia Tech's IRB on August 6, 2004.

Title: "Trajectories of Mathematics Teacher Education and Preservice Elementary Teachers Through Teacher Education Curriculum Networks"

IRB #: 04-382

Research approval by the IRB was later extended to June 29, 2006, as IRB #: 05-417.

Trajectories of Mathematics Teacher Education and Preservice Elementary Teachers Through Teacher Education Curriculum Networks

Doctoral Student: Laura Spielman, Department of Teaching and Learning, Virginia Tech
Faculty Co-Advisor: Gwendolyn Lloyd, Department of Mathematics, Virginia Tech
Faculty Co-Advisor: Jan Nespor, Department of Teaching and Learning, Virginia Tech

Purpose of the Project

> We can no longer regard courses, programs, and other participants and structures of teacher education as unchallengeable and operating in isolation. These features must be seen as interconnected and regarded as examinable and problematic in both research and practice. (Wideen, Mayer-Smith, & Moon, 1998, p. 169)

Research in mathematics teacher education has generally taken place within single courses or course sequences in mathematics content and methods, in mathematics-related fieldwork, in the student teaching of mathematics, and in the first few years of mathematics teaching. Just as any approach to research has its limitations (e.g., Florio-Ruane, 2002; Purcell-Gates, 2000), so too do these types of approaches looking mainly *within* mathematics. For example, such approaches make it difficult to closely consider relations between preservice elementary teachers' mathematics-related course experiences and other aspects of the teacher education program. In my dissertation research, I draw upon the networks perspective for educational research constructed by Nespor (1994) and based on his empirical research and a broad band of literature from fields ranging from social studies of science to geography. Paralleling Nespor's argument with respect to schooling, I will work from the position that mathematics teacher education "can't be understood on its own terms, but only by looking at how its practices are enmeshed in much more expansive networks" (Nespor, p. 132).

The ethnographic approach to research that I will incorporate represents an emergent design, in which the questions that I ask will continue to develop throughout the course of the study. I begin my dissertation research keeping the following two broad questions in mind as well as a range of related questions in mathematics teacher education and teacher education in general:

1. How are elementary teacher education curriculum networks organized and what is mathematics teacher education's trajectory through these networks?
2. What are preservice elementary teachers' trajectories through these networks?

These questions draw directly upon questions Nespor (1994) asked in his research related to physics and management programs and students' trajectories through those programs.

Participants and Procedures

The proposed research will take place during the 2004-2005 academic year. I anticipate the majority of study participants, approximately 150 total, to be college students enrolled in one of either *Math for Elementary Teachers* or *Math Methods* as well as the approximately 30 faculty and staff members or graduate students either teaching those courses or other courses that preservice teachers take or coordinating or advising program activities in some way.

Part of what my research will involve is following the movement of the above-mentioned students (Nespor, 1994; also see, e.g., Latour, 1987) through their courses and/or field placement experiences as well as through their college experiences in general. Second, the spaces in which teacher education activities take place will be important in my research. I will spend time in them and see who and what moves through them—such as people, things, and representations of practice (e.g., class notes, textbooks, homework assignments), and also at how the activities in these spaces are coordinated (Hutchins, 1995). In selecting college students to follow more closely, my interest will be in selecting as diverse a sample as possible, considering factors such as students' academic year, past coursework, gender, race, academic major (e.g., Early Childhood

Education or Interdisciplinary Studies), and GPA. I request permission to potentially work with all preservice elementary teachers in this way.

Although students and faculty will represent the majority of participants, I also request permission to consider anyone age 18 or older, *not* including those among the special classes of subjects (children, prisoners, pregnant women, mentally disabled persons), as possible participants in this study. For example, because the study incorporates an emergent design, there might be approximately 100 additional individuals who might have some relationship with the activities of the teacher education program but whose relevance related to this research I learn about only once the study has begun, either through my observational work or from the preservice teachers and faculty members with whom I will be working more closely. These additional participants might include, for example, college administrators, friends or relatives of the preservice teachers, preservice teachers at other stages of the teacher education program or planning to teach in secondary schools, or speakers at education-related workshops or meetings of clubs or other organizations.

Related to my interest in observing what moves through spaces, I first request permission to collect data related to my interests for this project by observing and taking field notes in public spaces both on—such as at the library, the computer lab, academic buildings, outside, in dining halls, places to eat, lounge or study areas, and auditoriums. I will select these spaces based upon what I learn from preservice teachers to be those public spaces in which they do most of their academic work and participate in the most conversations related to mathematics, teaching, or the teacher education program. I request a waiver of informed consent for observations conducted in public spaces, as some individuals might be present in these settings who are not otherwise participating in the study. Providing consent forms to everyone passing through such public spaces would be impractical and might also influence what takes place. For individuals I hope to work with more closely, I will provide the appropriate consent form (See forms A1-A4 below.)

I plan to also collect a wide range of publicly available information and artifacts to include as data in this study, including information from across the world. Such artifacts will include online course information, course texts, and university, local, regional, and national information related to mathematics, education, or teacher education—either available online, in newspapers, on television, or in other public places.

Second, I request permission to sit in the two above-mentioned courses as well as others that students take at the same time, and I also request permission to spend time in the field placement locations assigned to the preservice elementary teachers. This, then, also includes spending time in courses both in and outside of the teacher education program. Consent forms are included in the pages that follow. Consent form A1 will be provided to the instructors of these courses and to those supervising field placements. This form in part requests permission for me to interview them, to sit in on or participate in courses or field placements and take field notes, to occasionally videotape course meetings, and to obtain copies of course information such as syllabi, handouts, tests, assignments, and other documents either available or not available online.

I will offer two different levels of participation in this study for students (see consent forms A2 and A3). All students enrolled in either of the two above-named courses will be invited to participate and given a copy of consent form A2. Those who agree to participate will be giving me permission to interview them and to audiotape interviews, and to let me use their coursework as data for my research. I will additionally request that they provide copies (official or unofficial) of their transcripts, with the option of blackening out the grades if they prefer. More details are provided in the consent form. Those students representing a diverse sample of this larger population will be invited to participate with me more closely, and given consent form A3. Students agreeing to this level of participation will allow me to interview them, to follow them through their days more closely, moving with them in and out of courses, across campus, and even where they live, eat, and do their school-related work, interviewing them and audiotaping these interviews, given their consent. Further, I might request them to do such things as take

pictures of places where they live and work and to share with me such things as their notebooks, books, or journals from either their past or present schooling—anything that will provide entry into the nature of their experience with education, mathematics, or teacher education. Any additional participants that I invite into the study will be provided consent form A4. These participants will primarily engage in audiotaped interviews.

Risks and Benefits

There are no more than minimal risks to any of the participants in this study. For example, there is no connection between students' participation in this study and their assessment in any of their courses or other teacher education program related activities. There is also no connection between instructors', supervisors', or any additional individuals' participation in this study and their own evaluation in classes, work, or elsewhere. Participation in this project is both voluntary and is separate from any everyday responsibilities in and outside of work. No promise of benefits will be made to encourage participation. Participants may decide to withdraw their participation from the study at any time.

I will also attempt to minimize risks to participants in the ways that I analyze data and write about this research. My main goal will be to try not to reduce the complexity of whatever it is that I learn. I will not attempt to formulate through my research a single explanation of how, for example, the networks of "mathematics teacher education" and "preservice elementary teachers" move through the teacher education curriculum network. Rather, I will search for negative cases (Becker, 1998) and point out in my discussions multiple viewpoints and multiple types of experiences, keeping in mind how the ways in which I write about this research reflects upon and constructs those who will help me along the way to generate it.

This research is important in part for the different types of cross-program connections it might help to suggest regarding preservice elementary teachers' experiences, for the ways in which it might help teacher educators to bring as a question of consideration what "mathematics teacher education" *means*, for the ways in which it might raise additional discussions about the multiple politics associated with teacher education and mathematics teacher education, and for the ways in which it might generate ideas that further develop a networks perspective for educational research, such as elaborated by Nespor (1994).

Confidentiality/Anonymity

The researchers will provide as much protection for participants' anonymity as possible. Only the above-named research team or hired assistants will have access to the data for this study. All field notes, audiotapes, videotapes, pictures, and other artifacts will be stored in one of the investigators' offices, which will remain locked at all times. All audiotapes and videotapes will be destroyed at the completion of the project. Pseudonyms will be used in all written reports and presentations at conferences. However, despite every effort made to preserve anonymity, anonymity may be compromised.

Compensation

There is no compensation to be earned by participating in this project.

Informed Consent

The project will be verbally summarized for all potential participants, and informed consent forms will be provided to request their participation. For students, these summaries will be provided in the two above-named mathematics-related courses, whose instructors (Dr. Gwendolyn Lloyd and Dr. Jesse Wilkins) have already given me verbal permission to do this. Given the relation of this research to mathematics teacher education, a brief disruption of class time of this nature seems appropriate. For all other participants, any summaries will either be provided outside of class time or else during class time, if requested. Participants will be

requested to return the form within one to two weeks after receiving it, if possible, but can take as much time as they need and return the form at any time.

Examples of Interview Protocol

All interviews, whether with students, faculty, administrators, or otherwise, will be semi-structured or non-structured and focus primarily on topics related to education, such as on the individuals' past and current positions and experiences related to the field, or on their past and present experiences in education in general and also in relation to mathematics, teaching, or teacher education program experiences. The final page of this document includes examples of the types of questions I envision asking of participants, however, this is not inclusive of all types of questions I might ask. I have included two types—those types of questions I might ask of preservice elementary teachers and those that I might ask of faculty members or other participants.

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

Informed Consent for 2004-2005 Academic Year

Form A1 for Faculty, Graduate Students, and Supervisors

Trajectories of Mathematics Teacher Education and Preservice Elementary Teachers Through Teacher Education Curriculum Networks

Principal Investigator: Dr. Gwendolyn Lloyd, Dept. of Mathematics, Virginia Tech
Co-Investigators: Dr. Jan Nespor, Dept. of Teaching and Learning, Virginia Tech and
Laura Spielman, Dept. of Teaching and Learning, Virginia Tech (Dissertation Research)

I. The Purpose of this Research Project

The purpose of this study is to develop an understanding of how mathematics teacher education is interconnected with the teacher education program in general and to learn about students' experiences both in and outside of the program.

II. Procedures

Given the above purpose, this research partly involves the researchers spending time in courses, fieldwork, and other activities along with the preservice teachers and other students, such as in the places where they most often talk about or engage in teaching-related activities. If you choose to participate, your class or field placement location will be observed by the researchers or research assistants on a regular basis throughout the fall 2004 semester and you will be asked to participate in between one to four audiotaped interviews, with each interview lasting approximately 30 minutes to one hour. Some observations might additionally be audiotaped or videotaped. Class observations will focus in general on what types of activities or discussions take place and on how students participate in these activities. Observations and interviews will focus primarily on your experiences with teaching or supervising preservice teachers and other students and on the experiences of the students themselves. You will also be asked to provide copies of such materials as your course syllabus, classroom handouts, or information about assignments or tests. All of the data collected through these processes may be utilized for research purposes.

III. Risks

There are no more risks to you in this study than in your everyday teaching or supervisory activities. For example, there is no connection between your participation in this study and your departmental or university evaluations. There is also no connection between your students' participation in this study and their assessment in any of their courses or other teacher education program related activities. Participation in this project is voluntary and is separate from any everyday responsibilities in and outside of work. No promise of benefits will be made to encourage participation. You may decide to withdraw your participation from the study at any time.

IV. Benefits of this Project

No promise or guarantee of benefits will be made to encourage your participation.

V. Extent of Anonymity and Confidentiality

The researchers will provide as much protection for your anonymity as possible. All field notes, audiotapes, videotapes, pictures, and other artifacts will be stored in one of the investigators' offices, which will remain locked at all times. All audiotapes and videotapes will be destroyed at the completion of the project. Pseudonyms will be used in all written reports and presentations at conferences. However, despite every effort made to preserve anonymity, anonymity may be compromised.

VI. Compensation

There is no compensation to be earned by participating in this project.

VII. Freedom to Withdraw

You are free not to answer any questions or respond to situations that you choose without penalty. You are also free to withdraw from this study at any time without penalty. You may announce your withdrawal by discussing it with any member of the research team (Laura Spielman, Dr. Gwendolyn Lloyd, Dr. Jan Nespor) or by contacting IRB chair Dr. David Moore or mathematics representative Dr. John Rossi. Contact information for these five individuals is available at the end of this document.

VIII. Approval of Research

This research project has been approved as required by the Institutional Review Board for Research Involving Human Subjects at Virginia Polytechnic Institute and State University, and by the Department of Mathematics.

IX. Subject's Permission

I have read the Informed Consent and have had all my questions answered at this time. I hereby acknowledge the above and give my voluntary consent for participation in this project. If I participate, I may withdraw at any time without penalty by contacting one of the people listed below.

Signature	Date

Note: You will be given a copy of this form.

Should you have any questions about this research or its conduct, you may contact any of the following:

Name	E-Mail	Phone
Dr. Gwendolyn Lloyd	lloyd@vt.edu	231-5053
Dr. Jan Nespor	nespor@vt.edu	231-8327
Laura Spielman	spielman@vt.edu	231-8683
Dr. David Moore IRB Chair	moored@vt.edu	231-4991
Dr. John Rossi Mathematics Representative	rossi@vt.edu	231-8272

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

Informed Consent for 2004-2005 Academic Year

Form A2 for College Students

Trajectories of Mathematics Teacher Education and Preservice Elementary Teachers Through Teacher Education Curriculum Networks

Principal Investigator: Dr. Gwendolyn Lloyd, Dept. of Mathematics, Virginia Tech
Co-Investigators: Dr. Jan Nespor, Dept. of Teaching and Learning, Virginia Tech and
Laura Spielman, Dept. of Teaching and Learning, Virginia Tech

I. The Purpose of this Research Project

The main purpose of this study is to develop an understanding of how mathematics teacher education is interconnected with the teacher education program in general and to learn about students' experiences both in and outside of the program.

II. Procedures

You are being invited to participate in this study because you have enrolled in either *Math for Elementary Teachers* or *Math Methods*. This research partly involves spending time in courses, fieldwork, and other activities both in and outside of the teacher education program along with preservice teachers and other students, such as in the places where you and other students most often talk about or engage in teaching-related activities. Some of the classes you are taking or field placements in which you are participating will be audiotaped and videotaped.

If you choose to participate in this study, you will be asked to participate in up to three audiotaped interviews, with each interview lasting approximately 30 minutes to one hour. You will also be asked to share materials from your courses such as handouts, class notes, assignments, papers, or tests from your courses as well as copies of your academic transcripts, with grades blackened out if you prefer. Observations and interviews will focus primarily on your experiences related to mathematics, teaching, learning, and teacher education as well as on your experiences with college in general. All of the data collected through these processes may be utilized for research purposes.

III. Risks

There are no more than minimal risks to you or any of the other participants in this study. For example, there is no connection between your participation in this study and your assessment in any of your courses or other teacher education program related activities. Participation in this project is voluntary and is separate from any everyday responsibilities in and outside of your daily activities. No promise of benefits will be made to encourage participation. You may decide to withdraw your participation from the study at any time.

IV. Benefits of this Project

No promise or guarantee of benefits will be made to encourage your participation.

V. Extent of Anonymity and Confidentiality

The researchers will provide as much protection for your anonymity as possible. All field notes, audiotapes, videotapes, pictures, transcripts, and other artifacts will be stored in one of the investigators' offices, which will remain locked at all times. All audiotapes and videotapes will be destroyed at the completion of the project. Pseudonyms will be used in all written reports and presentations at conferences. However, despite every effort made to preserve anonymity, anonymity may be compromised.

VI. Compensation

There is no compensation to be earned by participating in this project.

VII. Freedom to Withdraw

You are free not to answer any questions or respond to situations that you choose without penalty. You are also free to withdraw from this study at any time without penalty. You may announce your withdrawal by discussing it with any member of the research team (Laura Spielman, Dr. Gwendolyn Lloyd, Dr. Jan Nespor) or by contacting IRB chair Dr. David Moore or mathematics representative Dr. John Rossi. Contact information for these five individuals is available at the end of this document.

VIII. Approval of Research

This research project has been approved as required by the Institutional Review Board for Research Involving Human Subjects at Virginia Polytechnic Institute and State University, and by the Department of Mathematics.

IX. Participant's Permission

I have read the Informed Consent and have had all my questions answered at this time. I hereby acknowledge the above and give my voluntary consent for participation in this project. If I participate, I may withdraw at any time without penalty by contacting one of the people listed below.

_____	_____
Signature	Date

Note: You will be given a copy of this form.

Should you have any questions about this research or its conduct, you may contact any of the following:

Name	E-Mail	Phone
Dr. Gwendolyn Lloyd	lloyd@vt.edu	231-5053
Dr. Jan Nespor	nespor@vt.edu	231-8327
Laura Spielman	spielman@vt.edu	231-8683
Dr. David Moore IRB Chair	moored@vt.edu	231-4991
Dr. John Rossi Mathematics Representative	rossi@vt.edu	231-8272

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

Informed Consent for 2004-2005 Academic Year

Form A3 for College Students

Trajectories of Mathematics Teacher Education and Preservice Elementary Teachers Through Teacher Education Curriculum Networks

Principal Investigator: Dr. Gwendolyn Lloyd, Dept. of Mathematics, Virginia Tech
Co-Investigators: Dr. Jan Nespor, Dept. of Teaching and Learning, Virginia Tech and
Laura Spielman, Dept. of Teaching and Learning, Virginia Tech

I. The Purpose of this Research Project

The main purpose of this study is to develop an understanding of how mathematics teacher education is interconnected with the teacher education program in general and to learn about students' experiences both in and outside of the program.

II. Procedures

You are being invited to participate in this study because you have enrolled in either *Math for Elementary Teachers* or *Math Methods*. This research partly involves spending time in courses, fieldwork, and other activities both in and outside of the teacher education program along with preservice teachers and other students, such as in the places where you and other students most often talk about or engage in teaching-related activities. Some of the classes you are taking or field placements in which you are participating will be audiotaped and videotaped.

If you choose to participate in this study, you will be asked to participate in up to ten audiotaped interviews, with each interview lasting approximately 30 minutes to one hour. You will be asked to allow the researchers to follow you in and out of most or all of your courses and also outside of courses on up to ten different days—such as to your apartment, the computer lab, the library, coffee shops, or wherever else you tend to participate in activities or discussions related to mathematics, teaching, or the teacher education program. The researcher will take notes either during or following these activities both in and outside of courses and might also audiotape or videotape these activities. The purpose of observations and interviews is to focus primarily on your experiences related to mathematics, teaching, learning, and teacher education as well as on your experiences with college in general. Additionally, you will be asked to share materials from your courses such as handouts, class notes, assignments, papers, books, or tests from your courses as well as copies of your academic transcripts, with grades blackened out if you prefer. You might also be asked to use a provided camera to take pictures of places or things on or off campus that are important to you in your work as a college student or related to your future teaching. All of the data collected through these processes may be utilized for research purposes.

III. Risks

There are no more than minimal risks to you or any of the other participants in this study. For example, there is no connection between your participation in this study and your assessment in any of your courses or other teacher education program related activities. Participation in this project is voluntary and is separate from any everyday responsibilities in and outside of your daily activities. No promise of benefits will be made to encourage participation. You may decide to withdraw your participation from the study at any time.

IV. Benefits of this Project

No promise or guarantee of benefits will be made to encourage your participation.

V. Extent of Anonymity and Confidentiality

The researchers will provide as much protection for your anonymity as possible. All field notes, audiotapes, videotapes, pictures, transcripts, and other artifacts will be stored in one of the investigators' offices, which will remain locked at all times. All audiotapes and videotapes will be destroyed at the completion of the project. Pseudonyms will be used in all written reports and presentations at conferences. However, despite every effort made to preserve anonymity, anonymity may be compromised.

VI. Compensation

There is no compensation to be earned by participating in this project.

VII. Freedom to Withdraw

You are free not to answer any questions or respond to situations that you choose without penalty. You are also free to withdraw from this study at any time without penalty. You may announce your withdrawal by discussing it with any member of the research team (Laura Spielman, Dr. Gwendolyn Lloyd, Dr. Jan Nespor) or by contacting IRB chair Dr. David Moore or mathematics representative Dr. John Rossi. Contact information for these five individuals is available at the end of this document.

VIII. Approval of Research

This research project has been approved as required by the Institutional Review Board for Research Involving Human Subjects at Virginia Polytechnic Institute and State University, and by the Department of Mathematics.

IX. Participant's Permission

I have read the Informed Consent and have had all my questions answered at this time. I hereby acknowledge the above and give my voluntary consent for participation in this project. If I participate, I may withdraw at any time without penalty by contacting one of the people listed below.

_____	_____
Signature	Date

Note: You will be given a copy of this form.

Should you have any questions about this research or its conduct, you may contact any of the following:

Name	E-Mail	Phone
Dr. Gwendolyn Lloyd	lloyd@vt.edu	231-5053
Dr. Jan Nespor	nespor@vt.edu	231-8327
Laura Spielman	spielman@vt.edu	231-8683
Dr. David Moore IRB Chair	moored@vt.edu	231-4991
Dr. John Rossi Mathematics Representative	rossi@vt.edu	231-8272

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

Informed Consent for 2004-2005 Academic Year

Form A4 for General Participation

Trajectories of Mathematics Teacher Education and Preservice Elementary Teachers Through Teacher Education Curriculum Networks

Principal Investigator: Dr. Gwendolyn Lloyd, Dept. of Mathematics, Virginia Tech
Co-Investigators: Dr. Jan Nespor, Dept. of Teaching and Learning, Virginia Tech and
Laura Spielman, Dept. of Teaching and Learning, Virginia Tech (Dissertation Research)

I. The Purpose of this Research Project

The main purpose of this study is to develop an understanding of how mathematics teacher education is interconnected with the teacher education program in general and to learn about students' experiences both in and outside of the program.

II. Procedures

If you choose to participate in this study, you will be asked to participate in between one to four audiotaped interviews, with each interview lasting approximately 30 minutes to one hour. Additionally, if your daily activities include participating in an instructional or student role in any courses, field placements, or other mathematics, teaching or teacher education program related activities, the researchers might observe during some of these activities, with some observations audiotaped or videotaped. Observations and interviews will focus primarily on the overall organization of the teacher education program, on students' experiences in the teacher education program and in college in general, or on instructors' experiences with teaching or supervising preservice teachers and other students. Class observations will focus in general on what types of activities or discussions take place and on how students participate in these activities. You might be asked share materials related to mathematics, education, or teacher education, such as information summarizing program objectives or classroom documents such as handouts, syllabi, class notes, assignments, papers, or tests. If you are a student, you might also be asked to provide copies of your academic transcripts, with grades blackened out if you prefer. All of the data collected through these processes may be utilized for research purposes.

III. Risks

There are no more than minimal risks to you or any of the other participants in this study. For example, there is no connection between students' participation in this study and their assessment in any of their courses or other teacher education program related activities. There is also no connection between instructors' participation in this study and their departmental or university evaluations. Participation in this project is voluntary and is separate from any everyday responsibilities in and outside of work. No promise of benefits will be made to encourage participation. You may decide to withdraw your participation from the study at any time.

IV. Benefits of this Project

No promise or guarantee of benefits will be made to encourage your participation.

V. Extent of Anonymity and Confidentiality

The researchers will provide as much protection for your anonymity as possible. All field notes, audiotapes, videotapes, transcripts, and other artifacts will be stored in one of the investigators' offices, which will remain locked at all times. All audiotapes and videotapes will be destroyed at the completion of the project. Pseudonyms will be used in all written reports and presentations at conferences. However, despite every effort made to preserve anonymity, anonymity may be compromised.

VI. Compensation

There is no compensation to be earned by participating in this project.

VII. Freedom to Withdraw

You are free not to answer any questions or respond to situations that you choose without penalty. You are also free to withdraw from this study at any time without penalty. You may announce your withdrawal by discussing it with any member of the research team (Laura Spielman, Dr. Gwendolyn Lloyd, Dr. Jan Nespor) or by contacting IRB chair Dr. David Moore or mathematics representative Dr. John Rossi. Contact information for these five individuals is available at the end of this document.

VIII. Approval of Research

This research project has been approved as required by the Institutional Review Board for Research Involving Human Subjects at Virginia Polytechnic Institute and State University, and by the Department of Mathematics.

IX. Participant's Permission

I have read the Informed Consent and have had all my questions answered at this time. I hereby acknowledge the above and give my voluntary consent for participation in this project. If I participate, I may withdraw at any time without penalty by contacting one of the people listed below.

_____	_____
Signature	Date

Note: You will be given a copy of this form.

Should you have any questions about this research or its conduct, you may contact any of the following:

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Dr. Gwendolyn Lloyd	lloyd@vt.edu	231-5053
Dr. Jan Nespor	nespor@vt.edu	231-8327
Laura Spielman	spielman@vt.edu	231-8683
Dr. David Moore IRB Chair	moored@vt.edu	231-4991
Dr. John Rossi Mathematics Representative	rossi@vt.edu	231-8272

Interview Information

Note: The examples below are *not* all-inclusive. Interviews will be semi-structured or non-structured and generally begin with these types of questions, but proceed in a wide variety of directions based upon interviewees' responses.

Examples of the types of things we might talk to faculty members and graduate students about during interviews:

- Their perspectives on the goals of their department
- Their perspectives on the purpose of the course(s) they are teaching
- Who takes the course(s)
- Their perspectives on their own role and the students' role in their course(s)
- How they teach the course(s)
- The nature of their past experiences with students in the course(s)
- What texts or other materials preservice teachers use in the course(s) and how texts are selected
- Their current position in the department and their research interests

Examples of the types of things we might talk to students about during interviews:

- What the neighborhood(s) was/were like where they grew up and went to school
- Their past experiences in mathematics classrooms and in school in general
- Their past and present experiences in the teacher education program
- Their decision to enroll in the teacher education program
- How course and field placement schedules are determined
- What they anticipate this upcoming academic year to be like for them; What they are looking forward to or not looking forward to; What they expect their courses or field placements to be like
- Their day-to-day relationships with others in and out of coursework (both preservice teachers and otherwise)
- Their reflections on particular classroom episodes that I observe (e.g., I might ask them to describe some activity that took place in a course.)
- What they envision their future classrooms to look like
- What grade they would be most interested in teaching and why

The types of things we might talk to additional participants about during interviews are the same as those for faculty members, graduate students, and students and will depend upon these participants' current positions. Questions will be related primarily to the following topics:

- The design of the teacher education program and their experiences related to the program
- Their experiences related to teaching or learning mathematics
- Their experiences related to teaching in general

LAURA JACOBSEN SPIELMAN

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1255 Cambria Street NW
Christiansburg, VA 24073
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Web Site: http://www.radford.edu/~lspielman

Education

- Ph.D., Curriculum and Instruction, Department of Teaching and Learning, Virginia Polytechnic Institute and State University (Virginia Tech), Blacksburg, VA, May 2006 GPA: 4.00
- M.S., Mathematics, Virginia Tech, Blacksburg, VA, December 1998 GPA: 4.00
- B.S., Mathematics, Roanoke College, Salem, VA, May 1997 GPA: 3.75

Employment

- Assistant Professor, Radford University, Department of Mathematics, 2005-Present
- Graduate Research Assistant, Virginia Tech, Department of Mathematics, 2003-2005
- Supervisor of Student Interns and Student Teachers, Virginia Tech, Department of Teaching and Learning, 2002-2003
- Instructor, Virginia Tech, Department of Mathematics, 1999-2002
- Mathematics and Statistics Tutor, Roanoke College, 1999
- Graduate Teaching Assistant, Virginia Tech, Mathematics Department, 1997-1998

Publications

- Spielman, L. J., & Lloyd, G. M. (2005). Contextualizing 'mathematics' in elementary teacher education. In G. M. Lloyd, M. Wilson, J. L. M. Wilkins, & S. L. Behm (Eds.), *Proceedings of the 27th Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education*, Montréal, Canada.
- Behm, S. L., Lloyd, G. M., Spielman, L. J. (2004). Curriculum negotiation and the implementation of conceptually different materials. In D. E. McDougall & J. A. Ross (Eds.), *Proceedings of the 26th Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education* (vol. 3, pp. 1300-1301). Toronto: OISE/UT.
- Spielman, L. J. (accepted for publication). Supporting constructivist theories of learning in teacher education: A case in mathematics investigating prior conceptions through the use of skits. *The Professional Educator*.
- Spielman, L. J., & Lloyd, G. (2004). The impact of enacted mathematics curriculum models on preservice elementary teachers' course perceptions and beliefs. *School Science and Mathematics*, *104*(1), 1-13.
- Wilson, M. R., & Spielman, L. J. (2003, July). *Teachers' conceptions of graph theory and functions: Implications for teaching*. In N. Pateman, B. Dougherty, & J. Zilliox (Eds.), *Proceedings of the 2003 Joint Meeting of PME and PMENA* (vol. 1, p. 335). Honolulu, HI.

National and International Refereed Presentations

Papers published in conference proceedings appear on this vita under "Juried Publications" and are not duplicated in the list of presentations.

- Spielman, L. J. (2006, November). "*Context-independent" philosophies in mathematics teacher education: The sorting of schools and the accomplishment of a program's irrelevance to teaching*. Paper proposed for the Culturally Relevant Mathematics and Science Panel at the annual meeting of the American Anthropological Association, San José, CA.
- Spielman, L. J. (2005, April). *Investigating preservice elementary teachers' views of practice through the use of skits*. Presentation at the annual meeting of the AERA, Montréal, Canada.
- Spielman, L. J. (2004, April). *Preservice teachers' observations of children's mathematical thinking*. Presentation at the Research Presession of the annual meeting of the National Council of Teachers of Mathematics (NCTM), Philadelphia, PA.
- Spielman, L. J., Behm, S., & Lloyd, G. M. (2003, October). *Learning outcomes of alternative enacted curriculum models in a mathematics course for preservice elementary teachers*. Presentation at the annual meeting of the American Association for Teaching and Curriculum (AATC), Baltimore, MD.
- Spielman, L. J., & Gao, H. (2003, October). *Understanding relationships between professionalism and teaching practice*. Presentation at the annual meeting of the AATC, Baltimore, MD.
- Lloyd, G., Behm, S., & Spielman, L. J. (2003, January). *Learning with and about curriculum materials: How preservice elementary teachers interpret and use mathematics textbooks*. Presentation at the annual meeting of the Association of Mathematics Teacher Educators, Atlanta, GA.

Research Projects and Grant Experience

- Dissertation Research, *Preservice Teachers' Characterizations of the Relationships Between Teacher Education Program Components: Program Meanings and Relevance and Socio-Political School Geographies*
  Committee Chair: Dr. Gwendolyn Lloyd
  Committee: Dr. Susan Magliaro, Dr. Jan Nespor, Dr. Jay Wilkins, and Dr. Skip Wilson
  - Department of Teaching and Learning Doctoral Student Research Mini-Grant Program, Virginia Tech, 2004-2005, $2500 for dissertation research
  - Graduate Research Development Project, Graduate Student Assembly [GSA], Virginia Tech, 2004-2005, $500 for dissertation research
- Research Assistant, *Building a Theory of Teacher Learning With and About Mathematics Curriculum: The Role of Innovative K-12 Materials in Elementary Teacher Education*, NSF-funded, http://www.math.vt.edu/people/lloyd/career/intro.html, Virginia Tech, 2002-2005
- Project Co-Researcher, *Understanding Relationships Between Professionalism and Teaching Practice*, Virginia Tech, 2003
- Research Assistant, *Investigating Teaching and Learning in Mathematics*, funded by the Center for Excellence in Undergraduate Teaching [CEUT], Virginia Tech, 2002
- Travel Fund Program, GSA, Virginia Tech, 2003, 2005, Funded for conference travel

- Faculty Study Group Program focused on the improvement of instruction, CEUT, Virginia Tech, 2001-2002, $500 for professional development (Also listed as Teaching Related Professional Development)
- May Writing Workshop, University Writing Program [UWP], Virginia Tech, 2001, $300 for professional development (Also listed as Teaching Related Professional Development)
- Master's Program Research, *Chaos and the Dripping Faucet*, Virginia Tech, 1998
- Summer Scholar Research, *Exploring Fuzzy Regression Analysis*, Roanoke College, 1996

Research Interests

- Preservice and inservice elementary and secondary teachers' learning to teach mathematics
- Power, politics, and equity in mathematics curriculum and education, and connections to and implications for children's learning
- Co-learning and co-investigations of mathematics education among preservice teachers, inservice teachers, teacher educators, and interested others
- Mathematics curriculum materials as resources for teacher learning
- Interdisciplinary investigations into teaching, learning, and teacher education
- Networks-based educational theory in mathematics education, teacher education, and education in general
- Ethnographic research methodology

Other Presentations and Workshops

- Spielman, L. J. (2006, March). *The politics of mathematics curriculum and standards: Questions for equity and social justice*. Presentation at the 28th annual meeting of the Virginia Council of Teachers of Mathematics, Blacksburg, VA.
- Spielman, L. J. (2005, March). *Mapping knowledge in elementary mathematics teacher education coursework and fieldwork*. Presentation at 21st Annual Research Symposium and Exposition, Virginia Tech, Graduate Student Assembly, Blacksburg, VA.
- Lloyd, G. M., Behm, S. L., Rivera-Marrero, O., & Spielman, L. J. (2005, March). *Research in mathematics education*. Presentation at the Graduate Issues Seminar in Mathematics, Virginia Tech, Department of Mathematics, Blacksburg, VA.
- Spielman, L. J. (2004, November). *Defining elementary teacher education curriculum networks and tracing elementary mathematics teacher education through these networks*. Presentation at Educational Studies Seminar, Virginia Tech, Department of Teaching and Learning, Blacksburg, VA.
- Spielman, L. J. (2003, April). *The mathematical development of prospective elementary teachers*. Presentation at MD/DC/VA Meeting of the MAA, Norfolk, VA.
- Spielman, L. J. (2001, November). *What can I do with a major in mathematics?* Alumni Panelist, Math and Physics Career Program, Roanoke College, Salem, VA.
- Spielman, L. J. (2001, August). *Lesson planning*. Workshop for Virginia Tech Mathematics Department Graduate Teaching Assistants, Blacksburg, VA.
- Spielman, L. J. (2001, August). *An introduction to Mathematica for calculus*. Workshop for Virginia Tech Mathematics Emporium workers, Blacksburg, VA.

- Spielman, L. J. (2000, November). *Virginia Tech Mathematics Emporium orientation and Excel introduction*. Workshop for Montgomery County Public Schools Math Teacher Enrichment Program, Blacksburg, VA.
- Spielman, L. J. (2000, November). *Computer laboratory based calculus using Excel and Mathematica*. Presentation at MD/DC/VA Meeting of the MAA, Washington, DC.
- Spielman, L. J. (2000, October). *Technology and Mathematics: The Virginia Tech Model*, Presentation at meeting of the Blue Ridge Council of Teachers of Mathematics, Salem, VA.
- Jacobsen, L. (1997, April). *Fuzzy Regression and the Baseball Hall of Fame*, Presentation at MD/DC/VA Meeting of the MAA, Williamsburg, VA.

Research Related Professional Development

- *Teaching and Teacher Education New Faculty Seminar*, Annual meeting of the AERA, 2006
- *Grant Writing Workshop*, Radford University, 2005
- *Teaching and Teacher Education Graduate Research Seminar*, Annual meeting of the AERA, 2005
- Presented research, led discussions, and attended many Mathematics Education Graduate Seminars, Virginia Tech, 2002-2005
- Attended Educational Studies Seminars in the Department of Teaching and Learning and a presenter in the Seminar Series, Virginia Tech, 2004-2005
- *Show-Me Researchers' Workshop*, University of Missouri-Columbia, Participation funded by the Show-Me Center, 2003
- *Writing Successful Grants*, Faculty Development Institute [FDI], Virginia Tech, 2003

Courses I Have Taught

- Introduction to Number Systems, Radford University, 2005-2006
- Mathematics and Human Development I, Radford University, 2005
- Mathematics and Human Development II, Radford University, 2006
- Number and Computing for Teachers, Virginia Tech, 2003
- Geometry and Computing for Teachers, Virginia Tech, 2003
- Elementary Calculus I with Matrices, Virginia Tech, 2002
- Multivariable Calculus, Virginia Tech, 2002
- College Algebra and Trigonometry, Virginia Tech, 2000
- Calculus with Trigonometry I, Virginia Tech, 1999-2001
- Calculus with Trigonometry II, Virginia Tech, 1998-2001
- Calculus I, Virginia Tech, 2001
- Differential Equations, Virginia Tech, 2000

Teaching Related Professional Development

- *Margaret Sue Copenhaver Institute for Teaching and Learning*, Roanoke College, 2006
- *Distance Learning Course*, Mathematics for Secondary Teachers I, Virginia Tech, 2002
    - Observed most course meetings in connection with my research experience in *Investigating Teaching and Learning in Mathematics*

- *Faculty Study Group Program*, CEUT, Virginia Tech, 2001-2002
- *May Writing Workshop*, UWP, Virginia Tech, 2002
- *Learning Communities and Institutional Change* workshop series, CEUT, Virginia Tech, 2000-2001
- *Technology and Information* workshop, FDI, Virginia Tech, 2000
- *The Skillful Presenter* workshop, CEUT, Virginia Tech, 2000
- *Principles of Good Practice in Science and Engineering* workshop, CEUT, Virginia Tech, 1999
- *Maximizing Student Motivation* workshop, CEUT, Virginia Tech, 1999

Math and Math Education Honors and Awards

- Phi Kappa Phi (National All-Discipline Honor Society), Virginia Tech, 2002-Present
- Graduated magna cum laude with honors in mathematics, Roanoke College, May 1997
- First place for student talks at the MD/DC/VA Regional Meeting of the Mathematical Association of America (MAA), April 1997
- Julia McBriety Chalfant Memorial Award for Excellence in Mathematics, Roanoke College, 1997
- Honors Program, Roanoke College, 1993-1997
- Summer Scholar Research, Roanoke College, 1996
- Pi Mu Epsilon (National Mathematics Honor Society)

  President of Virginia Delta Chapter, Roanoke College, 1995-1997
  Member of Virginia Beta Chapter, Virginia Tech, 1998-Present

Department and University Service

- Faculty Club, Executive Board Member, Radford University, 2006-Present
- Curriculum Committee, Mathematics Department, Radford University, 2005-Present

  Developed new geometry course proposal for preservice secondary teachers
- College of Arts and Sciences faculty representative in the CVC Annual Fund Drive for charity, Radford University, 2005
- Recruitment Committee, Mathematics Department, Radford University, 2005-Present
- Brochure Committee, Mathematics Department, Radford University, 2005-2006
- Course co-coordinator and curriculum and course development for Calculus with Trigonometry II, Mathematics Department, Virginia Tech, 2000-2002
  - Designed numerous computer lab assignments using *Excel* and *Mathematica*
  - Maintained several departmental course web sites
  - Responsibility for course organization and syllabus design for 10-12 sections of the course each semester
- Graduate Teaching Assistant Interviews Committee, Mentor to Graduate Teaching Assistants for Phase I of their teaching certification process, 2000-2002
- Graduate Teaching Assistant Mentoring Committee, Mentor to Graduate Teaching Assistants for Phase II of their teaching certification process, 2000-2002
- Initiated undergraduate student participation and served as faculty advisor for a team earning Honorable Mention honors in the Math Contest in Modeling, Consortium for Mathematics and Its Applications, 2001

- Peer-Elected Instructor Affairs Committee, Mathematics Department, Virginia Tech, 2000-2001
    - Initiated and participated in faculty peer observations of teaching
    - Facilitated communication between instructors and department leadership
- Part-time supervisor of the Mathematics Emporium, Virginia Tech, 2001-2002
- Women in Mathematics Career Day Committee, Coordinated volunteer participation for committee efforts to support middle school female students' interest in mathematics, Mathematics Department, Virginia Tech, 1997-2004
- Mathematics Awareness Month Committee, Supported elementary and middle school students' interest in mathematics, Virginia Tech, 1997-2004
- Common Time Examinations Committees, 1999-2002
    - Elementary Calculus with Trigonometry I & II
    - Calculus II

Additional Relevant Professional Service

- Reviewer, *Journal for Research in Mathematics Education*, 2006-Present
- Reviewer, *Journal of Mathematical Thinking and Learning*, 2006-Present
- Program Planning Committee, 27th meeting of the International Group for the Psychology of Mathematics Education, Blacksburg, VA, 2004.
- Reviewer, *Teachers' use of mathematics curriculum materials: Research perspectives on relationships between teachers and curriculum*, Remillard, Herbel-Eisenmann, & Lloyd (Eds.), 2005
- Reviewer, Annual meeting of AERA, 2005-Present
- Reviewer, Annual meeting of PME-NA, 2004-Present
- Webmaster, MD/DC/VA Section of the MAA, http://www.math.vt.edu/org/maa, 2002-2005
- Member of national Committee on Web Policy and Procedures, Mathematical Association of America (MAA), 2004-2006
- Co-chair for local planning and administration of the MD/DC/VA section meeting of the MAA hosted by Virginia Tech, 2001

Professional Memberships

- American Anthropological Association

  Council on Anthropology and Education
- American Educational Research Association (AERA)

  AERA Special Interest Group: Critical Educators for Social Justice

  AERA Divisional Membership: Learning and Instruction

  AERA Divisional Membership: Social Context of Education

  AERA Divisional Membership: Teaching and Teacher Education
- Association of Mathematics Teacher Educators
- Mathematical Association of America
- North American Chapter of the International Group for the Psychology of Mathematics Education
- National Council of Teachers of Mathematics