THE LIVED EXPERIENCE OF IN-SERVICE SCIENCE TEACHERS BUILDING A

COMMUNITY OF PRACTICE DURING A LONG-TERM

PROFESSIONAL DEVELOPMENT

by

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DEDICATION

This work is dedicated to my two and a half year old daughter, Alara Rose Sawey,

and to all the children depending on us to help them *become*.

ACKNOWLEDGMENTS

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CHAPTER 1: INTRODUCTION

In a letter published in the inaugural volume of *Phenomenology and Pedagogy*, Maxine Greene states, "I could understand, as never before, the problematic of the taken-for-granted, the illusion of an objective world defined by official or expert others" (Greene, 1983, p. 3). Consider the following fictional narrative:

Jennifer awakens to the familiar sound of her ancient clock radio playing static mixed with a little Tchaikovsky. It is still summer vacation but she is about to begin her eighth year teaching high school biology. But Jennifer is not sleeping in today. As part of her district requirements she must attend professional development in the summer – and she is not looking forward to it. With few exceptions, Jennifer has not been impressed by much of the continuing education she has attended during her career and so she has no reason to expect anything different this time. She pulls herself out of bed and blinks at the bathroom light as she turns on the hot water. While she showers she thinks about what she might have to read that she can smuggle in under the usual three-ring binder of handouts. Magazines and catalogs are good because they lie flat – but you have to turn the pages too often and it can become too obvious. She thinks about the novel on the nightstand she has been dying to finish – too thick and obvious. Then she gets an idea.

She dresses quickly in her most comfortable jeans and a t-shirt. It feels nice not to dress up and who is she there to impress anyway? These workshop people fly in one day and fly out the next – after picking up their huge paycheck. She checks the time on the clock radio. If she doesn't get there at least 20 minutes early all the good seats will be taken and she will be forced to sit in the front where she won't get any reading done!

She grabs the novel off the nightstand and heads for the scanner. She quickly scans and prints the next two chapters – hoping that will be enough to keep her from being bored. She is proud of her clever problem solving and smiles at herself. The printed pages will look just like all of the other handouts and she will look like she is simply enthralled with them!

As Jennifer drives to the school, she wonders if her two friends from school will be there and whether or not she will get to sit with them. Karen and Jennifer became friends four years ago when Jennifer moved to her school in her fourth year of teaching. Karen had been something of an unofficial mentor for Jennifer, trying to help her acclimate to the school but not really discussing teaching strategies or sharing ideas. Jeanine always brings the good chocolate and Karen is usually good for clever "under her breath" comments that will keep you awake. This is assuming the workshop leader doesn't pull one of those assigned seating catastrophes of course. Suddenly Jennifer slaps her hand against the steering wheel of her '98 Civic as she realizes she has forgotten her precious Diet Coke sitting on the kitchen counter. Oh man, it is going to be a long day.

Programs, curriculum, pedagogy, or equipment do not directly make the difference in the life of a child – it is the teacher with whom he or she interfaces. Both the *Benchmarks for Science Literacy* (AAAS, 1993) and the *National Science Education Standards* (NRC, 1996) emphasize this importance. The authors of the *Benchmarks* state that, "the single most important source of knowledge on student learning comes from thoughtful teachers" (AAAS, 1993, p. 327). In a compatible statement in the *Standards*, the authors suggest that teachers "need to have a significant role in the process by which

decisions are made concerning the allocation of time and resources... However, to assume this responsibility, schools and districts must provide teachers with the opportunity to be leaders" (NRC, 1996, p. 52). Past experiences have the potential to impact learning and therefore, professional developers must consider these in designing professional development (PD) (Loucks-Horlsey, Love, Stiles, Mundry, Hewson, 2003).

Continuing education in the form of non credit PD is a practice taken for granted in education to help teachers continue to grow as professionals. Classroom teachers and professional development providers appear in many instances to live in different educational worlds (Miller, 2001). The typical interface between providers and in-service teachers occurs when they come together for the teachers to learn *from* these providers (Little, 1993). Both have a specific role to play; the teachers are there as novices to learn and the providers are there as the experts to teach. This may encourage only a one-way communication path for knowledge transfer, rather than a community of practice (CoP) (Lave & Wenger, 1991; Wenger, 1998; Wenger, McDermontt, & Snyder, 2002). Historically, the focus of PD has been on content (and pedagogies specific to that content) as opposed to the social and personal development of teachers (Howe & Stubbs, 1997; 2003), which researchers have identified as a critical facet of effective professional development (Hargreaves, 1995; National Center for Improving Science Education, 1993; O'Loughlin, 1992). In addition to general social and personal development, researchers suggest that teachers need to grow as members of a community (Borko, 2004; Darling-Hammond, 1993; Lieberman & McLaughlin, 1992; Putnam & Borko, 2000).

Professional developers are expected to attend to teachers' needs for new content and pedagogy, but Wenger (1998) suggested there is also a need for social and emotional

support through sustained relationships and communities of practice. Despite these recommendations, teachers have often been left on their own, without social support or mentorship opportunities (Little, 1990), and without the long-term aspects of effective professional development (Bybee & Loucks-Horsley, 2000). Some PD models have now begun to embrace the teacher as an active participant in her own PD (Loucks-Horsley, Love, Stiles, Mundry, & Hewson, 2003), and to see these teachers as human beings with powerful emotional needs, which are connected to their ability to acquire new knowledge (Salzberger-Wittenberg, Williams, Osborne, 1999). Teachers receive support in their buildings through the administration and staff as well as from their peers/colleagues. When they leave their buildings for professional development they are also seeking support.

Because of the firmly rooted conceptualizations of PD for teachers discussed above, there is a need for a paradigm shift (Kuhn, 1962) in regard to research in PD.

Rather than replacing one form of professional development with another,

we would be wiser to examine what exists and to make it better… [and]

whatever occurs, publicize the results. Little is gained from collecting

information for only bureaucratic purposes. Instead, put the information,

in digestible form, into the hands of those making choices about ongoing

learning opportunities. (Hill, 2009, p. 470)

According to Kuhn, a successful transition to a new paradigm may require researchers to leave behind an old paradigm in favor of this new one, which must be created (1977). This new paradigm should encompass a thorough investigation of teachers' experiences, which Knowles, Holton, & Swanson (2005) suggest are the basis for how adult learners

define themselves.

       The purpose of this research is to explore the lived experiences of five teachers participating in an alternatively structured professional development (Bloom, Holden, Sawey, & Weinburgh, 2010; Weinburgh, 2005, 2007; Weinburgh, Groulx, Bloom, & Sawey, 2007) that encouraged the construction of a community of practice. Researchers have suggested a need to be sensitive to and conscious of the social and personal development of the teacher in PD (Barnes, Hodge, Parker, & Koroly, 2006; Loucks-Horsley, Hewson, Love, & Stiles, 1998; Loucks-Horsley, Love, Stiles, Mundry, & Hewson, 2003). Naturalistic inquiry is most appropriate to explore these experiences.

CHAPTER 2: REVIEW OF THE LITERATURE

This exploratory study draws upon three primary areas of scholarship: the human in human science research, professional development of teachers, and communities of practice. These subjects are reviewed with regard to their relevance for this study.

The Human in Human Science Research

The natural intuition afforded human beings is already recognized as valuable in the educational setting (Hooks, 2003; Noddings & Shore, 1984; Palmer, 2007). Ainley (2006) states that "affect is as central to understanding the character of educational experiences as are motivation and cognition"(p. 391). It is worthwhile to examine these emotional experiences in order to increase our own awareness and understanding (Salzberger-Wittenberg, Williams, & Osborne, 1999).

According to Schutz and Pekrun (2007) there has been a significant increase in research in the area of emotion with regard to education. They state that "…the educational context is an emotional place, and emotions have the potential to influence teaching and learning processes (both positively and negatively). By implication, there is a great need to study emotions in education" (Schutz & Pekrun, 2007, p. xiii). But for some time emotion has been disregarded and even denigrated in the profession of teaching, according to Noddings (1996), a scholar and philosopher who focuses on the notion of caring in schools. However, more researchers are now focusing on the positive and negative emotions associated with social interactions in the teaching profession (Zembylas, 2003a,b) as well as the emotional experience of teachers (Golby, 1996; Hargreaves 1998, 2001). These emotional aspects of teaching are important, but exactly

how these emotions affect teaching has not been widely studied (Sutton & Wheatley, 2003).

Professional Development

The literature on PD is substantial and researchers agree that it is most effective when it provides: (a) a model for classroom teaching, (b) continuous, long-term support, (c) opportunities to collaborate in a professional community, and (d) opportunities for social and emotional development.

Model for Classroom Teaching.

Teachers benefit from PD in which they can participate as active learners experiencing content for the first time and in which innovative, research-based teaching strategies are modeled (Borko & Putnam, 1995; Garet, Porter, Desimone, Birman, & Yoon, 2001; Loucks-Horsley et al., 2003). Active learning encourages teachers to become engaged in the activities of the professional development community (Lieberman, 1996; Loucks-Horsley et al., 2003). This engagement must include opportunities for teachers to see new content specific teaching strategies modeled by the providers (Borko & Putnam, 1995). For example, in the area of science education, research shows that teachers lack training in inquiry and this should be part of their ongoing PD (Loucks- Horsley, et al., 2003). Many practicing teachers have never experienced the kind of teaching advocated in the literature and therefore, teachers should first experience these strategies the way their students will when they encounter the material for the first time (Darling-Hammond & McLaughlin, 1995).

Continuous, Long-Term Support.

Researchers agree that PD is most effective when it is an intensive, content-

focused, and long-term PD with a substantial amount of contact hours to provide on-

going support for the teachers. (Borko & Putnam, 1995; Bybee & Loucks-Horsley, 2000;

Darling-Hammond, 2000; Garet, et al., 2001; Hiebert, Gallimore, & Stigler, 2002; Little,

1990; Loucks-Horsley, et al. 2003). A study by Garet et al. found that,

> Time span and contact hours exert a substantial influence on the core features of
>
> professional development experiences… Reform activities tend to span longer
>
> periods and to involve greater numbers of contact hours than traditional activities…
>
> [and that] longer activities tend to promote coherence including connections to a
>
> teacher's goals and experiences, alignment with standards, and professional
>
> communication with other teachers (Garet et al., 2001, p. 930-933).

This model contrasts with that of the traditional workshops spanning one to three days.

These workshops have been found to have fewer lasting effects and leave teachers feeling

unprepared for classroom instruction (Darling-Hammond, 2000). Rather, PD should

provide long-term experiences, with more opportunities for active learning and collective

participation (Birman, Desimone, Porter, & Garet, 2000). Long-term PD may also

provide benefits for the development of community (Bybee & Loucks-Horsley, 2000).

Opportunities to Collaborate in a Professional Community.

What teachers learn and how they learn it is largely determined by the interactions

with the people in one's environment (Borko & Putnam, 1995; Vygotsky, 1986).

Shulman (1999) suggests that those in the teaching profession may need to examine the

professional development in other scholarly traditions in the sciences, such as medicine.

Many of these traditions operate within a community of practice. The research suggests

teachers need to grow as members of a community (Borko, 2004; Darling-Hammond,

1993; Hargreaves, 1995; Lieberman & McLaughlin, 1992; National Center for Improving

Science Education, 1993; O'Loughlin, 1992; Putnam & Borko, 2000). This community

should provide continuous access to support (Darling-Hammond, 1998), allow for

collaboration among members (Borko & Putnam, 1995), and must be content and context

specific (Borko & Putnam, 1995). Lieberman & McLaughlin (1992, p.673) state that

professional networks share four common features: (1) a clear focus to specific content,

(2) a variety of activities and learning opportunities, (3) opportunities for discourse, and

(4) development of personal leadership.

Researchers in math and science education agree with generalists in PD research.

Both suggest the necessity of these communities (Darling-Hammond & McLaughlin,

1995), that there should be a focus on content knowledge in order for the experience to be

meaningful to the participants, and that this content knowledge must be context specific

(Garet et al., 2001; Loucks-Horsley et al., 2003). They also state that effective PD in

science and mathematics education should include mentoring, networking, and

collaborative work (Garet, et al., 2001).

Collaboration between schools and universities is needed (Cochran-Smith, 1991;

Loucks-Horsley et al., 2003) as well as a general ethic of collaboration (Lieberman &

Miller, 1999). Darling-Hammond and McLaughlin (1995) note that these relationships, if

allowed to emerge as true partnerships, can dramatically impact the future of teaching

and learning. The support received from these relationships appears to fulfill teachers'

need to feel more confident (Bell & Gilbert, 1994; Wilson & Berne, 1999).

Social and Emotional Development.

There appears to be a recent movement away from traditional models of professional development which were focused on content and specific pedagogy as opposed to social and personal development of teachers (Howe & Stubbs, 1997; 2003). Researchers in education have suggested a need to focus on this social and personal development in PD (Barnes, Hodge, Parker, & Koroly, 2006; Loucks-Horsley, Hewson, Love, & Stiles, 1998; Loucks-Horsley, Love, Stiles, Mundry, & Hewson, 2003). There is much agreement that the teacher is the key figure in any change to a new paradigm (Darling-Hammond & Bransford, 2005) and that these teachers must be active participants in the process (Loucks-Horlsey et al., 2003). As teachers begin to experience PD in this new paradigm, a thorough investigation of teachers' experiences (Loucks-Horlsey et al., 2003) is needed. Knowles, Holton, & Swanson (2005) suggest these experiences are the basis for how adult learners define themselves.

Communities of Practice

Communities of practice (CoPs) were originally defined by Lave & Wenger (1991) as, "the process of social learning that occurs when people who have a common interest in some subject or problem collaborate over an extended period to share ideas, find solutions and build innovations" (Wubbels, 2007, p. 226). The idea that learning is socially constructed (Vygotsky, 1978) is central to communities of practice and researchers have suggested that social learning theory may inform these communities (Putnam & Borko, 2000).

Wenger and his colleagues define CoPs in this way: "CoPs are groups of people who share a concern, a set of problems, or a passion about a topic, and who deepen their

knowledge and expertise in this area by interacting on an ongoing basis" (Wenger, et al.,

2002, p.4). They offer examples of how these members interact by saying, "As they

spend time together, they typically share information, insight, and advice. They help each

other solve problems. They discuss their situations, their aspirations, and their needs.

They ponder common issues, explore ideas, and act as sounding boards" (Wenger, et al.,

2002, p.4). These defining characteristics support the idea that CoPs are created for the

purpose of creating shared knowledge among the professionals in the community.

        In addition to the ways in which they define CoPs, Wenger and his colleagues

have suggested ways in which the CoP defines itself through growth and development.

Wenger (1998) distinguishes three conceptual areas in which a CoP may define itself:

domain, community, and practice. When the CoP defines its purpose through the process

of defining its own domain (Wenger, et al., 2002), this includes decisions regarding the

content of the community. This helps guide the community toward a common set of

goals. The community may also be defined by the ways in which the participants interact

and share knowledge (Wenger,1998).

        Originally, Lave and Wenger (1991, p.29) said that learning in CoP's follows a

"legitimate peripheral participation in communities of practice." They concluded that the

members of the community of practice were participating in the learning as they moved

from a position of peripheral participation to more active participation within the center

of activity. Wenger and his colleagues (2002) later provided further clarification

regarding the active participation which was to include participation in knowledge

creation within the community. This shift from peripheral participation to active

participation can also be a bridge between established members of the CoP and incoming

members new to the CoP (Lave & Wenger, 1991). This occurs as new members are empowered by sharing their knowledge with the other members of the CoP. According to Wenger (1999), this process leads to "reification" whereby the community gives form to its experience by the creation of products – both tangible and intangible. Wenger (2006) comments specifically on the use of CoPs in education as a way for teachers to connect and communicate with their peers as well as those in authority over them. In addition, they state that participants may develop personal relationships and a common identity, in short, "they become a community of practice" (Wenger et al., 2002, p.4).

Researchers in education have suggested that, "these communities evolve over time, and they revolve around norms of openness, scholarly rigor, and collaborative construction of professional knowledge" (Lieberman & Mace, 2008, p.227). Current research includes multiple studies which focus on building communities using technology (Chesbro & Boxler, 2010; Jones & Preece, 2006; Lieberman, 2000; Lieberman & Mace, 2010; Vavasseur, & MacGregor, 2008). Researchers focused on face-to-face communities have suggested that teachers learn best within these communities, when properly implemented (Grisham, Bergeron, Brink, Farnan, Lenski, & Meyerson, 1999; Grossman, Wineburg, & Woolworth, 2001; Supovitz & Christman, 2003). A study by Chinn (1999) suggests that long term professional development supports the establishment of communities of practice. Professional developers and teacher educators must develop their understanding of communities of practice in order to better prepare teachers (Stein, Smith, & Silver, 1999).

CHAPTER 3: METHODOLOGY

The purpose of this research is to explore the lived experiences (Van Manen, 1990) of 5 teachers participating in a long-term professional development building communities of practice. This is a naturalistic inquiry and qualitative methods suggested by Lincoln and Guba (1985) based on the constant comparative method (Glasser & Strauss, 1967) were utilized.

Context and Participants

The context of the study was a two-year Teacher Quality PD funded by a grant from the Texas Higher Education Coordinating Board. Professors at a small private university in a large metropolitan area provided the PD for 24 science teachers. The teachers were selected from several schools connected through a feeder pyramid in a large urban independent school district. All of the schools included were identified as high-need schools as designated by No Child Left Behind (NCLB) with high percentages of economically disadvantaged students. Teachers applied for the program and were evaluated to determine whether they met the federal criteria for the designation of a highly qualified teacher. Admission preference was given to teachers who did not meet the criteria for highly qualified under NCLB. The participants in the PD participated in an intensive summer experience (70+ hrs), meeting daily for three weeks. When the school year began, the community continued to meet monthly on Saturday mornings (60+ hrs) throughout the academic year. According to the providers of the PD (Weinburgh, 2009), the objectives were:

Content: Teachers will increase science content knowledge in the areas of water issues, matter and energy, inquiry, and the nature of science.

Pedagogy: Teachers will improve pedagogical skills related to engaging English

Language Learners (ELLs) and using outdoor spaces to teach science.

Efficacy: Teachers will increase their feelings of efficacy toward teaching

science, particularly relating to water issues in the environment.

Outdoor Spaces: Teachers will increase their use of outdoor spaces for teaching

science through field investigations at their schools or at remote sites.

In addition, the providers of the PD encouraged the building of a community of practice

(Burroughs, Schwartz, & Hendricks-Lee, 2000 as cited in Weinburgh, Smith, & Clark,

2008; Wenger, 1998; Wenger, McDermontt, & Snyder, 2002) as a safe place for teachers

to learn with and from one another, alongside the professors as fellow learners.

Seeking information-rich cases for exploration, the sample deemed most

appropriate for this study was a purposive one, specifically a maximum variation sample

(Patton, 1990). Participants were selected based upon my own judgment about which

participants would yield the maximum variation for the study. At the outset of the PD I

observed all 24 participants. Seeking rich descriptions of the phenomena, I immediately

began to narrow the number of participants I was observing. When focusing on rich

details, "selecting a random sample from the population of interest may not be the proper

method of choice; rather, samples may be purposively selected to illuminate phenomena

in depth" (National Research Council, 2002, p. 105). In deciding on these participants I

relied heavily on observations and reviewed my own field notes as well as participant

journals. I employed criterion sampling in that participants were chosen after considering

their willingness to share reflective journal writing, status as a new or returning member

of the community, position in either elementary or secondary education, reasons for

attending the PD, and gender. As evidenced in their journal entries, all of the participants appeared to be willing to offer reflective responses regarding the PD.

I chose participants to represent some of the diversity in the PD. This included both elementary and secondary teachers, new and returning teachers, teachers attending for a requirement vs. enrichment, new and experienced teachers, and male and female teachers. I also tried to choose some participants who demonstrated a genuine interest in the content of the PD as well as those who did not. By this process I selected five participants from the original pool of twenty-four teachers. Each of the five participants is introduced briefly in the following passages:

Clara – "The Outdoor Educator"

Clara is a female in her late twenties. She is a middle school science teacher in her fifth year. She was attending the PD with colleagues from her school. She regularly takes her students outside to study the environment.

Louise – "The Scientist"

Louise is a female in her early thirties. She is a second year high school science teacher who came to education through alternative certification. She had previously worked in industry as a geologist. Louise was attending the PD after attending previous workshops put on by the university at which the PD was being offered. She loved the workshops and was attending for enrichment rather than requirement.

Jaime – "The Big Kid"

Jaime is a female in her late twenties. She is an elementary teacher in her fourth year of teaching. Her mother is also a teacher and Jaime came to education

through a traditional teacher preparation program at a university. She describes

herself as a "big kid" and credits this as one of the reasons she wanted to attend

the PD focused on outdoor activities. Jaime was attending for enrichment only,

having obtained more than enough hours for professional requirements.

Joshua – "The Observer"

Joshua is a male in his mid twenties. He is a middle school science teacher in his

first full year in the position. He began the semester before as a long-term

substitute. Joshua was attending the PD after being encouraged to do so by

colleagues who had previously attended the PD. I refer to him as the observer

because he was often concerned with how others were doing.

Tiana – "The New Teacher"

Tiana is a female in her mid twenties. She is a high school science teacher in her

first year. She was voluntarily attending the PD as part of a campus team from

her high school. She attended the PD to join her colleagues and also to fulfill

requirements toward professional development for her school district.

Data Collection

Data used for this study were collected under an approved request to the

Institutional Review Board (IRB) of the university at which the research was conducted.

Data collected included researcher observations and field notes, participant journals,

photographs, and one-on-one participant interviews.

Observations and Field Notes.

I was present for the entire summer portion of the PD experience. I was not a

provider of the PD although I was present in the room and taking field notes. Participants

were told that I was there as an observer to assist the PD providers in the evaluation of

the program by providing data to the PD providers. I did not participate in activities

provided for the teachers.

I observed teachers during each day of the PD. During these observations I took

note of the physical environment and the participant's responses to these environmental

factors, body language and facial expressions of the participants, actions of the PD

providers, and my own personal experiences. I recorded observations and reactions on a

small laptop computer and in a handwritten journal. During times when typing on the

computer might have been distracting or obvious to the participants, I chose to make

handwritten notes. In addition to the written field notes, I used a digital audio recorder to

record my notes of observations during outdoor field experiences when other written

methods were not appropriate. These recordings were later transcribed, by an outside

source, for inclusion in the final analysis. As suggested by Cohen (2000), these

observations included not only aspects of the participant's experience, but also my

experiences as researcher.

Journals.

During the course of the PD, participants were asked to keep a journal. Their

entries included a collection of guided and non-guided entries. Sometimes the PD

providers gave the participants a specific prompt and asked them to respond in their

journals. Other times participants were asked to write in their journals and not given a

prompt, to allow for more free reflection. Providers of the PD read and responded to

journal entries each day. The participants were fully aware that the providers of the PD

were reading these journal entries and in many cases this took the form of a written

dialogue back and forth. The participants were also aware that I was reading these journal entries for the purpose of understanding their experience.

During outdoor field experiences the journals were used to record the participants' observations about the area. I kept field notes indicating which journal entries were prompted, how they were prompted, and when and where the writing took place. The journals were also used to record scientific data the participants were collecting as part of the day's activities.

Photographs.

The PD providers and I often took photographs during the activities – particularly during outdoor activities. Many participants also took photographs during the outdoor field experiences and so the fact that I was also taking pictures did not seem to draw differential attention. The photographs were used as prompts during participant interviews and as supplemental archival materials for data analysis.

Interviews.

The primary method of data collection was participant interviews. I used a general interview guide approach which Patton (1990, p. 342) says involves, "…outlining a set of issues to be explored with each respondent before interviewing begins." Prior to the first interviews I reviewed the participants' journals and their personal field notes. Based on these data, I created an interview guide for each participant (Appendix A). These topics were used as talking points during the orientation and overview interviews. I used these talking points as guides for the interviews but was not bound by them. The first round of interviews was conducted at the conclusion of the summer portion of the PD. These were orientation and overview interviews (Lincoln & Guba, 1985) designed to prepare for

follow-up interviews. I met with each of the participants individually. Four of the five

interviews were conducted at the participants' respective schools, typically in their

classrooms. One participant chose to meet with me at the university where the PD was

conducted. All participants were given the option of where they wanted to meet. The

interviews were conducted in an open ended style - probing areas that were of interest

during the interview (Moustakas, 1994; Sokolowski, 2000; Van Manen, 1990). The

interviews focused on the social and emotional experiences of the participants during the

PD.

The second round of interviews was conducted near the end of the school year

and was designed as a focused exploration (Lincoln & Guba, 1985) based on the prior

interview. At this point the participants had completed the monthly Saturday follow up

sessions provided at the university as well as additional outdoor experiences at remote

sites. Again, participants were invited to participate in one-on-one interviews at either

their school building or the university campus. All five participants were willing to be

interviewed a second time. Four of the five interviews were conducted in the classrooms

of the participants and one chose to meet at the university campus. In preparing talking

points for this second interview I reviewed the transcribed interviews from the beginning

of the school year, as well as the participant journals.

In order to maintain the integrity of the data, I conducted member checking

(Lincoln & Guba, 1985) as needed throughout the writing and analysis portion of the

research project. Member checking is a process of verifying the validity of the data.

The first checkpoint was conducted after the first interview and prior to the second

interview. I also conducted a final member check prior to the completion of the project.

The research participants have had the opportunity to review the analyses I made based on their data. Based on this information, I made additions and/or deletions to the final narrative as required.

Data Analysis

Wanting to remain true to the organic development of my research methods, but also desiring a framework to guide my research, I chose a variation of the constant comparative method originated by Glasser & Strauss (1967), as modified by Lincoln & Guba (1985). This method afforded me the opportunity for a broad exploration of the phenomena, and also for identifying the most salient features in the data.

I utilized data management procedures, audit trails, and member checking as suggested by Lincoln & Guba (1985). Interview transcriptions (see appendix B) were formatted to provide an audit trail. Line numbers were added to each interview transcription. Transcriptions were unitized, that is, divided into meaning units corresponding to a single concept. Each meaning unit was given its own page in the data document. Headers were created for each of these pages to identify the particular interview (fall or spring), participant, and data card number within its series (for example an interview might have 135 data cards and each card would need to indicate which it is in the series). These data were printed onto 4" x 6" cards (see appendix C). Participant journals were scanned and reproduced on cards as well (see appendix D). A different color card was assigned to each of the five participants.

Each data card was examined and given a brief code, consisting of a few key words, in the bottom right hand corner. The purpose of this code was to provide a landmark regarding the larger content of the card. A second, but no less important

purpose, was to be a continuous reminder to isolate the data on the card from any of my own assumptions about what the author of the statement may or may not have meant. Therefore, these codes were concrete in nature, describing only that which was explicitly described in the text excerpt on the data card (Lincoln & Guba, 1985). Theories were set aside during this phase of the data analysis in order to fully engage in inductive analysis which, "begins not with theories or hypotheses but with data themselves, from which theoretical categories and relational propositions may be arrived at by inductive reasoning processes" (Lincoln & Guba, 1985, P.333).

After coding of individual meaning units, the process of sorting the data began. Units of meaning were compared with one another and sorted into groups that appeared to be related. Labels indicating themes for these piles were not generated initially. I would examine each card and place it somewhere in the emerging schema based on similarities between the units. When a meaning unit appeared to fit in more than one category, a duplicate card was created. Each pile of cards was then evaluated for a unifying phrase that represented its contents. These unifying phrases were used to indicate themes. During this process I took care to evaluate the placement of individual cards. Some cards were moved to other, more appropriate piles. In some cases, a pile had been created which contained multiple themes. These piles were then distributed into new piles creating additional themes. Additionally, some piles were combined, when a single unifying theme was more appropriate. During this process, I re-read the original transcripts in order to assure accurate codes for each meaning unit, and by extension, appropriate themes in which to classify the data. This process continued over the course of many working sessions, during which cards were sorted and re-sorted multiple times

until no additional conceptual themes emerged and I was reasonably confident that the themes accurately represented the meaning units for which they had been created.

Once I could be reasonably confident that these themes indeed represented the meaning units contained within them, I moved to theory generation based on the emergent themes. A process similar in function to the initial sorting of cards was used to explore relationships between the themes. Here I was searching for elements of "mutual shaping" (Lincoln & Guba, 1985, p.340) rather than cause and effect. These elements of mutual shaping were used to produce a, "reasonable construction of the data" (Lincoln & Guba, 1985, p.347). Because this is an exploratory study, the relationships suggested in this construct are hypotheses supported with evidence from the data. This construct attempts to explain, in part, the lived experience of the teachers during this professional development.

During the final analysis phase I utilized the technique of peer-debriefing in which, "the inquirer's biases are probed, meanings explored, the basis for interpretation clarified" (Lincoln & Guba, 1985, p.301). This debriefing, in which I presented my analysis to peers, allowed me to test my assumptions and emotional connections to the theories. Additional member checks were conducted during each interview as well as at the close of the study when participants were asked to consider the results of the study.

In addition to the experience of the participants, the nature of human science research requires the researcher to examine his or her own experience as part of the research. Lincoln and Guba (2003) reflect on the role of the self as researcher, "It is a conscious experiencing of the self as both inquirer and respondent, as teacher and learner, as the one coming to know the self within the processes of research itself" (p. 283). In

addition, Moustakas (1994) notes that, "The life experience of the heuristic researcher

and the research participants is not a text to be read or interpreted, but a comprehensive

story that is portrayed in vivid, alive, accurate, and meaningful language" (p. 19).

Therefore, as suggested by other researchers (Cohen, 2000; Jaeger, 1997; Moustakas,

1994; Van Manen 1990), I have made every effort to be aware of my own experience as

the researcher.   These experiences have been recorded in field journals (written and

recorded digitally) of my observations during the summer.

CHAPTER 4: RESULTS

From 10 transcribed interviews (appendix B) which ranged in length from 30

minutes to 2 hours, and 250 pages of reflective participant journals (appendix D),

approximately 1,200 significant statements were mined (Moustakas, 1994). From these

statements, 650 meaning units were identified (appendix C), 27 themes emerged, and

seven categories of themes were constructed (Glaser & Strauss, 1967; Lincoln & Guba,

1985; Van Manen, 1990). The themes are presented within their constructed categories.

No other hierarchical relationship is implied by the order of the categories, or the themes

within the categories. Each section focuses on a particular category of themes.

Category 1: Participant Entry

The participants came to the PD with a variety of interests and expectations; with

some having overcome challenges to attending the PD. Meaning units expressed their

excitement prior to attending the PD, identified specific reasons for attending, explained

what they hoped to take away, and described the challenges they had to overcome in

order to attend the PD. These meaning units were clustered into the themes of (1)

expectations and (2) challenges. These two themes comprise the constructed category of Participant Entry.

Participant Entry: Theme 1 - Expectations

Participants expressed thoughts, ideas, and/or feelings relating to their expectations for the PD. This theme also encompassed references to their excitement and anticipation prior to attending the PD (Clara, SP10:141; Jaime, F09:11; Joshua, J1; Louise, F09:35; Tiana, J1). For example, "I like these kinds of professional developments, I can't wait really. I wonder about what we are going to do…" (Jaime, SP10:81-82). In general, participants came with an expectation of learning (Joshua, F09:203) and growing in their field (Louise, SP10:363). Several shared that they simply loved education (Jaime, F09:19; Joshua, SP10:109-110), were ready to improve their own abilities (Joshua, J47), and get "re-energized" (Clara, J1) prior to the new school year. With one exception (Tiana, F09:2-3; F09:150-158), participants reported that they were attending the PD for reasons other than obtaining PD credit hours.

RES: So why were you interested in it? Do you remember?

LOUISE: Because it was focused on environmental. It sounded more applicable to what I was doing. It was definitely the field I came from so it is more interesting to me. [I am interested in teaching] environmental science classes and integrating environmental issues into the teaching of biology.

RES: So did you need hours?

LOUISE: No gosh no. I've got so many hours it's unbelievable. I've got about 200. (Louise, F09:38-48)

Other participants also shared that they, "have hundreds of hours" (Jaime, SP10:89-90)

and came anyway because of the focus on environmental systems and outdoor education

(Clara, F09:28). Joshua said the following about his entry into the PD:

> "I had a really busy summer and had other professional developments I needed to
>
> go to… but those two weeks were open! …my minor is a science degree and so
>
> every chance I get to grow my science side I want to take it. I heard a lot of really
>
> positive things from everybody who participated in last year's and so it was a no-
>
> brainer, everybody liked it and I needed it!" (Joshua, F09:202-203).

Participant Entry: Theme 2 - Challenges

Challenges facing the participants included managing outside responsibilities such

as childcare and other employment in order to attend (Clara, F09:350-351; Joshua,

F09:574-586; Louise F09:78-79). Additional challenges included concern that there was

not enough material directly related to testing objectives (Clara, J32; Tiana, SP10:16-42,

49-94), and concerns that they did not have enough or as much knowledge and/or

experience to contribute to the community (Jaime, J1; Tiana, F09:481-493).

Two participants related experiences in which their status as a parent was a

challenge (Joshua SP10:76-79, Clara F09:189-191). Joshua was a newly single dad and

shared experiences relating to those outside challenges. He said,

> "I was feeling really anxious, I had out of class anxiety, a lot of it. Tons... I think
>
> I was definitely very distracted. I was moving and I had to figure out stuff with
>
> my daughter. [I had] a few things going on" (Joshua, F09:115-119).

Clara, as a new mom, described her difficulty leaving her young son with a sitter, by

saying that, "if it had been any other PD I would have said no…[but the objectives of this

PD] made it easier to leave him than if it had not been something I was passionate about"
Clara, F09:179-187).

Some participants described challenges relating to jobs outside of their teaching
(Joshua, SP10:379-380; Louise, F09:78-79; Tiana, F09:161-166). Joshua said Saturdays
were a challenge for him because he coached and refereed soccer games. He lamented,
"all these people depend on me and it is very difficult getting away… it makes it difficult
to focus when I know I am letting other people down. I'm not able to just come in there
and not worry" (Joshua, SP10:378-399). Tiana was working in the evenings part-time
and she stated that sometimes, "It made it so I was more tired the next day and couldn't
be as involved" (Tiana, F09:161).

Finally, some participants described mental challenges to full participation in the
community. For example, Jaime and Tiana both felt they had far less knowledge and
experience than other participants (Jaime, J1-3; Tiana, F09:178-179) and therefore could
not contribute as much, "so I am just going to sit and listen," said Tiana (F09:489). In
addition, Tiana and Clara both expressed concern over whether there would be enough
connection to district testing objectives for them to take the activities back to their
classrooms (Clara, J32; Tiana, SP10:21-42).

Category 2: Satisfaction with Characteristics of the PD

Participants reported instances of satisfaction with particular characteristics of the
PD. The themes were categorized as: (1) "Fun or Interesting," connections to the (2)
"Natural Environment," (3) "Group Dynamics," (4) "Long-Term Continuity," and (5)
"Pace of the PD."

Satisfaction with PD: Theme 1 – "Fun/Interesting"

Several participants indicated that the PD was "fun" and/or "interesting" (Jaime, J32, J50; Joshua, J36, J41; Louise, F09:560-564; Tiana, F09:336,721). Joshua wrote in his journal after a trip to the local wastewater treatment plant, "I felt like a kid spying on a secret testing lab!" (Joshua, J30). In discussing reasons she came to the PD even when the content was not immediately useful in her current classroom assignment, Tiana said, "but that is fun for me [canoeing] so it's easy to go, even though I wouldn't be able to take my students" (Tiana, SP10:387-388). In an earlier interview, Tiana's eyes were wide as she talked about her experiences in the summer,

> "I thought it was amazing that we went to so many different places. Actually going - man I thought we would be going, [just] around the area. But since we went all the way to [city within 250 miles], and we went to [a different city within about 250 miles]. It's like we actually got to go to the different places. The waste water treatment plant was interesting. I had never thought of that place before!" (Tiana, F09:401-406).

Other participants expressed satisfaction with the variety of outdoor field activities. Joshua wrote, "I'm grateful for the opportunity to see so many interesting things" (Joshua, J34).

Satisfaction with PD: Theme 2 – Natural Environment

Units of meaning emerged that revealed new knowledge of human impact and environmental systems content as well as sensory and emotional experiences relating directly to the participant's connection to the natural environment. These units of

meaning emerged from interviews as well as from participants' reflective journals and were collectively referred to as a theme relating to "the Natural Environment."

The extension of environmental science knowledge to issues regarding human impact on the natural environment was evident in the participant's stories of change in their lives as a result of their new knowledge. Jaime said she went to the store and bought aluminum water bottles to replace the bottled water she had been buying (F09:397-405). Her new knowledge was reflected in the change to her daily activities. The same may be said for other participants. Tiana proudly said that she, "bought tilapia the other day… and I was thinking about it [that it was a sustainable fish]" (Tiana, F09:531). Yet another participant shared that the life of her family was already different, "…just from our gained knowledge collectively of the water issue" (Clara, F09:260-262). Finally, Joshua reflected on why it was important to pass on this knowledge to others. He said that, "Otherwise everybody will continue on the same course they are on which is doing whatever you want" (Joshua, F09:757-758).

One participant felt the outdoor experiences helped to "cement the content" (Clara, J31). This new content included examples of new knowledge about how water quality changes throughout the various stages in the watershed (Clara, j24), mercury biomagnification in human food sources (Jaime, F09:501-502), identification of poison ivy (Jaime, F09:278-280), and how a wastewater treatment plant actually mimics nature (Clara, J16). Jaime said she was proud because, "before I would have been like, whatever, there is a winged creature coming at me! Now I'm like, hey that's a damsel fly!" (Jaime, F09:664-665).

Two of the participants expressed a variety of ideas, thoughts, and feelings in which they were able to describe their sensory experiences with emotion and in detail. These same two participants expressed a desire to more fully immerse themselves in the environment. Joshua seemed to connect to the smells in various locations such as the sewage at the wastewater treatment plant (Joshua, F09:167-168), but also how "you can smell the cleanliness of the treated water going back into our world" (Joshua, F09:560). Jaime on the other hand, was focused on what she could see. After seeing a picture of herself sitting by the water she commented, "so when we went out there it was perfect. It was calming. Nobody else was around me so I could focus. I remember looking in the water. I saw the water more than anything else. I felt calm" (Jaime, F09:702-704). She said she enjoyed just, "watching the water form and roll around" (Jaime, F09:181). An example of a strong sensory experience came from Joshua. He wrote in his journal about a particular experience of striking his foot on a stone in the water and allowing the sound to take him back in time (Joshua, J17). In the first interview he described the experience by saying,

> "It was odd because [it was just] that simple... I was going over to take a
> temperature test by the waterfall and when I crossed over I felt that unique feeling
> and sound of a stone hitting another one. Almost that interesting almost hollow
> clank of two rocks hitting each other under my foot… it instantly transported me
> back to my childhood." (Joshua, F09:449-452).

Joshua and Jaime also expressed feelings of being drawn to immerse themselves in the immediate natural environment (Jaime, J50, F09:170; Joshua, J41, F09:414-416). Joshua explained one of his reasons by stating, "there is so much growth and discovery that can

take place from going inside yourself and allowing your mind to wrap around the environment" (Joshua, F09:430-431).

Satisfaction with PD: Theme 3 – Group Dynamics

The meaning units that comprise the theme of Group Dynamics included references to experiences as members of the whole group, small working groups, and in "branching out" (Louise, F09:137) to meet new colleagues in other groups. References to the whole group included general descriptions of how they "loved/liked their group" (Jaime, F09:10; Joshua, J41; Louise, F09:390), as well as more targeted and thoughtful responses. In his final journal entry after the summer institute, Joshua responded to the final writing prompt, "What you need to know…" by sharing what it meant to him to be a part of the group (emphasis mine):

> "The luxury of receiving valuable information, equipment, and new friends is nice
>
> for anyone… It reassures me about what I'm getting into *and most importantly,*
>
> *that I'm not alone.* I… felt 'spoiled' by my experience, but [admit I prefer it]
>
> over one of boredom and inadequacy in the investment of my time… I've loved
>
> everyone and I'm really grateful, thanks." (Joshua, J48).

Additional units of meaning emerged related to participant experiences working in their small groups. Participants reported receiving "motivation" (Joshua, F09:676; Tiana, F09:704), opportunities for "collaboration" (Louise, SP10:450), and "knowledge resources" (Jaime, J21). Finally, participants expressed satisfaction with the opportunity to branch out and work with new people (Clara, J10; Jaime, J51; Joshua, J19; Louise, J14; Tiana, J10). Louise wrote in her journal about how she liked changing seats because she, "wanted to get the chance to work with others" (Louise, J14).

Satisfaction with PD: Theme 4 – Long-Term Continuity

In general, units of meaning emerged as references to the continuous support they felt they needed and were receiving. Clara spoke about this in the final interview saying she was pleased with the time she had devoted to the PD and that she agreed that, like this PD,

"…professional development needs to be built where teachers have mentors. Connecting with them, and touching base with them throughout the year…You can't just give them the info and send them away. Because we as humans will fall back to what we know best or what's in the book... You really have to have that human contact and the continuity and support that goes on" Clara, SP10:213-222).

Clara's comments focused on the professional support from the long-term PD, where Joshua's appreciation was more personal. During the Fall interview, upon seeing a photo of him sitting with the group of teachers he sat with the first few days, Joshua remarked how surprised he was to think about how they felt like strangers back when the photo was taken. He added that it felt like a long time ago (it had been about 4 weeks) and remarked that, "they turned from strangers into friends… I saw some of them today at the convocation. We were hugging and having this little reunion…" (Joshua, F09:1132-1138). Other participants made references to their personal comfort level because they knew people (Tiana, J10), as reasons they came back [again this year] to be with the group again (Jaime, F09:11).

Satisfaction with PD: Theme 5 – Pace of PD

Meaning units related to the pace of the PD emerged praising the "forward momentum" (Louise: F09:85), and the need for the occasional, "super-brain speed" (Joshua, J18). Jaime explains why she was so excited to be invited to come back to the PD the second year. She said,

"when I was invited to come back again, I came back because it was more exciting. It's more hands on and we can talk and get a little more rowdier than when we are inside a classroom and there is a whole bunch of teachers. You can see them like reading their papers, or they have their iPods on and they are looking at the person but they aren't paying attention. You have to pay attention at this workshop or you will miss it… I mean, it's fast paced and it wasn't boring!" Jaime, F09:10-16).

Other participants focused specifically on how particular experiences provided anticipation which moved the PD forward, for example, "It was just like oooooh… how will we do this?!" (Joshua, F09:684-685) and "talking about it [what we would be doing], it gets you more excited" (Tiana, F09:208-209). Also included in this theme are units of meaning regarding the participants' satisfaction with the variety of activities – specifically how that helped keep the pace moving and "break it up" (Tiana: F09:239). Joshua stated, "It [the variety of indoor and outdoor activities] just destroyed the ability for the monotony to set in strongly… it seemed perfectly set up. Even the outdoor activities were not like they were all the same" Joshua, F09:1028-1030). Other participants also reported a general appreciation for the variety and balance of activities (Jaime, J51; Louise, J48; Tiana, J22).

Category 3: Dissatisfaction with Characteristics of the PD

Participants reported far fewer instances of dissatisfaction with the PD, but these data were intense enough for sorting into themes. These themes can be categorized as the: (1) "Pace and Flow of PD," (2) "Structure or Goals of the PD," (3) "Immediate Classroom Application," and (4) "Physical Environment." Themes related to the dissatisfaction participants experienced within the affective domain are discussed elsewhere (see Affective Domain).

Dissatisfaction with PD: Theme 1 – Pace and Flow of PD

Reports of the pace seeming too slow were few, and isolated to one participant. Early in the experience, she recorded in her journal her occasional dissatisfaction with the pace of the activities and reported being anxious to move on to the next activity (Louise, J3). Later, she shared her thoughts on the aquarium activity. "I thought it was terribly unexciting… we kept going, we kept going on… I was wondering why everybody was so into this discussion" (Louise, F09 421-435). These were the only negative references to pace from this participant.

In contrast, participants reported multiple instances where they felt the pace was too fast and were unable to keep up, or experienced feeling left behind. In general, these were related to particular situations in the PD which included field sites and travel to these sites. Joshua wrote about his trouble keeping up with the outdoor group, "the pace was faster than I could keep up with which sadly led me to miss many of her [the speaker's] explanations" (Joshua, J41). He said during an interview, "by the time we had caught up we had missed more info" (Joshua, F09:407-408). Tiana reported that in these situations she sometimes didn't want to stop to ask the person next to her to explain

something because she didn't want to miss the next part (F09:515-520). Jaime noted she

would sometimes end up, "being one of the ones being left behind" (J43). Other

participants simply reflected on their experience as a whole. Clara (J21) began one of her

reflective journal entries by simply stating, "I felt a little overwhelmed."

Other instances of dissatisfaction with pace involved using multiple pieces of

equipment in the field including: journals, probes and data harvesters, water sampling and

testing equipment, and video flip cameras. Clara (J24) noted in her journal, "I definitely

felt rushed through the data collection." Another participant reflected on using the

probes, "I just didn't have time to learn how to operate all of them" (Joshua, F09 1039-

1040). Clara also wrote in her journal she felt overwhelmed by a trip to a local dam.

During the first interview she said,

> "I just felt like because we had all this equipment and a pretty limited amount of
>
> time to get through all these tests and to like kind of congeal the information in
>
> my head… See we had our journals and the video cameras, probes, and all these
>
> tests and then it was time to go and I was like ok everything is all spread out and
>
> we still didn't get through every test. And I think it was because we were trying
>
> to establish the place and I was really taking that seriously and really trying to do
>
> that and so I didn't feel like I got to do that right. I think part of that was coming
>
> from the creek where I felt like we just kind of flew through without any purpose
>
> and then I finally had my purpose and I ran out of time and I had all this stuff.
>
> That's why I felt overwhelmed (Clara, F09:316-328)."

Clara smiled broadly but sighed heavily as she finished speaking and tossed her hands

toward the ground.

Dissatisfaction with the flow or continuity of the content was expressed. One particular instance occurred when the participants reported an expectation of understanding a particular process (the treatment of wastewater) from beginning to end. Instead, one participant felt she received a presentation from the facility representatives which, "didn't flow…" because she needed to "…see it from beginning to end to make a connection" (Jamie, F09:260). She had written in her journal that she was, "disappointed that we did not start at the beginning of the process" (Jaime, J34). Another participant was also disappointed in the flow of the content. Clara stated she was "hoping it would allow [her] to more fully understand the path" (Clara, J15) and that she would "really be able to follow what happens from the moment that [the wastewater] came in... I felt like as I left the room I wanted to know what I would be doing if I was a water molecule" (Clara, F09292-295).

In addition to the specific expectations regarding the path of a water molecule through the wastewater treatment plant, participants reported dissatisfaction with the flow of this particular PowerPoint. Joshua wrote, "the PowerPoint slideshow was scary in that I nearly fell asleep three times due to the nature and flow of information coming in" (Joshua, J30). Jaime echoed a similar reflection, "the presenter talked too quick for me… [and] used too many pictures/visual aids but not enough words on the slide show - at least not for the key points he was trying to make" (Jaime, J34). Exasperated, Joshua said, "there were times where I was like ok, that's enough power point sliding ok?" (Joshua, F09284-285). The data which reflected participants' perceptions that the presentation was too slow were isolated to this event.

Dissatisfaction with PD: Theme 2 - Structure/Goals of the PD

Data reflecting dissatisfaction with the structure or the goals of the PD include instances in which participants felt there was a general lack of a unifying question or set of goals for a particular activity, where they felt they were conducting too many tests and collecting too many samples, and/or a general dissatisfaction with the perceived lack of data analysis.

In response to some of the inquiry-based activities, some participants reported dissatisfaction with the amount of preparation or instructions for particular activities. Participants reported that it sometimes felt, "too open-ended" (Louise, J37) or that they felt, "anxiety" (Joshua, J6) during the inquiry process. Clara explained that she often needed a guiding question. She stated,

> "I think I would have taken it [the inquiry activity] more seriously and put more of myself into it if I had had an original question. And I know that I could have taken the time… or if we had just said ok take the time to think of a question that you want to answer and I just never did. Part of that may have been my group because [another participant] and I liked to play and just go do stuff and you know we are comfortable with each other so we didn't feel like we needed to do that. I definitely do need to and I know a good portion of our students need that too. Why am I doing this? Give me a reason" (Clara, F09:88-95).

In addition to needing a guiding question for the inquiry, Clara expressed concern that she did not have enough information with which to complete some of the tasks (F09343-345).

Participants also reported a dissatisfaction with the "culmination of their data"

(Joshua, F09:363-364) and the lack of closure to particular PD activities (Tiana, F09443-445). Louise expressed concern about the lack of understanding regarding the purpose of the data they were collecting. She said, "well yeah I was like what are we doing with all this stuff?   We just keep getting it" (Louise, F09380-381). In another interview, Tiana gave her thoughts regarding the data she and her team collected.

> "Well we kept doing all of that water testing, but I wasn't sure what we were going to be doing with it after. It just seemed repetitious. I don't know if it was just for us to get familiar with all of it or if we were trying to prove something. I mean we compared our answers with everybody else from each place we went to. But we didn't compare what our answers were from when we went to [the northern part of the state] versus from when we went [South] or versus when we went around here. I didn't know if there was some goal with it or if it was just to get familiar with everything. Otherwise it seemed to get repetitious to do water testing at each place" (Tiana, F09:730-739).

Other participants also reported a need to have a goal in mind. Clara wrote the following in her reflective journal:

> "I found my group with a list of data to collect – not because we needed the 'data' but because we had the tools to collect it and knew those were the tests you do for the water. I was more than willing to do the task – and I enjoyed it, but I found I didn't apply any meaning to it. What that tells me about myself is that I need a 'why' to really apply myself" (Clara, J8).

In reference to his dissatisfaction with the collection of data, Joshua (J40) stated that, "the freedom of raw data collection is nice at times, but I personally experienced periods of

motivation anemia with regards to the purpose of my data." Like Clara, he expressed a

need for a different entry into the inquiry.

In addition to dissatisfaction with the purpose of their data, participants also

reported dissatisfaction with the number of times they were asked to sample the water at

various sites throughout the PD. In general, participants stated they were looking for,

"more activities than just sampling the water" (Tiana, F09:334-335) and sometimes felt

they were "just collecting water samples" (Jaime, J51). In a particular reflective journal

entry she completed at home by typing her response on a computer and taping it into her

journal, Louise (J39) reported that one of her general frustrations with the number of tests

was, "why we keep testing the water for all these parameters. We have no plan on why

we are testing the data. As we get the data, no one is connecting the information to the

bigger picture."

Joshua was bothered by the tests because of other content or experiences

he felt he might be missing. He reflected on these experiences in his journal,

> "Each ten minute period I took to collect a pH sample or temperature reading and
>
> share the data made me feel as though I were losing crucial time to study the
>
> physical and natural environment" (Joshua, J42). He further explains his frustration
>
> with multiple tests and samples saying, "At this point I feel like a novice who
>
> tinkered daily, instead of a master who delved incrementally through an organized
>
> process" (Joshua, J43).

During the subsequent interview, when asked to elaborate on his experience he replied,

> "I wanted to absorb so much of this info and just learn so much. There is so much
>
> to learn… I have a very finite amount of time to be in, yet I am being trivialized

again with these silly tests. I [was thinking] please leave me alone for a little while with these silly tests… I have 10 groups of people doing these same tests with these same water samples… can you just give me one of them so I can focus… so I can get done and then listen to [the presenter] tell me about her area? I [was thinking] why are you wasting my time? That's what if felt like" (Joshua, F09:388-395).

Dissatisfaction with PD: Theme 3 - Immediate Classroom Application

Primarily, the participant's dissatisfaction with their lack of immediate classroom application opportunities were expressed by lamenting the *number of lessons* they were getting to take back to their classrooms for immediate use with students. However, this theme also emerged in situations where participants reported a *desire to have more instruction* in regard to how to use the activities with students.

Tiana, a first year teacher, revisited this theme multiple times during both interviews. In the Fall she described how she was often multi-tasking during the PD by using her netbook (provided by the PD) to "look up different resources" (Tiana, F09:269-270). During the interview at the close of the school year, she was even more vocal about her desires. She referred back to how she was feeling during the summer PD and what her expectations were saying, "in my mind I was like what kind of lessons are you going to give me?" (Tiana, S10:308-309). When asked what she felt she needed from PD in general, she stated, "who's going to bring me the stuff I can bring in that is really interesting to the student? A new way that they can do it that is really fun that I can actually do with them" (Tiana, S10:239-241). Other participants contributed similar reflections. Joshua (S10:258-260) commented that "giving us lab material" was

something the PD did not seem to provide enough of, and Clara wrote in her journal that she found herself, "struggling to create relevant inquiry lessons that meet objectives" (Clara, J32).

Participants also expressed a desire for more pedagogy. During the Fall interview Joshua talked about his experience in the field. He stated "it did feel like someone had cut my mind in half and sent it on two different field trips. One was to teach me about the environment and the other to a lesser degree about being a better teacher. It seemed like there was less amount of time spent on that. It seemed like it was more about the content" (Joshua, F09:344-347). Another participant admitted that she, "needs more of how we can use it in the classroom" (Tiana, S10:30-31).

Dissatisfaction with PD: Theme 4 - Physical Environment

Participants reported instances in which they experienced dissatisfaction with the physical environment in which the PD was taking place. These experiences included challenges in maintaining physical proximity to the speaker, discomfort with natural phenomena, and being negatively affected by the immediate environment in some particular way.

Participants reported instances in which they had difficulty with their physical proximity to the speaker or leader. This occurred in a variety of outdoor settings as well as during a bus tour in which the speaker was standing at the front of the bus without a microphone. In general, participants commented that it was difficult to keep up in the larger group/outdoor setting and they often ended up in the back. One participant suggested it "would have been easier to navigate in smaller groups" (Jaime, J42). She referred to a time she missed what the speaker was saying because, "he was talking and

everybody at the front was listening and engaged and I was at the back and I couldn't

hear him" (Jaime, F09:292-293). When asked whether she considered moving up to the

front she replied, "no, I just stood in the back. I had lost out from the beginning so I was

like, whatever" (Jaime, F09:306-307). Another participant described feeling anxious

when she was in the back. She said, "if I'm in the back and they are moving on… I can't

handle that. It gives me anxiety" (Tiana, F09:511-513). Louise also commented on

being in the back, saying "I was like, I am at the back of the group, wait!" (Louise,

F09:519-520). In some instances, the lack of close proximity to the speaker resulted in

the participants having difficulty hearing (Clara, F09:382; Jaime, F09:285; Joshua,

F09:400; Louise, J37-J38).

Phenomena in or related to the natural outdoor environment posed an obstacle to

full participation by the participants. For some participants, the summer heat was a

factor. Tiana explained, "if I'm outside and it starts getting hot, I just kind of stop… It

made it so I wasn't as involved and my body shuts down…I turn more into a listener than

a hands on person" (Tiana, F09:346-360). In addition to the heat and sun exposure,

Jaime described another outside interference. She recounted an experience journaling

during a site visit to one of our local lakes, saying, "I sat down on a rock to journal… and

there was this jet ski and he created these big waves [and I] got wet… It was hot, I got

sunburned and I was uncomfortable for the rest of the evening…" (Jaime, J48).

Sometimes, natural phenomena such as poison ivy (Jaime, J37), unpleasant odors

(Tiana, F09:545-549), and things that crawl were the potential barriers to participation.

Tiana wrote about a particularly challenging day in her journal:

"I tried to go down to the river but I had a hard time. I got ant bites and had to

take off my shoes and I heard there was a black widow in the rocks so I got scared

and I didn't go all of the way down" (Tiana, J16).

She further described it during the first interview by saying,

"But when I heard that there was a black widow there that frightens me. It made

me not want to go down and do anymore because if there's one there could be

more. And I didn't want to walk back on those rocks because of those ants. I still

have a scar from the ants, but that's ok" (Tiana, F09370-377).

Tiana was disappointed in not joining her teammates, but was firm in her choice not to

proceed. Other participants also named fire ants (Jaime, J37) as occasional barriers to

their participation.

At times, something in the immediate natural environment was identified as

having a negative effect on the participants. For example, Joshua identified a particular

day in which, "the environment was begging me to fall asleep. The climate, darkness,

presentation. The long rhythmic bus ride…It was just a warm, comfortable, cloudy day"

(Joshua, F09:503-531). Louise echoed a similar experience at the wastewater treatment

plant, "the lecturer just kind of PowerPointed us to death – I kept nodding off" (Louise,

J27). Another participant commented on a trip that was "exhausting - the bus ride

trekking through the sand to get there and then the bus ride back – I got a little nauseous

on the ride back" (Jaime, J50).

Other instances of dissatisfaction occurred with regard to particular needs for

individual participants. Louise marked a day when she was finally able to change seats

so that she, "finally had a table to write on!" (Louise, J15). And Jaime commented that

she often doodles because of her need, "to have something in my hand. I need to be doing something" (F09:88-89). Finally, Tiana described her thoughts about not being able to sit still very long. She said,

> "I generally don't sit still. I always have to kick my leg… I am always rubbing my leg or kicking my feet and I annoy people... So I'll sit and listen, but I'm always moving around. I can't get comfortable on a chair. I tend to need more breaks sometimes. Even if I don't need to use the restroom, I just get up and go just so I can walk around… I don't like getting up when anybody's talking. I feel like that's rude and I don't want anybody thinking I'm getting up because they are not entertaining. I just can't sit still for long" (Tiana, F09:229-238).

Category 4: Satisfaction with PD Providers

Participants reported instances in which they experienced satisfaction related to the providers of the PD. The meaning units that comprise this category can be grouped into two themes: (1) the "Credibility of Providers," and (2) the "Variety of Providers." Of note is the lack of a category of meaning units that might express *dis*satisfaction with the providers. The absence of these data is discussed in chapter five.

Satisfaction with Providers: Theme 1 - Credibility of Providers

Units of meaning indicating a perception of credibility from the providers included references about the provider, or something the provider did that lent them additional credibility. For example, one participant expressed that she was pleased with the pedagogy regarding science and literacy and that she, "got the impression that that was understood by the instructors here" (Louise, F09:715-716). Joshua was particularly impressed to see one of the providers joining in the hard work and "throwing canoes up

on the truck" (Joshua, SP10:480-481). For Louise, it was important to know that one of the providers had taught in high school and that several had backgrounds in the content area of science. She stated, "the instructors seemed up to date on stuff and I really liked that [one particular provider] has a strong background in science…" (Louise, F09:70-701).

During one of the activities, a provider shared the story of his own graduate research, later prompting the following reflection from one of the participants: "He's not giving us info that he looked up on the internet or info he just threw together from various resources. This is a recap of something he went and experienced" (Joshua, F09:780-782). Other participants echoed similar comments regarding the narrative style of this particular provider (Clara, J30; Louise, F09:478-480; Tiana, F09:527). Joshua, wrote this in his journal: "He gave my favorite presentation of the two week period. The combination of his personality and obvious self-investment in his subject led to my great connection with him" (Joshua, J46).

Satisfaction with Providers: Theme 2 - Variety of Providers

Participants expressed satisfaction in getting to hear multiple perspectives on the issues and content (Clara, J30; Joshua, J24; Louise, SP10:46-50). In general, they felt that this brought a fresh perspective to the various environmental issues. Commenting on these multiple perspectives, Joshua wrote,

"There is always something amazing about a perspective in new awareness. Even if the information isn't completely new, the presentation of realities in how our lives operate greatly allows for better decisions to be made. I enjoy good

speakers, and I enjoy it even more when they care about what they do. (Joshua,

J8).

Additionally, Louise liked that this variety allowed the PD to have "subject matter

experts" (SP10:49), and Clara found she could enjoy some presenters more than others

(Clara, F09:379-380).

Category 5: Participant Actions During The PD

Themes emerged which referred to activities in which the participant had to take

action in order to participate. Meaning units which comprise this category included

references to the following participant activities: (1) "Networking," (2) "Building

Personal Relationships," (3) "Journaling with Provider," and (4) "Sharing Knowledge."

Participant Actions: Theme 1 - Networking

Participants indicated satisfaction with multiple levels of networking

opportunities within the PD community as well as an opportunity to network in an

extended PD community from another location. With the exception of Tiana, all of the

participants mentioned networking. Two participants, both of whom were participating

with a small group from their school, talked about how much they appreciated the

opportunity to spend time with co-workers (Clara, SP10:95-98). Joshua wrote in his

journal, "sharing this time with [Clara and two other co-workers] is very encouraging to

me and brings me comfort about joining their school" (Joshua, J34).

Another participant explained how she would use the opportunity for networking

as a selling point in telling others about this PD (Louise, F09:592). Specifically, she

talked about the characteristics of the participants and how their presence could either

add to, or detract from, her experience. She stated,

"People came to this group who wanted to be here. They were enthusiastic about being here…So you will make connections with people who really seem to enjoy teaching more. At some of the other teacher developments some of the people [make you wonder], 'why are these people teaching?' They seem like they hate it. Go do something else! There are other jobs outside of teaching if you really hate it do something different…. [But] this group really liked it" (Louise, F09:693-699).

Clara, a new mom, wrote in her journal on the first day that she was "thrilled to be able to re-fuel with my fabulous colleagues" (Clara, J1).

During the PD the participants had the opportunity to spend a day with a group of teachers from another Teacher Quality PD approximately 250 miles away. Participants expressed satisfaction with this trip and their new "network" (Joshua, F09:181). Jaime wrote in her journal about how she enjoyed meeting the new teachers and how they "compared equipment" and sampling techniques (Jaime, J43). At the close of the PD, Clara suggested obtaining contact information from both groups so she could, "set up a forum for discussion, sharing, etc. to help with bringing new ideas and inspiration into the classroom" (Clara, J32). Joshua summed it up in his journal, "I'm not alone" (Joshua, J48).

Participant Actions: Theme 2 - Building Personal Relationships

Participants indicated an appreciation for the personal relationships with other participants and the activities that provided opportunities to build these relationships (Clara, J10; Jaime, J47; Joshua, J6; Tiana, F09:458-464). Participants also shared stories of getting to know their new colleagues, even meeting socially outside of the PD (Joshua,

F09:166-167). Joshua was also satisfied to be able to get to know his co-workers on a more personal basis (Joshua, J34). He said, "getting to know the people I work with here [on his home campus] was a huge plus" (Joshua, F09:260-261). Other participants actually commented on Joshua reaching out to get to know them. During the Fall interview in reference to a photograph of Joshua and herself, Tiana discussed her experience:

> RES: That's at the Dam just outside the house. You were standing outside…
>
> TIANA: Yeah I was like the only one that couldn't handle it… but I just started walking in and… it was just too much... I kind of felt bad being the only one that wasn't able to handle it and not getting involved on that one. I tried it three times and it was just too strong.
>
> RES: You made a valiant effort. When I showed Joshua this picture he said 'Oh, Yeah I remember… I was talking to Tiana, I really feel comfortable talking to Tiana because she's new like I am'
>
> (Tiana, F09:641-653).

As the conversation continued, Tiana smiled and mentioned that Joshua would often ask how she was or if anything was on her mind (Tiana, F09:654). Jaime described her efforts getting to know another participant. After relating stories of being somewhat uncomfortable with this particular participant, Jaime sighed and said, "but when you get to talk to him and after you get rid of what he looks like, he's a nice guy. He's smart, funny… he's cool once you get past the outside" (Jaime, SP10:410-411).

Participant Actions: Theme 3 - Journaling with Provider

PD providers read participants' reflective journals daily and wrote comments and questions back to the participants. The next morning the participants had the opportunity to read those comments and questions and to respond by writing back in the journal. All of the participants in this study responded in writing to questions or comments from providers in their journals, (Clara, J10; Jaime, J4; Joshua, J2; Louise, J3; Tiana, J3) indicating that they had been reading the provider comments and questions. Meaning units which comprise this theme included references to the reflective journaling made by participants during interviews, as well as examples of the journal communication between providers and participants.

Participants expressed appreciation for the fact that the journals were being read daily by the providers (Joshua, F09:837-839). Clara spoke specifically about what the providers were doing with the information from the participants. She seemed surprised at the provider's willingness to alter the course,

> "I think a lot of times we do [PD] that is just full steam ahead. No altering the course because this is our agenda… So, it was nice to know it was being read and that it might affect what was happening" (Clara, F09:662-65).

Joshua also commented on how he approached his journaling, "…whenever you know someone else is reading it" (Joshua, F09:850-851). He was often concerned that he might be sharing too much or too personal information (Joshua, J28; F09:147) and admitted that sometimes he "felt self-conscious [in the beginning] but was fine the rest of the time" (Joshua, F09:861).

Multiple examples of participants and providers writing back and forth in their journals emerged in the data. What is salient about these questions, comments, and responses is the evidence of communication. Clara wrote about the experience and said, "I think it probably made me more honest because I knew it would make a difference… If it's a communication type thing that is. It felt like communication rather than writing" (Clara, F09:72). In some cases the writing was about the data the participants were collecting (Joshua, J9) and others wrote back and forth about future lesson plan ideas (J13). Still others received guidance in how they were journaling (Jaime, J50). The following is an example of one of the participant's journals in which he was communicating with one of the providers about a new teaching strategy:

> JOSHUA: Use 'word wall', split academic/everyday. - Increase vocabulary, induce curiosity.
>
> PROVIDER: What does this split accomplish?
>
> JOSHUA: Split allows them to make a transition from a word to a better option.
>
> (Joshua, J2)

The provider was checking for understanding regarding the teaching strategy that Joshua intends to adopt. Joshua demonstrated acquired knowledge beyond a cursory understanding of the technique.

Participant Actions: Theme 4 - Sharing Knowledge

Knowledge shared can be categorized in one of two ways: (1) knowledge directly related to the content and/or activities in the PD, and (2) content and/or pedagogical knowledge not directly related to the PD. The data suggested that all of the participants in this study were involved in sharing/receiving knowledge with their peers.

Participants shared knowledge regarding data collection and content directly related to the PD. During the PD, participants worked with their small groups to gather data about the various sites visited. The data suggested that participants independently realized they could get a better sample of an area if they shared data. Clara wrote in her journal, "the lack of fish is questionable, I wonder if there were some recorded in other parts? Perhaps our spot was too shallow?" (Clara, J5). Later in the PD she wrote that, "it will be nice to get to see the differences in what data was collected" (Clara, J24). In addition to sharing data, participants helped each other with the content of the PD. Tiana reported that sometimes she didn't know how to proceed until others began and that she would often turn to [another participant] for help (Tiana, F09:426-427; SP10:292-294). Jaime often mentioned a particular participant and the help he offered her,

> "Originally they were using vocabulary words that I hadn't used in such a long
> time that I couldn't remember it. So I'm sitting there looking at them smiling and
> nodding and it was kind of fuzzy… but [participant] was awesome! We'd talk
> and he would help me out" (Jaime, F09:26-30).

Jaime also wrote about this in her journal. She said, "I probably have the least amount of knowledge on this topic and the members of my table were valuable resources, they explained what I did not know/remember and filled in the gaps I had" (Jaime, J21). Tiana depended on Louise's knowledge of geology to help her understand the concept of flow. Louise remembers, "ya'll had talked about how there had been different flow at different times and Tiana didn't really understand that so I was explaining that it is influenced by the water table [goes on to explain flow]" (Louise, F09:409-414).

In addition to sharing content related to the PD, participants shared general knowledge about content and pedagogy with one another in a variety of ways. Some participants shared electronic files of resources and lessons (Clara, J32; Louise, J34; Tiana, J27). Tiana participated in some of the computer file sharing and reflected in her journal, "the most beneficial thing to me was meeting new teachers and not only getting new lessons materials from you guys [the providers] but also from the other teachers that I met" Tiana, J27). Others made more general references to just sitting and "listening and learning from them [her peers]" (Jaime, F09:554-555) and how they enjoyed the knowledge of a particular participant because, "he's a very nice humble person… He was there to be a learner but at the same time add a lot of interesting information" (Joshua, F09:239-242). Louise was grateful to tap into the resources of the group and was interested to find that cabbage juice could be used in place of phenolphthalein but that unfortunately, "other teachers have not found ways to make the concept of pH less abstract" (Louise, J4). Clara described plans to set up a "…forum for discussion, sharing etc. to help with bringing new ideas and inspiration into the classroom" (Clara, J32).

Category 6: Application Opportunities Following the PD

The data suggested that outcomes of the PD included opportunities for application of knowledge and resources. Participants reported instances in which they had applied or may have the opportunity to apply new knowledge gained through the PD, as well as examples of using the resources they received through the PD. Units of meaning emerged regarding the utilization of new resources, new pedagogical knowledge, new content knowledge in environmental systems, personal implication of the environmental

issues presented, and new or renewed desire to pass this knowledge and awareness along

to, "friends, family, and students" (Joshua, J8).

In the first theme presented in this category, (1) "Materials and Activities,"

participants described using materials from the PD or described their plans to do so in the

near future. In the two themes which follow, participants described their acquisition of

new (2) "Pedagogical Knowledge," and new (3) "Content Knowledge." In the fourth

theme participants described the ways in which this new knowledge had (4) "Personal

Implications" for them, and in the final section participants expressed a new or renewed

sense of environmental awareness and a specific, (5) "Desire to Pass it On."

Application Opportunities: Theme 1 - Materials and Activities

Data units which comprise this theme include references to materials and

activities received from the PD that participants had already used, had a plan to use,

and/or had shared with other colleagues outside of the PD community. One of these

pieces of equipment was a small digital video recording device for use in their

classrooms. By the end of the first week, Jaime was already downloading her videos and

preparing them to use in her classroom (Jaime, J20). During the Spring interview she

talked about how she had changed as a teacher and how she used new materials,

> "I am able to bring back more… When I find something cool, I bring it back to
>
> my classroom. Like when we got [funding from the PD], I went out and bought
>
> those millipedes. So I brought something back and I could talk about habitats"
>
> (Jaime, SP10:313-318).

Jaime was a second year participant and had received other equipment the previous year.

On day two she wrote in her journal how she was "excited" to use the video camera and

was also planning to go back to her classroom that evening to pick up her data probe equipment from last year to use the next day (Jaime, J5).

Other participants also showed things in their classrooms that they and their students were using. In the following excerpt from the final minutes of the Spring interview, Clara was asked to tell what she would share with others about her experience (Clara, SP10:305-325). She used this question as a springboard to show materials she had used and currently uses in her classroom.

> CLARA: I told the woman that is taking my spot [that] it was incredible content with a very supportive group. It would be long term… and [there would be] lots of goodies - I did use that selling point. At the same time those goodies have been well used in my classroom. All of the things have been well used. Those butterflies are from the [PD] actually. And we did a conversion to biomass and watched little bitty caterpillars, so sorry I got off track.
>
> RES: no actually you didn't. They are "goodies" but we hope that it shows that we respect you and we want you to have something to look forward to. What's a goody?
>
> CLARA: That whole terrarium. (stands up and walks across room)
>
> RES: Is that a red ear slider? (follows)
>
> CLARA: I had a student bring two in that had been stored in a tank smaller than that tube for four years…
>
> RES: Are you trying to rehabilitate them?
>
> CLARA: I'm not sure they will grow. I have a bigger tank that I will get them into.

RES: But the tank came from the [PD] last year?

CLARA: Yeah. A woodland terrarium. It came with ferns, fish, moss, lichens. I even housed random insects that started growing!

RES: Do the students still enjoy it?

CLARA: Yep every day.

Clara was afraid she had gotten "off track" because she was excitedly showing materials used in her classroom. Louise also wanted to show what she had been doing with her students, after overcoming a few technical challenges. She reported success with adapting the "fish activity" in her classroom (Louise, SP10:90-94). She reported that, "there was not a color printer on the campus so I had to go to [a copy store] and print them all off and then take them to get them laminated" (Louise, SP10:349-351). Louise, like others, went out of her way in order to implement what she had received from the PD.

Still other participants reported plans to use materials and/or activities from the PD. Tiana planned to use the "fish activity" with her high school Biology class (Tiana, F09:19-20). Clara planned to use the probe equipment and said, "I think I've got a plan established in my head" (Clara, F09:226-227). Jaime wrote in her journal that she had collected several natural items at field sites that she will take back to her Kindergarten students (Jaime, J39). Two participants planned to use digital resources such as the PowerPoint presentation from the lecture on mercury (Louise, F09:465-470), and Clara said that she thought her students might really benefit from a video of a "real live lab" (Clara, J16). Finally, Jaime had already shared some of her equipment with other teachers at her school, and was excited to share more because, "these teachers don't have

[equipment] so I would share it with them. I was able to use it not only in my classroom, but with other people too… I learned and brought other people in" (Jaime, SP10:319-325). And she described other plans as well. In the following interview excerpt she described her success using materials from the previous year's PD and then explained that she intended to do the same kinds of things this year.

> "I had a butterfly net that I got last year. And there's this one boy in my classroom and he just sat there and he would draw and he'd talk to people and wouldn't do his work. But when I gave him that net he went outside and caught insects. And he was running and he was like, 'look what I have!' You could see the excitement on his face. So they go out they play, have fun, and they are learning. That's the best part. I took them out last year and did an alphabet. Like G, grass, T trash, whatever we found. We found a nail. If we couldn't take it back with us, we had a camera and I took a picture of it and stuck it on the wall. I'm going to do it again… I took [knowledge and materials] from last year's TQ and I used it and this year I'm going to do the same thing. So my kids not only will know about insects, but they will get to learn about water because I was educated about water. It's not something that's in the book that's dull and dry [or] terms they don't understand. So I can do it my way" (Jaime, F09:421-436).

Application Opportunities: Theme 2 - Pedagogical Knowledge

Units of meaning which indicated the acquisition of new pedagogical knowledge included concepts relating to inquiry learning and experiencing this style of learning as a "first-time learner" (Jaime, J6; Tiana, J3), various specific teaching strategies (Jaime, J59,60), and examples of participants who were able to move beyond what they were

given and design their own new lessons because the PD had helped them to "approach [teaching] differently" (Louise, SP10:187).

Inquiry learning was one of the foci of the PD. Participants referred to their experiences as a "first-time learner" in a classroom inquiry setting, saying they thought it was helpful to understand how their students might feel in those situations (Jaime, J6; Joshua J6; Tiana, J3). Participants were supportive of the need to include this style of learning/teaching in their classrooms – particularly to show students how science progresses. Louise mused that she could show them, "…how you can gather data and it is not always useful" (Louise, F09:378) and Joshua wrote about his strong support of inquiry in the classroom, saying "science is a discipline based on and grown in inquiry, so this mind set is non-negotiable" (Joshua, J47). And Clara wrote about how inquiry is directly related to some of the larger goals she had for her students and why she intended to continue to use it in her classroom. She wrote, "leading students to a place where they can participate in the process of inquiry allows them to feel confident… not only in science but in life. Problem solving teaches our kids to think for themselves and not follow blindly" (Clara, J31).

Participants also referred to a variety of teaching strategies they learned throughout the PD. Louise wrote to the providers in her journal saying, "I am getting lots of use out of the organizational and classroom management ideas – please keep sharing!" (Louise, J50). Three participants had already begun using one of the academic language acquisition strategies called a "word wall" (Jaime, J60; Joshua, F09:97; Louise, F09:157-160). Jaime kept an ongoing list in her journal of all of the teaching strategies she had been learning that she wanted to try (Jaime, J59). Three participants took these teaching

strategies and their new pedagogical content to a higher level by generating new ideas for lessons and how best to teach certain content (Jaime, J72; Clara, J5, J24; Louise, J5,13,23,42, and 50).

Application Opportunities: Theme 3 - Content Knowledge

The data suggested that participants acquired or, at minimum, were exposed to new content knowledge focused on environmental systems. Meaning units within this theme refer to content knowledge which could be useful to them as teachers and content knowledge which affected them personally. These units of meaning included references to content which they had either already applied or believed they would have the opportunity to apply in their individual classrooms.

Some participants made general references to the content and how they might use it in the future. Joshua said that he was grateful for the addition of the content knowledge as a "really nice foundation for the curriculum we go back to" (Joshua, SP10:261-263) and that in the beginning he was excited about the topic of water (Joshua, F09:768). After a presentation about mercury in the environment, Joshua said that the new content, "gave him a funny desire to go sign up for intro bio classes" (Joshua, J46). Clara also commented that the topic of water was "really helpful" and that she would "get to bring in that content" (Clara, SP10:46). After an emotional trip to the local dam around which Joshua grew up, he wrote in his journal about the sensation he had as a result of the new knowledge about our local waterways. He wrote, "then following outward from the dam to the river locations gave me a sensation as though I were 'riding' through the dynamic waterways of [the city]" (Joshua, J39).

Other references included those to specific content such as "the water cycle" (Jaime, F09:58), "background content information" related to using the data probes (Clara, F09:219), the use of dichotomous keys (Tiana, SP10:462-463), the recognition of new plant species (Joshua, J36), scientific modeling (Tiana, J12), and even new vocabulary words for Louise, our geologist, who remarked, "some of the words I had never heard before like lentic and lotic. I was like, 'I have a master's in geology and I've never heard these before!'" (Louise, F09:271-273). Jaime had never been exposed to information regarding the processing of bottled water. She said, "when I heard what's in the bottles, it doesn't go through any kind of procedure... At least I know that the water that comes to my house had chemicals that [made it] as clean as it can get" (Jaime, F09:400-404).

Jaime seemed particularly affected by the new knowledge she was gaining. In a journal exchange between Jaime and one of the providers, she responded to the provider's comment on her detailed note-taking during the presentations. She said that part of the reason she took so many notes was that she wanted to "…remember what I did the past 2,3 days [that I want to] share with my students! I really like to go back and see what info I caught… that's the interesting part!" (Jaime, J30). In fact, there were multiple references to the knowledge that Jaime had already brought back to her students or intended to "modify and teach the little ones" (Jaime, J73). In the following excerpt from the Spring interview, Jaime shared a story about a career day speaker from the water department and how proud she was that she possessed related content knowledge to add to her student's experience. In response to a question about how her experience in the PD was different from the secondary teachers' experience she commented that she

probably cannot use a lot of things. Sitting on one of her "babies" chairs, she quickly sat

upright and said:

> JAIME: We did do a water study so I used some of the stuff I learned. I
>
> understood what I was teaching and it made it easier to teach to them…We had a
>
> lady come in for career day from the water department and I was like – 'I know
>
> about this!' She was talking way over their heads… she was using all these big
>
> words and my kids were like huh?   [When she left] I had to sit there and [say to
>
> the kids] 'oh do you remember [when we talked about the water]'… We went
>
> over… a little water study and [they] had seen a flip chart so we could relate to it.
>
> That was cool. I got to use my knowl– (she stops abruptly and opens her eyes
>
> wide) ooooh, you know well, because we talked [about] the processing - the poop
>
> plant! I could use some of my knowledge, I was like oh that's neat!
>
> RES: I can see some pride in your face. As soon as you said when the water
>
> person came in and you were raising your hand like, 'I know, I know.'
>
> JAIME: I was like one of the kids, man. And then I was like, 'I've got a
>
> question!' Not that I wanted to correct her, but I was like, 'but but but…'
>
> RES: It obviously had an emotional reaction for you that you knew that.
>
> JAIME: I was right, I knew it.
>
> RES: And why was that important to you?
>
> JAIME: It's good to know things. It's good to validate someone. I knew that -
>
> you know. [My kids could say] 'My teacher wasn't wrong, my teacher taught
>
> me!' Because I knew it!... It makes you feel good to know it.
>
> (Jaime, SP10:174-199).

In a journal entry in the Fall, Jaime responded to a question about what was going to happen to the water supply over the next century by describing how she previously thought about water, and then shared her new understanding regarding water issues.

"Well, I thought about water as it comes out of the sink. You turn it on, it's there. I've heard that it is renewable. And I mean I haven't really thought about the future. You know. When we went to some of the various field trips they were talking about water isn't going to be around forever if we don't do something about it. I kind of thought about it. What do I do at home? What can I do? I'm like any Joe Schmo, I go to [the local mega mart and buy] the big 24 pack and I drink it throughout the whole week. You need water for your body and it easy to pick up the plastic bottle. I didn't even think about the bottles needing water to be manufactured. I was like whatever. It's just, water's water. I go over there and turn on the sink, go to the bath tub and it's on. I've never had problems with water except when my toilet continued to run. I thought about that too, I thought oh my gosh, what about all that water I wasted! And my Mom's like, 'Jaime…' and I was like you know what mom, yeah there's an ocean, but we'd have to find a way to get the salt out. It makes me think now with these little kids and they just flush and flush. I'm thinking what about those kids who don't have water. What about the people in 30 years or if I live another 50 years. What's going to happen? Will there be water for me?" (Jaime, F09379-395).

In addition to her new content knowledge regarding water availability issues, Jaime became known by her fellow teachers as somewhat of a local outdoor expert within their department, sharing her live animals and taking care of the school's education garden

because many of the other teachers "didn't have time or know what to do" (Jaime, F09:445-446).

Application Opportunities: Theme 4 - Personal Implications

The data from interviews and journals involving Jaime were particularly intense within this theme. She seemed to refer to many changes she had implemented during the PD. Joshua also referred to personal implications in his own life. After a discussion of local water issues conducted by a representative from the regulatory agency, Joshua wrote a "bottom line" in his own words, "our population depends on this process for so many reasons, and as is true with most things, we take for granted the convenience of our civic infrastructure" (Joshua, J7). In their journals, Joshua and Tiana both told personal stories of growing up around lakes and never understanding how they operated and how important they were (Joshua, J34, Tiana, J21). At the close of her journal entry, Tiana wrote, "I feel bad that I don't normally think about how what we do and build impacts nature" (Tiana, J21). Participants also expressed concern for water supply issues (Jaime, J7,J8,J9; Tiana, J4). Jaime wrote,

> "What's going to happen in the future with our water supply [in the next] 20
> years? 30 years? 50 years? 100 years? Where are we going to get water when we
> run out… Every solution to the… problem sounds expensive and timely. What
> can I do – grey water idea sounds interesting but how do you implement?" (Jaime,
> J8,J9).

Compared to Jaime's usual light-hearted journaling style, this entry was particularly serious. Tiana also reflected on water issues in writing, "I didn't realize how much it takes to get clean water to our residential areas [also] I don't normally purchase bottled

water but I now know it might not be worth it" (Tiana, J4). In this entry Tiana

demonstrated that she was thinking about multiple water issues and how humans could

have an impact on them.

Jaime's data referred to several changes which she believed had occurred as a

result of her new environmental awareness. In addition to the references above, Jaime

shared that she had recently purchased refillable water bottles to replace her old habit of

buying the disposable plastic bottles (Jaime, F09397-399). After she described her

reasons for doing this, she was asked whether she had known any of this before attending

the PD. She answered,

> "No, I had never really thought about it… water's readily available. You go to a
>
> restaurant and they smack down water in front of you. Sometimes you don't even
>
> drink it. I think about the times that I didn't drink that water. Does it go right
>
> down the drain? I really didn't think…" (Jaime, F09:406-410).

Jaime acted on her new content knowledge by purchasing a refillable bottle for her water,

having realized it took even more water to produce the plastic bottles (Jaime, F09:386-

387). As the interview continued she shared more about what she had done with her

students, what she wanted for them in the future in regard to environmental awareness,

and another situation with a water questionnaire in her water bill where she was delighted

with her new content knowledge (Jaime, F09:414-456). She wrote,

> "You know what's funny. I got a water questionnaire with my water bill. And
>
> some of the questions were like, 'do you wash your car on the grass, in your lawn,
>
> or on the pavement?' I was like – 'I wash it on the pavement. I was like ooohh…
>
> I know why you aren't supposed to wash it on the pavement!' It makes you think

about it. I sat there and had to be honest. I was like it's easier and I don't want to

park my car in my lawn…" (Jaime, F09:450-455).

Jaime demonstrated that she was able to identify the scientific reasons behind the

questions the water department was asking. In response to a question about her feeling

empowered by this knowledge she responded,

"I thought back on the mistakes I had made in the past. I was like oh! Something

clicked… I look at the water now. And sometimes I might use more than I need

to, but I'm trying to you know. I don't wash my clothes as much. I wait a little

longer. You know, like I do wash my clothes and still take showers, but I'm a

little bit more mindful" (Jaime, F09:458-462).

Application Opportunities: Theme 5 - Desire to Pass it On

Each participant involved in this study expressed a new or renewed desire to pass

on this environmental awareness to others, particularly their students. This

environmental awareness referred to water and wastewater issues and "the complexity of

life" in environmental systems. For example, Jaime felt her eyes had been opened by the

PD and that she could also do that for her kindergarten students (Jaime, F09:413-414).

She spoke about what she wanted to pass on to her students:

"The water that we are wasting can be used for other things. There's not going to

be water around forever. We have to find a way. If I can plant the seed now,

maybe there will be kids that are conscious of that and that will influence them.

So if I can get one person each year, that one person, you know, he can be the

next person that finds a way to - I don't know, renew water, I don't know. You

never know" (Jaime, F09414-420).

In a journal entry, she took these ideas one step further and considered the specific

content that would be important for her students. She wrote a reflection in her journal in

which she thought about these goals and how she might best accomplish them.

> "I think it would be important for the children to get a basic understanding of the
>
> waste removal cycle – maybe pictures of where water starts and continues until it
>
> is totally used up?   I would want to instill ways to prevent water wastefulness like
>
> turning off water when not using it, or taking long showers, multiple flushing
>
> (kinder babies do that), playing in water in sink, (kinder babies do that as well).
>
> Maybe some cause and effect to show them what could potentially happen in the
>
> future with "THEIR" water source – make it important to them!" (Jaime, J35).

Tiana (J15) echoed a similar desire for her students to "know how valuable water is," and

to understand how difficult it is to clean, and therefore to, "think about how not to waste

water." Louise agreed that knowledge of "the interconnectedness of water" is something

she would like to pass on to her students as she helped them "understand how much their

lives demand water" (Louise, J29). Clara also desired to bring in content for her students

which would show them, "how they were interacting with their environment and how it

was interacting with them" (Clara, SP10:164-169).

Finally, no participant wrote more prolifically about his own connection to the

environment and his desire to pass on the importance of this connection than Joshua.

What follows are two excerpts from his journal in which he wrote about his own personal

connections which surfaced as a direct result of experiences at outdoor field sites and a

second entry where he wrote about his 6th grade students.

"My most prominent thought concerns the feeling of the outside world, and working in it as opposed to the classroom. I see in each day of my life, three younger brothers of mine that have their time and minds fully immersed within either [video games] or a computer. The only break from these machines is made for either food or restroom breaks, or the need to use their cell phone. When I struck the bottom of my foot against the stones in the stream today as I crossed and looked at the trees over me and the baby frogs jumping, it reminded me of a childhood of daily exploration that was very much my past, but not the life they (my brothers) have experienced even remotely. Is it so difficult for me to comprehend the selfish and 'me-first' tendencies of their generation, when a void exists between them and their world they share. Mind-blowing appreciation for our planet's beauty overwhelmed me on my trip to the NE the past several days, but the reality is that we have wondrous pieces of testament to nature's majesty right under our noses. My brain so desperately wanted to explore the creek, and despite the past and childhood that today's students may or may not share with me, I know they have a great capacity to love and enjoy our outdoors, and an immeasurable need to be taught how delicate it is and [how] important it is to each of us" (Joshua, J17).

Joshua wrote the previous entry early during the summer portion of the PD. Toward the end of the summer portion of the PD, he wrote the following journal entry in which he considered the specific abilities of his 6th graders to connect to their environment. He wrote,

"I teach 6th graders, and they are in no way 'below' the ability to perceive the complexity of life and the systems that sustain it. Waiting until late high school, college, or never, to engage their awareness to such matters is a risk our society has taken and failed upon, resulting in a generation of adults that now know and/or care very little about certain truths... The variety our planet expresses in how humans deal with their environment and meet its challenges is astonishing. We discussed today in class about how islanders, Germans, etc. are so different in their resource management. Looking closely at ourselves, then at others, is crucial to finding an improved course. I do not want my students to 'take my word' or have textbooks brief them on tidbits of reality. My entire reason for taking this [teaching] job is to prepare beautiful potential-filled minds with the knowledge and desire to be responsible citizens that will find solutions, not join the collective society of 'laissez-faire' living. The way to do that is through vision, and the kiddos deserve to see what's going on" (Joshua, J32).

What is most prominent regarding these data is that the participants were considering their students in particular. They were considering how these issues related to their daily lives, and how best to approach the content with their population.

Category 7: Affective Domain

Participants provided descriptions of experiences which were most appropriately considered to be part of the category, "Affective Domain." Data in this category referred to expressions of both positive and negative emotions related to activities in the PD. The meaning units that comprise this category are organized within the following themes: (1)

"Honored by the PD," (2) "Treated Well by Providers," (3) "Comfort in Various

Situations." (4) "Fears of Others' Perception," and (5) "Observing Negative Behavior."

Affective Domain: Theme 1 - Honored by the PD

This theme is unique in that it emerged from a single participant, Joshua. There is

a single meaning unit from another participant which seems to fit in this theme although

her reference is much more implicit than Joshua's. Tiana spoke in general terms about

her understanding of, and appreciation for, the difficulty in planning for and actually

presenting PD (Tiana, Sp10:366-369). On the other hand, for Joshua, feeling "flattered"

by the PD was a recurrent theme (Joshua, F09:177). In the following excerpt from the

final Spring interview Joshua shared his thoughts about how fortunate he was to be in the

teaching profession and then explained his amazement that PD programs such as this

existed (Joshua, SP10:96-111). Then he continued, eyes wide,

> JOSHUA: Look at the stuff you guys do here at [the university]. I've got all this
>
> equipment that comes to me. These awesome retreats and all this stuff. I get paid
>
> to go to it! My goodness!
>
> RES: I can't help but notice that when you said, 'I get paid to go to it' your eyes
>
> got wide.
>
> JOSHUA: Yeah.
>
> RES: So talk to me about how it makes you feel. That's really what I want to
>
> know. Tell me about how it makes you feel – I mean the way you have been
>
> treated from [the university at which the PD is being held].
>
> JOSHUA: Well, there's a… feeling that I know that I felt when the year started
>
> that I still feel…The feeling that has persisted through the year, that I probably

have shared with you in the past, is that I still am amazed that these kinds of

enrichments and [professional] development programs that you guys offer exist.

I listen to [public radio] everyday and I hear about a struggling world where

people aren't making it. And then I see… these…mind bogglingly thought out

programs that you guys work so hard on - and [our provider is working so hard]

and everybody just [puts in so] many hours. They put [so much] into the

preparation and [then the] money behind all of that. I'm always kind of blown

away by all that. And that feeling has never gone away.

(Joshua, SP10:116-135).

During the Spring interview, Joshua also shared that he felt fortunate to have been

accepted into the PD but was worried about "…those other first-year teachers that don't

have you guys" (Joshua, SP10:159-162). He was flattered by the time and effort the

providers put in and the fact that, "you guys stayed after [to read our journals] even when

they were pretty long days" (Joshua, F09:183-184). He elaborated on why he felt

flattered, again referring to the time invested, "I knew people had to…spend a lot of time

making deliberate plans for my educations programs, I felt very flattered" Joshua,

F09:175-177).

Affective Domain: Theme 2 - Treated Well by Provider

Participants expressed appreciation for how they were treated by the providers

throughout the PD. A realization for Louise was that she was able to say, "I know I'm

being listened to." (Louise, SP10:408). She said it was different from other PD she had

attended because, "here, I think that the presenters have listened to us" (Louise,

SP10:73). Clara found it remarkable that she was treated as if she were someone with

knowledge. In the following excerpt from the final interview she described why this was important.

> RES: I know you have said before that we did [help you] feel like a professional. Can you tell me why?

> CLARA: I think because we were treated like we knew something. A lot of times you hear, 'oh… teachers aren't going to do that… or they can't do that. They can't teach inquiry - they won't get it. At [this university PD] we have been treated like we can do this, it might be hard, but here are the challenges and how we should overcome them. (Clara, SP10:270-276)

And Jaime, despite the fact that she had previously mentioned needing help with the content from her peers (see "Sharing Knowledge with Peers"), was still pleased because, "I don't feel like they are 'dumbing' it down" (Jaime, SP10:201). And Joshua echoed the feeling of being treated as if he had great value to the providers of the PD (Joshua, J48; SP10:96-135).

Affective Domain: Theme 3 - Comfort in Various Situations

With the exception of Louise, each of the participants specifically mentioned feelings of comfort regarding the PD. Joshua mentioned an increased level of comfort with the other teachers from his middle school (Joshua, J34). During the Fall interview he said,

> JOSHUA: I didn't know Clara at all until [this PD].

> RES: So that was nice to get to know her.

> JOSHUA: It was. And [my other two co-workers] and I worked a bunch together at your program. I wrote a little in my journal about that. I was really happy to

have been able to get closer with them before school started. I feel much more

comfortable being able to go to them for help (Joshua, F09112-117).

Joshua, who often wrote the longest entries in his reflective journal, explained what

might have been one of the reasons for his feelings of comfort. He said, "the thing that

was really crucial to my comfort… [especially because I was a first year teacher, was

that] I was more comfortable being able to depend on my journal notebook than I was

speaking out" (Joshua, F09:826-832) and when he was frustrated he remembered,

"retreating to my journal" (Joshua, F09:1160-1161). Despite these retreats, Joshua did

share that he was often comfortable talking with other first year teachers in the

experience, specifically Tiana. He said, "I remember feeling comfortable about talking to

her because she seemed really nervous about teaching her first year…I remember talking

to her… and I felt comfortable hearing someone that is in the same situation as me"

(Joshua, F091146-1153).

The participants also shared comments of general comfort with the PD or the

people involved in the PD (Clara, J1; Joshua, J12, J19; Jaime, SP10:437-438). Referring

to how she felt coming back and seeing familiar faces, Jaime said, "I was more

comfortable - it was like coming home" (Jaime, F09:561-562). Clara, who always

seemed socially active within the group, shared this about how it takes awhile for her to

get comfortable with people.

"I mean people that know me it is surprising because I will chat and everything

but… around people that I'm not comfortable with or haven't met it takes a lot of

energy to get that out of me… [but] those are my people. I felt that everybody

there was there for the same type of reason... I knew that there was a common

ground even if I didn't know everyone there. But like going to parties or out just

with people it's exhausting" (Clara, F09:115-122).

Tiana also referred to the other people in the PD, saying, "it was comfortable just because

I thought the people there were comfortable" (Tiana, F09:458-459).

Meaning units also emerged which seemed to indicate feelings of comfort

although the word "comfort" was not specifically used. For example, when asked about

her first impressions regarding the PD, Tiana said,

> "I thought it seemed very laid back. You walk in and you don't start feeling
>
> nervous. You walk in and don't start feeling like you don't belong and
>
> everybody's way advanced. I think I was the newest teacher, but I never really
>
> felt like I was too new to be in there" (Tiana, F09:197-200).

In reference to her first impressions of the instructors, she responded that they were,

"…not intimidating, not going to make you nervous. [It seemed like they] had a lot of

information and were willing to help" Tiana, F09:210-213). Tiana was relieved not to

feel nervous in much the same way that Jaime described just feeling "peaceful" at times

during the PD (Jaime, J43). Clara also described how she had had a really rough school

year and, "so it was nice to feel like I was where I needed to be…" (Clara, F09:332-336).

Affective Domain: Theme 4 - Fears of Other's Perception

Participants expressed concern over what others might think of their actions

during the PD or their contributions to the discussions during the PD. The data which

comprise this theme included references to concerns regarding the perceptions of both

their peers and the providers. Joshua was concerned with the provider's perceptions of

him on a day when he really struggled (Joshua, F09:510-511). He admitted there was a

time he could barely stay awake during a long PowerPoint at the wastewater treatment

plant. He shared,

> "[I was thinking] I'm not sure if I can fight it much longer. I remember…I kind of
>
> like jerked up… [and I thought] oh please say [the provider] didn't see me
>
> sleeping. I think [there was] a good half hour [where] I just thought I was being a
>
> bad kid" (Joshua, F09: 523-526).

Another example of a time that Joshua was concerned about what the providers would

think of him occurred early in the PD. One of the providers commented on his excellent

journal writing and Joshua admitted, "that freaked me out… [and] for the next half of the

day I felt a little extra noticed" (Joshua, F09:862-876). Then in his final journal entry of

the summer experience, Joshua apologized for being stressed during the PD and not

always being fully engaged. He wrote that there were times when, "I took refuge within

my mind from various stressors (stressors from outside class!), so I apologize for periods

of excessive quiet. I've loved everyone and am really grateful, so thanks" (Joshua, J48).

His entries indicated that he did not want his quiet to give the providers the wrong idea.

Other participants also indicated concern that the providers not misunderstand

their behavior. For example, Jaime wrote in her journal that she enjoyed taking notes and

listening, "…even though sometimes it does not appear that way – I have to doodle…"

(Jaime, J70). Tiana also expressed concern that the providers might misinterpret her

behaviors when she was really tired from working the night before (Tiana, F09:159-168),

when in fact, "It really has nothing to do with you [the provider]" (Tiana, F09:178). In

the following excerpt from the Fall interview, she expressed similar concerns regarding

her need to walk around the room sometimes.

RES: And did you feel comfortable, because I know at the beginning [the

providers] said if you need to get up and take a break, go for it. Did you fill truly

comfortable or did you still feel that little bit of guilt every time you wanted to get

up and walk around?

TIANA: The guilt thing is my own little deal. I don't think that they really got

mad or anything. It's just I always try not to. Even when we had our [district

convocation] and everybody is cheering and stuff… I still felt guilty getting up

and going to the restroom when [the superintendent] is talking. I mean you are

supposed to sit and listen. I just have that in me. But sometimes I just have to get

up anyway. (Tiana, F09:247-255).

During the Spring interview she again expressed concern over how the providers might

have viewed her behaviors when asked how she felt during the Saturday morning

sessions. She said, "I have a mind that wanders a lot. You can probably tell. Sometimes

when I'm sitting there my mind is wandering and then I have to get up and take a break

and then I feel bad" (Tiana, SP10:260-262). When asked about these guilt feelings and

why she thought she had them, Tiana said she felt bad because, "I don't want it to be like

the way I feel when students seem like they are not getting anything out of what I'm

doing. And so then I feel guilty. I don't want anyone thinking that about me" (Tiana,

SP10:264-266). Tiana then shared her thoughts about using her netbook during the PD.

She said that she was often using it to look up ideas for lessons to use during her first

year of teaching and, "that's probably where my, I don't know, my attitude came from for

the summer. I was so nervous about what I would be teaching and what lessons I had. In

my mind I was like, 'what kind of lessons are you going to give me?' You know, what

tips will you get me?" (Tiana, SP10:309-310). Later in the interview she commented:

> RES: So I noticed that you said that that was probably the reason for your attitude
>
> and that surprises me that you said that. So tell me more about that.
>
> TIANA: Well I guess I don't know if attitude would be a good word, but I mean
>
> more of like surfing the web, doing that kind of stuff you know. Because that's
>
> not the type of teacher you guys are looking at. It is supposed to be more of a
>
> quality thing. Not somebody using it as a time for looking for their lessons.
>
> (Tiana, SP10:327-334)

Jaime and Tiana also indicated concerns about how their peers perceived them.

This included not wanting to, "…sound dumb in front of them" (Jaime, F09:560-561),

and, said Tiana, "I tend to think people don't really think what I have to say is important

so sometimes I keep it a little bit down" (Tiana, F09:474-475). Tiana also said about her

peers, "I always think they are thinking - oh, she is doing it wrong" (Tiana, 373-374).

During the Fall interview Jaime recounted a time when she would normally have done

leaf rubbings in the field (Jaime, F09:138-147). She said that this year's group of all

secondary teachers was different and "you can sense it and you can see it. It's a totally

different vibe" (Jaime, F09:151-152). When asked if she thought this had something to

do with why she didn't feel comfortable doing the leaf rubbings she replied, "I don't

know. That's a really good question, because nobody else was doing it. Hmmm.. That's a

good point. Maybe if they were doing it I would have been like - it's ok to do it. I have

permission now [but] everybody else was drawing graphs and labeling" (Jaime, F09:155-

158).

Affective Domain: Theme 5 - Observing Negative Behavior

Participants reported observing behavior from their peers that they considered negative or out of place. Joshua suggested this was sometimes a concern of his.

"Right off the bat I learned something about myself as a student… I noticed that my productivity changed depending on my group… I do better with more self-motivated partners… [all of the] lolly-gagging and lack of assertion from my teammates made me feel a little unmotivated (Joshua, F09:249-259).

Later in the interview he said, "I'm [often] looking around at what people are feeling and talking to everybody" (Joshua, F09:658). He continued by saying,

"I want to know how everybody is doing. Be open about it. I'm very sensitive to it. If something is going on, it's just a habit. I just want to know what's going on - how everybody is feeling. I don't know how to explain it - it's just the way that I behave" (Joshua, F09: 948-951).

When asked about times in the PD when participants were unengaged (Joshua, F09:159) and whether he thought it affected him, he replied,

"It's tricky with adults. You have to be able to stay on task and move forward sometimes without getting too overly invested in the personal side of stuff… I can feel it on somebody's face if they are confused or not. I think being able to be in touch with the [feelings] somebody is experiencing is going to help you be able to figure out what they need… I feel like it is more fitting to my day if I connect with the people around me" (Joshua, F09:959-978).

The data from Joshua's interviews indicated that perceived negative behaviors from his peers were barriers to his full participation in the PD.

Other participants did not exhibit the same level of connection as Joshua, but did mention isolated incidents in which they were negatively affected. Although she said she was not distracted by them (Louise, F09:116), Louise echoed similar observations saying, "Some people really didn't seem to want to do anything when they were here and I was a little surprised about that because you were giving us tools to do something… and some people were just… completely tuned out" (Louise, F09:105-113). Finally, Jaime shared an experience in which she admitted she was sometimes distracted by "doodling back and forth" with a peer at her table.

CHAPTER 5: DISCUSSION

The fictional narrative in chapter one described a teacher preparing for a professional development that she expected would fit the norm of past experiences, and so she planned accordingly. The participants in this study also brought negative past experiences with them as they entered this professional development. Nevertheless, they were willing to enter into a new system and search for opportunities to develop. Each of them sought different solutions to different problems. Once they entered the system they experienced their environment in multiple ways: natural, physical, social, and emotional. Through these experiences the participants began to exhibit signs of developing a community. This is the essence of the experience for these five participants – the beginning stages of developing a community of practice (Wenger, 1998).

Lived Experience

Although the participants had in fact lived this experience, they might have been unaware that they were exhibiting characteristics typical in the nascent stages of building a community of practice (Wenger, 1998; Wenger, et al., 2002). The data suggested that the participants were able to identify outcomes they believed to be related to their experience of the professional development. Participants reported feelings associated with belonging to a community such as being comfortable, treated with respect, and being listened to by the providers. These teachers also experienced success in applying knowledge and using the materials associated with the community (Wenger, et al., 2002).

In general, the five participants entered the system with positive expectations, participated at least peripherally (Wenger, et al., 2002) in the community activities, and generally had their needs met. As the teachers entered the PD, they encountered two main

categories of experience. First, they encountered The PD team which consisted of two co-P.I.'s for the Teacher Quality Grant who were two of the core providers, and a third member of the core team who served as a content specialist. Initial impressions of the core providers as credible were a significant part of the initial experience.

Second, the teachers experienced various aspects of the professional development itself. One aspect was the group dynamic based on the individuals with whom they worked, as well as their perceived quality of those individuals. The teachers experienced long-term continuity by meeting for three contiguous weeks in the summer and then monthly throughout the school year.   This provided opportunities for ongoing support, particularly in classroom implementation. Together, they experienced a typically fast-paced professional development focused on water in environmental systems. In general, the teachers identified many positive characteristics that they believed were a departure from their past professional development experiences. They also identified negative characteristics of particular PD activities such as a perceived lack of goals, a pace that was too slow, or a presentation which did not flow. Concurrently with or subsequent to experiences, the teachers then engaged in activities. These activities included networking with other teachers, establishing personal relationships with some of their peers, sharing knowledge with one another, and establishing a line of communication between themselves and the providers in an interactive reflective journal.

When the teachers were able to fully participate in the Community of Practice without constraints, they experienced two major outcomes. These outcomes had to do with feelings or with the application of knowledge and materials. Teachers were able to utilize materials from the grant and even share them with other colleagues. In addition to

the physical materials, teachers reported success with implementation of new content and/or pedagogical strategies. The second of these outcomes had to do with the feelings they experienced as a result of the PD. The teachers experienced feelings of being honored by the efforts of the providers in both physical and emotional ways, feelings of comfort and belonging in the community, and feelings of personal value by being treated as professionals with valuable knowledge. These themes were intensely represented in the data from multiple participants, indicating their importance as part of the participant's lived experience.

In addition to these affective outcomes, teachers also demonstrated a capacity to apply their learning. The capacity to apply their learning was evident in their use of materials received from the grant as well as their self-reported acquisition of new content and pedagogy – both from the providers and their peers. This new content and pedagogy was evident as either general thoughts about what they might bring to their classroom in the future, a definite plan to bring a particular idea into their classroom, or the actual implementation of something they took away from the professional development and/or the community.

Although the data could be considered positively skewed, negative themes also emerged which revealed potential constraints on the process of building a CoP. These potential constraints either came directly from the providers, or through the content and/or process of the professional development.   A dissatisfaction with either may prevent the participants from participating fully in the actions of networking, building personal relationships, communicating with their providers, and sharing knowledge with their peers. This in turn may prevent the participants from building the community of

practice and enjoying the positive outcomes that result from participating fully in that community.

The constraints that directly dealt with the providers included participant fears of the provider's perception of their actions, and a perception of feeling trivialized by inquiry activities they perceived as too open-ended. Opportunities to derail the process included dissatisfaction with the flow of the PD, the lack of structure and/or clear goals of a particular activity, the environment, or the number of specific lessons/activities they were hoping to take back to their classrooms.

Once a constraint is encountered, this changes the journey for the participants. They may lose confidence, enthusiasm, and comfort in participating as an agent in the community of learners. When these changes occur, the entire community is impacted. During these times participants may be vulnerable to negative experiences with their peers. These may include fears of their peer's perception of them, and noticing what they perceive as negative behaviors among their peers.

Limitations

The absence of negative data regarding providers may be a result of the participants' knowledge of my connection to the providers. Although every attempt was made to separate me from the providers, the relationships came through and were surely evident to the participants. Future studies may benefit from teams of researchers working collaboratively to investigate a matrix of mutual shaping relationships.

In examining the limitations of this study, consider the following riddle: "If you lived in a world where everything was blue, what would you not know? You wouldn't know blue" – anon. It was not until near the end of the writing phase of my study that I

realized I had overlooked the most obvious assumption in this study. I assumed there would be emotional reactions on the part of the participants. Because of this, my interview questions were certainly directed toward emotional responses.

Implications for Professional Development

The value of this type of research may remain enigmatic to those who "listen in vain for the punch-line, the latest information, or the big news. As in poetry, it is inappropriate to ask for a conclusion or a summary" (Van Manen, 1990, p. 13). But for those who listen, they will find the invaluable treasure of the lived experience of the participants.

In preparing professional development for teachers there are inherent assumptions that one must make about the audience.   Further studies may help prevent providers from making incorrect assumptions by helping them set aside pre-judgments. Future studies focusing on mutual shaping relationships identified in this study may help future PD providers to look at the experiences they offer teachers and question how they are actually experienced.

In this particular study, the data lead us to question a phrase this researcher has used throughout the body of this work – professional development *provider*. Perhaps one of the most significant implications of this study may be a re-examination of that language. Does it set up a pre-determined hierarchy, constraining dispersion of authority? Does the center of activity change in relation to what is considered peripheral engagement? Or is it simply a misnomer which should be revised? Regardless of semantics it is clear that the roles of the providers in this PD could be better characterized as facilitators. The title is not important, the behaviors that lead to these titles are.

Administrators and professional developers can benefit from reading exploratory studies such as these and use their new understanding to create professional development experiences that value school teachers as emotional beings. In turn, I dare to hope that the teachers who have come to feel more valued by the PD may reconnect with the reasons they chose their profession and re-ignite their own passion for science teaching and learning. Perhaps the real winners will be students who find a love of learning because they have teachers that love it and are not discouraged from letting their passion be a significant part of their professional lives. Rather they are part of a community which supports their social and emotional growth as well as their true professional *development*.

Implications for Future Research

The data suggest that participants experience positive outcomes when they enter the system and have needs met. However, participants also experience situations in which constraints were placed on their movement through the system. In these situations their participation level within the community drops, as does their number of opportunities for positive outcomes such as application of new knowledge. Professional development providers cannot be certain that every participant enters the system and has a positive experience that leads to these outcomes. However, they can provide multiple opportunities for teachers to re-enter the system, thus potentially increasing the number of opportunities to have a positive experience through the system. Studies which examine the effects of multiple entries into the PD would offer additional insight.

There is an untold story within these data. In part, it is the story of how these teachers interacted with their natural environment. It is also a story of changes in ways of

thinking about the environment and by extension, environmental education. It is a story of small but significant changes. Future studies should include a more thorough probing of these areas during the participant interviews.

Finally, teachers are human beings with emotions. The effects of these emotions on teaching and learning are only beginning to be thoroughly investigated. Before we can more closely examine these relationships, we must understand what these emotional experiences are. A passage from *The Teacher in Modern Education* (circa 1935) reads, "Those who become leaders in teaching are found in schools that permit teachers to live human lives" (Overn, 1935, p. 353). Almost a century later, how much do we allow teachers to be human and how much do we really know about their humanness? Naturalistic inquiry offers a set of lenses through which researchers may examine this humanness and how it affects the experience of teachers in professional developments and classrooms.

Making Meaning: Jennifer's Re-entry

Like art that must be experienced before it is truly complete, this study is not complete until readers construct their own meaning from its pages. In an effort to encourage the reader to explore this meaning, I offer the following for consideration and possibly inspiration. Unlike the introductory narrative explaining Jennifer's fictitious preparations for a workshop, what follows is based on some of the most salient lived experiences of the five teachers who offered their personal meaning for exploration in this study.

When we last left Jennifer she was considering turning around her '98 Civic to go home and get her diet coke… and wondering whether her colleagues and friends would

be at the workshop to help her get through it. Jeanine would have chocolate and that would be great, but Karen was her partner in commiseration. Whenever they got to the part of the workshop where the providers started talking down to them and making it clear that they were doing a horrible job, at least they could give each other knowing glances. Without Karen she would have a very different day…

But when Jennifer arrived, she wasn't entirely surprised to see that Karen wasn't there. Karen has taught for 23 years and has a lifetime certificate so she needs few PD credit hours. She has seen programs come and go too many times to get excited when the next one comes down the pipe. She had planned to go just to hang out with Jennifer, then she heard it lasted for three weeks and then that you had to attend once a month on Saturday mornings…

Well as it turns out Jennifer did have a very different day. In fact, ultimately, she had a very different long-term experience. After the first day she went home and called Karen, trying to convince her to join the PD:

J: Karen where were you???

K: Sweetie, you know these are my last few weeks before school starts and I still have so much to do around here… Plus my daughter just recently changed her schedule and really needs me to help with my grandbaby…

J: OK but I'm just sayin'… this thing is cool! I am sitting here right now playing with my new netbook and downloading lessons I want to try out this year. They also gave us a small video camera, I took videos of a creek bed today to show my kids about water flow. I can show you how it works if you want… I'm about to try to upload them.

K: What do you mean they gave you a video camera?

J: It is part of this grant. They are giving us lots of materials we can use with our students.

K: Yeah well… I once sat through 8 hours of sales pitch for a condo in Cancun for a two night vacation too… I know how these things work. No thanks dear, the equipment would be nice to have for the students, but my time is more valuable than that.

J: I know, I really do… but I am telling you this really was kinda different. We didn't just sit there all day listening to one person Power Point us to death. We did lots of different things that broke up the day and there were different providers of the PD that guided us. They have a team of people, not just one. They have content specialists and then people who specialize in the pedagogy more. Some are university professors, but others also have taught in K-12 schools. They didn't talk down to us and it just felt really comfortable right away. Then they started telling us about all of the field trips we are going to take – I am so excited! I really wish you would consider coming with us…

K: Is this the PD that Marcella went to last year?

J: Yeah, she is the one who told me about it!

K: She was always talking about that PD now that I think back…

J: Karen, this really seems to be a welcoming group and I just got the sense that they cared about what I already knew and what I thought. We wrote in these journals about our expectations for the PD and how we were feeling about it so

far, and they are all staying afterwards to read them and write back to us in them.

I mean, I'd be tired and outta there when it was over!

K: Was anyone else there from our school?

J: Jeanine was there… she brought the chocolate but we had snacks! There was

never a time when there wasn't food there as a little pick-me-up, you know? I'm

going to gain ten pounds!

K: Do you think they would still let me join?

J: I'll talk to Grace first thing in the morning – she is one of the main providers of

the PD. She seems very knowledgeable and organized but I still feel comfortable

just going up and talking to her. You can tell she cares about what is going on

there, that she is really invested in it… Anyway, I can call your cell right

afterwards and you could probably just come on up!

K: I can't tell you I'm not still skeptical Jennifer, but what you describe does

sound like a different kind of opportunity. I'll try to be open-minded like you

(teasing her a little).

J: Oh I am so excited - that is great! OK you're gonna need a hat, sunscreen, and

bug spray for sure! Also your refillable water bottle (laughs) we are talking

about the environment you know!

K: Oh Jennifer what have you gotten me into now…?

J: You know what Karen, I don't know about you but I need all the support I can

get. I am tired of being around the teacher's lounge where everything is gloom

and doom and all about what the students can't do. These people, the other

participants, I can tell they want to be there for the same reasons I want to be

there. That really makes a difference to me. They are my people you know? I met a teacher from another school and she has no one there at all to help her… no one will even share their lessons with her or anything. So she and this other teacher swapped flash drives and now they both have more resources. But it is more than just the "lessons." Already I can see I am thinking about the way I teach… the way I approach teaching I mean. Not just what activity am I going to do. I was already writing down ideas about lessons I want to create myself. It was wild! I was sitting there listening to this new information but my brain was just going a hundred miles an hour. I kept writing these ideas in my journal about ways I could get certain ideas across to my students, what ideas were important for them to know, and how I could use some of the new equipment to help them learn. There were times when I got distracted, sure. It wasn't perfect, there were times I wanted it to either go faster or slower. I think I was also distracted not because of the presentation but because I really needed to get stuff for this new class I am teaching and so I was sometimes searching for lessons on the netbook and so I know I missed some content there. But then the next thing would happen and we would get up and do something else and I kind of got a re-start. It was cool. So anyway, I hope I haven't gotten you into anything you don't feel like you will get something out of. There are others like me who aren't there just for the free stuff or because they need a lot of credit hours. We are trying to make a change in education, and we need to work together to try to do that. (pauses)

K: (pauses) OK Jenn, call me or text me after you talk with Grace... It does sound like a group that has some goals and are willing to work together. Despite my attitude sometimes, I always used to say that teachers ought to behave and be treated more like other professionals. I'm not sure exactly when I stopped saying that... by the way, shouldn't you at least call her Dr. Grace?

J: Oh no, she was very clearly Grace right from the start. Different huh?

K: Maybe so...

APPENDIX A

Fall '09 Interview Guide: Louise

General:
Tell me about how you came to be involved in this professional development.

How did you feel about it the days before it began?

What were your first impressions on day one?

How do you feel about looking forward to the Saturday sessions?

Talk about the day your cat had kept you up. How did that change your experience?

Water:
Were you surprised by anything you learned about the state of our water situation?

Journal Entries:
"Frustrated about the pace of the class" – talk about that.

Activities:
Talk about the planning of the native aquarium activity – you said in your journal it was not very exciting, talk about that.

I noticed in your journal you did not take many notes during the mercury discussion compared to previous days, can you talk about that?

You mentioned the lectures had mostly been "refreshers" – how did that affect the way you experienced them?

You also said this "freed up your thoughts" talk about what you thought about.

Groups:
You mentioned you were happy when you got a new group and that you had felt "trapped" in your old group, talk about that.

Pictures:
I have some pictures I want to show you and I just want you to respond to them in some way.

Fall '09 Interview Guide: Joshua

General:
First, I just want you to take me in to this experience for you. Put yourself back in the classroom and on the field trips. I want to go to these places with you. Before we go to my specific questions, what would you like to say about the experience?

Tell me about how you came to be involved in this professional development originally. Have you done much other PD?

I get a sense that people are very important to you, talk about some of the interactions you had with the other participants and how that changed your experience – either positively or negatively.

At one point you asked for time to talk about the big picture. Did you feel you ever got that?

Activities: TCU CREEK
I noticed you went further up to explore the stream. Tell me about that.

WASTEWATER PLANT
Talk to me about the Power Point presentation experience at the Wastewater Treatment plant and compare it to the rest of the field trip.

LEEPER LAKE
Talk to me about the trip to North Texas when we joined L.B. and her teachers.

WACO WETLANDS
How about when we were back at TCU debriefing about Waco Wetlands and looking for organisms, did you feel left out?

BENBROOK DAM & TRINITY
Talk to me about the day we went to Benbrook dam and what that was like for you personally.

You told M.H. you felt "spoiled" by this experience. Talk about that.

AQUARIUM
The morning we did the activity with Mark where we planned to switch the aquarium –

Talk about the planning of the native aquarium activity itself – how was that experience?

LECTURES
Tell me about your personal response to learning about the state of our water.
Were you surprised by anything you learned about the state of our water situation?

Talk about the experience of trying to learn how to edit the video, your experience was a little different. Can you talk about how that felt?

You said in your journal that even if the information wasn't new, the presentation of realities was and gave you a new perspective. Can you elaborate on that?

Mercury lecture: Your journaling here seemed much more to do with the presenter than the content – talk about that experience.

<div align="center">JOURNALING</div>
This appeared to be a big part of the experience for you. How was it to journal in the classroom with time constraints and worrying about being "the last one"?

One of your journal entries really took you outside of the classroom. You talked about striking your foot against the stones and remembering your childhood and lamenting that your brothers did not have the same experience. You also compared this local environment to your recent trip to the NE. Let's talk more about this day and this experience for you.

In your journal you also talked about the creek experiment and how different the indoor planning was from being faced with the actual stream. Talk about those two experiences and the differences.

You mentioned having trouble sleeping until the very end of the two weeks. How do you think that affected – or was affected by - your experience in the PD?

You really went back and forth with you feelings about all of the water testing. Talk about some of those.

Groups/People:
Talk about the differences in your first group and the group we switched you to. You mentioned there were "no nerves interfering with your new seat". Looking back, how do you think the change affected you?

I noticed you checking in with people from time to time – even with me.   I remember you coming up to me more than once asking how I was doing. Talk about that part of the experience for you.

You seem very aware of the people in your surroundings. How do you think that might make your experience of a PD like this different?

You mentioned how nice it was to spend time with some of the teachers you will be teaching with here. Talk about that part of the experience.

Pictures: I have some pictures of you and I want you to respond to them in some way.

Fall '09 Interview Guide: Clara

General:
Tell me about how you came to be involved in this professional development?

Have you ever done journaling (personal & direct) like this in PD with responses from the instructors? What was that experience like?

Is your personal space important to you? How was your personal space during this PD?

How did having an 8 week old baby at home affect your PD experience?

(1) You have done PD of your own right? Tell me about that.

Water:
Were you shocked by anything you learned about the state of our water situation? Were you aware how much water is used for fracing?

Journal Entries:
You mentioned in your journal you were glad to be back... talk more about that.

On day one you said you felt comfortable here can you elaborate on the reasons why?

In regards to the first TCU stream activity you said in your journal that you needed a "why"… can you talk about how this experience was for you?

You mentioned you were a "huge introvert", but you did not appear this way to me. Can you talk more about that?

You mentioned that the ppt at the TRA plant "lacked" can you elaborate on that?

In your journal you said that you felt overwhelmed during the Benbrook Dam/Trinity River day… can you talk more about how you felt and why?

In your last entry you said you were getting "re-inspired"... can you tell me how?

Activities:
Talk about the planning of the native aquarium activity – you did not seem as engaged as I had seen you before? Is this accurate?

How did it feel to have to miss the trip to North Texas?

Talk about your personal response to the afternoon we spent talking about Mercury.

Pictures:
I have some pictures I want to show you and I just want you to respond to them.

Fall '09 Interview Guide: Jaime

General:

Tell me about how you came to be involved in this professional development originally.

You are a Kinder teacher in with secondary teachers… how did that feel?

More than once you said to me that you "live in a state of confusion"… were there times during the PD that you were confused? How did that feel?

You said in your journal that you got to see how students felt w/o instructions. Talk more about how that felt for you in particular.

Note taking: I notice you write the entire time during most lectures. Can you tell me about that?
        Also, do you think it makes it hard to listen when you are copying a lot from the power point?

The prompts for journaling were a little different this year, we asked you to tell us your feelings. What did you think of this difference?

How did you like the music we played during journaling sometimes?

On day 1 you said you were "relieved about the field trip situation – how we were going to get there"… tell me about that.

Activities:

TCU CREEK

When we went to the TCU creek your group went the farthest up the stream and was also the last to leave… can you talk about that?

WASTEWATER PLANT

At the wastewater plant you said the tour was jumpy… tell me more about that.

LEEPER LAKE

When we were at the little spring near Leeper lake you said it was hard in a big group and mentioned poison ivy… tell me about that experience.

At Leeper lake you said you felt peaceful and often got left behind. Tell me more…

BENBROOK DAM & TRINITY

At Benbrook Dam, you said you got upset because you couldn't hear right? Tell me more

AQUARIUM

The morning we did the activity with Mark where we planned to switch the aquarium – you did not appear your usual chipper self. Do you remember anything about that?

Talk about the planning of the native aquarium activity itself – how was that experience?

LECTURES

Were you surprised by anything you learned about the state of our water situation?

In your journal you said "what's going to happen in 20, yrs, 30, 50??" Tell me how that makes you feel.

On wed of the second week Molly H did a lecture about groundwater. You seemed different that day and were not taking as many notes and were looking at your organisms. Can you talk about that?
        I noticed a similar thing when we did the fish key activity. What do you
        remember about that?

The next day was Thurs and we had the Mercury lecture. You appeared the least excited I have seen you… can you talk about that experience?

ORDERING

Ordering: talk about your discussion with Ali.

Groups:
Talk about the differences in your first group and the group we switched you to. Looking back, how do you think the change affected you?

I want you to tell me about Mike. Towards the end you guys had clearly become friends. I noticed you doodling back and forth. How did that change your experience the last few days in class?

Pictures: I have some pictures of you and I want you to respond to them in some way.

Fall '09 Interview Guide: Tiana

General:

Tell me about how you came to be involved in this professional development. Was it basically required for you?

Describe how you felt about the PD in the days leading up to it?

What were your first impressions on day one? Think back and try to describe your experience those first few minutes and hours.

How do you feel about looking forward to the Saturday sessions?

I know you were working most evening after the workshop during the day, how do you think that might have changed your experience during the day?

I remember one day you made the comment that it is really hard for you to sit still a long time and that you get uncomfortable. Can you talk about how that affected your experience during the two weeks?

You seemed to really enjoy having access to the netbooks in class. How would your experience have been different if you had not had one?

- The instructors rarely asked you guys to close your netbooks even during lectures. Why do you think they made this choice?
- Could you make this choice with your students?
- Being totally honest, was the netbook a distraction for you?
- Imagine if they had made you close them all the time, can you try to imagine how that would have felt?

Water:

What did you learn that surprised you the most about our current water situation and our future water supplies?

Journal Entries:

You said in your journal that you are from Minnesota and so learning about local water here must have been very different for you. Talk about what that was like for you.

You gave the Waco a 4/5 and said you liked it the best. What did you like about this trip and why do you think you liked those things?

You said in your journal it was hard for you when you got tired and when it was hot. Think about the time you were the most uncomfortable and describe how you felt.

Activities:

Talk to me about the day you stepped in the ant bed and then heard Molly W. said she saw a black widow. Describe what that whole experience was like for you.

Compare your experience of the indoor vs. the outdoor activities.

Talk about the planning of the native aquarium activity, what was that like for you?

How did you like the disease activity when we had to go around the room and find pairs? Talk about the experience standing by the operations building at the Benbrook dam.

What can you say about the day we had the instructors come and talk about video editing. Was that more or less interesting to you than other days?

The day we had the lecture about Mercury involved a lot of content. What can you say about how you experienced that particular lecture about Mercury?

Groups:

On the third day you guys came in to assigned seats, talk about what that experience was like for you.

You were in a group with Emily and Ali for the majority of the two weeks. Talk about your group and the group dynamics.

On the last day we allowed everyone to seat themselves wherever they wished. Most people seemed to go to the same spot out of force of habit. Did you? Why or why not?

Pictures:

I have some pictures I want to show you and I just want you to respond to them in some

way.

Spring '10 Interview Guide: All

(Academic year follow up interviews)

General Questions (may be used for all participants)

Action research

What did you decide to look at in your own classroom for the action research?

Had you ever conducted any research on your own classroom? Informally?

How has this PD been different from others you have attended?

Would you invite friends and colleagues to join this PD?

What would you tell them?

Talk about the difference in attending the summer portion and the academic year portion of the PD?

Participant specific questions

Louise
> You came into this PD with a great deal of content knowledge compared to other participants, how do you think this changed your experience?

Jaime
> Would you say you came into this PD with more or less content knowledge than others? How did this change your experience?

Joshua
> This summer your enthusiasm was inspiring. Do you feel you remained this enthusiastic throughout the academic year?

Clara
> Talk to me about your decision to apply to the doctoral program in Sci Ed

Tiana
> In the summer PD you said you had trouble motivating yourself to be here, have the Saturday sessions been different?

APPENDIX B

Interview Transcript - Sample page

Interview Spring 10 -transcript   Clara   4

CLARA: I guess pre service teachers they were observing because every Thursday for at least 6 weeks coming in and sitting

RES: That was very kind of you to allow them in your classroom.

CLARA: There have been people in my classroom all year. It has been very interesting.

RES: Are you use to it?

CLARA: At this point yes. Now it's all lonely because nobody is coming.

RES: Are the students use to it?

CLARA: Yeah, they were fine with it. Nobody got really distracted by the people being in the classroom. To the point that I had a student teacher for 6 weeks and since they had been so used to other people interacting with them it was a more smooth transition than I was anticipating.

RES: So tell me something about the Saturdays this year. How were they different? Or how was your experience of them different from the summer? Or was it different?

CLARA: I looked for the Saturday's as more of a touching base and keeping everybody reminded of what we had talked about. So it was that nice continuity that you miss sometimes when you go to a lot of things

RES: So when Friday night would roll around and you knew the next day was Saturday how did you feel the night before?

CLARA: Fine, excited probably.

RES: Really?

CLARA: Yeah. They have never been something I have dreaded.

RES: I don't think a lot of people would say that.

CLARA: Really? Maybe I'm a nerd.

RES: No that's part of what I want to know. Is did you look forward to it? Do you know why you did and didn't? And is it different from other professional dev?

CLARA: Oh yes.

RES: How different?

CLARA: Ok that's not entirely true. Real school professional development I always look forward to as well. It's something I find relevant. This part of it. And I huge part of it. District professional development today that we have to have doesn't always feel relevant. I used to help

APPENDIX C

Examples of meaning units printed on cardstock

Interview Spring 10   Clara   22 of 54

133 RES: So tell me something about the Saturdays this year. How were they
134 different? Or how was your experience of them different from the summer? Or
135 was it different?

136 CLARA: I looked for the Saturday's as more of a touching base and keeping
137 everybody reminded of what we had talked about. So it was that nice continuity
138 that you miss sometimes when you go to a lot of things

139

Interview Spring 10   Clara   23 of 54

139 RES: So when Friday night would roll around and you knew the next day was
140 Saturday how did you feel the night before?

141 CLARA: Fine, excited probably.

142 RES: Really?

143 CLARA: Yeah. They have never been something I have dreaded.

144 RES: I don't think a lot of people would say that.

145 CLARA: Really? Maybe I'm a nerd.

146

Interview Spring 10   Clara   24 of 54

146 RES: No that's part of what I want to know. Is did you look forward to it? Do
147 you know why you did and didn't? And is it different from other professional
148 dev?

149 CLARA: Oh yes.

150

Interview Spring 10   Clara   25 of 54

150 RES: How different?

151 CLARA: Ok that's not entirely true. [name omitted] professional development I
152 always look forward to as well. It's something I find relevant. This part of it.
153 And I huge part of it. [Some] professional development today that we have to
154 have doesn't always feel relevant.

155

Interview Spring 10   Clara   22 of 54

133 RES: So tell me something about the Saturdays this year. How were they
134 different? Or how was your experience of them different from the summer? Or
135 was it different?

136 CLARA: I looked for the Saturday's as more of a touching base and keeping
137 everybody reminded of what we had talked about. So it was that nice continuity
138 that you miss sometimes when you go to a lot of things

139

APPENDIX D

Example of a page from a participant's reflective journal. All journal pages were printed

full size for coding, and later reduced to 4 x 6 cards for sorting.

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Educational background

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Professional Certifications

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Previous Teaching Experience

2007 *Adjunct faculty*. Texas Christian University, Fort Worth, TX
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2004-2006 *Teacher.* St. Andrew's Catholic School, Fort Worth, TX
2003-2004 *Principal.* Masonic Home and School, Fort Worth, TX
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Memberships in professional organizations

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ABSTRACT

THE LIVED EXPERIENCE OF IN-SERVICE SCIENCE TEACHERS BUILDING A

COMMUNITY OF PRACTICE DURING A LONG-TERM

PROFESSIONAL DEVELOPMENT

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This naturalistic inquiry explores the lived experience of five teachers through the first of a two-year professional development (PD) focused on environmental systems, outdoor education, pedagogical content knowledge, and building a community of practice. Qualitative data include participant interviews, participant journals, and researcher field notes. Thematic analysis of the data was conducted utilizing a variation of the constant comparative method (Glasser & Strauss, 1967) as modified by Lincoln & Guba (1985). Data are presented categorically and the relationships between themes are explored. Finally, the data are alternatively presented in the form of a creative dialogue, which summarizes the most salient aspects of the data. Implications for PD are discussed and include the suggestion that PD providers consider offering multiple opportunities for participants to re-enter the system, thus increasing the chances for positive outcomes associated with building a community of practice. These outcomes include networking, the application of newly acquired knowledge, and receiving continuous support from the professional community.