BRIDGING COMMUNITIES AND PRESERVICE SCIENCE TEACHER EDUCATION THROUGH COMMUNITY IMMERSION: A COLLABORATIVE ACTION ETHNOGRAPHY

by

VICENTE C. HANDA

(Under the Direction of Deborah Tippins and Norman Thomson)

ABSTRACT

This study was an attempt to answer the call for culturally relevant and community-centered pedagogies in the preparation of prospective science teachers through student and faculty immersion in a rural farming and fishing village in the Philippines. Using the methodology of collaborative action ethnography, ten prospective chemistry teachers and two science teacher educators formed a research team to examine the participants' experience of community immersion. Drawing from multiple data sources, findings of the study were presented as specific individual narratives of three case students and as schematic group narratives of participants' collective experience of community immersion. Analysis of narratives revealed the following: (a) a discrepancy between participants' notions and experiences of community; (b) an evolution of participants' belief set—from naïve to complex—about the purposes, values, and goals of community immersion through direct exposure and experience in the village; (c) six categories of knowledge and learning themes brought about by participants' experience of community immersion; (d) five roadblocks to successful implementation of social

justice service learning; (e) a trend from bifurcated to complimentary use of research data and traditional evaluation tools to assess students' learning through community immersion; and (f) a cyclical model of a transformative community-based science teacher education that emphasizes "giving back" through service learning as an antidote to "mining" from community funds of knowledge. The study generated two important theoretical contributions: (a) the Theory of Negotiated Meanings, which attempts to explain learning in a collaborative context through simultaneous and complimentary negotiations of personal, shared, and group meanings of a common experience; and (b) the Framework for Community-based Science Teacher Education, which is envisioned to guide science teacher education practitioners and policy makers in planning and implementing of community-based science and science education related endeavors.

INDEX WORDS: community immersion, community-based science education, community-based science teacher education, community funds of knowledge, community-based service learning, collaborative action ethnography, culturally relevant pedagogy, service learning, social justice, theory of negotiated meanings

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DEDICATION

To my beloved mother,

Consolacion Callao Handa,

Who planted the “seed,”

Watered and nurtured it,

And died without reaping

The fruits of her labor;

And to Novel,

Kent, Vince, and Kris,

My love and inspiration,

To whom I offer the fruits of my labor.

To you all, I lovingly dedicate

This humble piece of work.

ACKNOWLEDGMENTS

About three years and nine months ago, I left the Philippines to pursue a doctoral degree in the United States of America. With a sense of fulfillment, this chapter of my academic life is about to end. I will go home full of happiness and gratitude as I bring with me pleasant experiences and memories of people who, in one way or another, have helped me in my academic journey.

This journey has been made possible due to the help and inspiration of great men and women who offered their shoulders so that I can stand taller and higher. The rush of success comes like a fleeting vapor but the memories of human kindness I hope to keep in my heart forever—something that I can reflect and revisit even in the twilight of my life. I look forward to sitting on a rocking chair, where every thought of persons who touched my life will gladden my heart and bring a smile on my face.

I am forever grateful to my late mother, Consolacion Callao Handa. She was and has been a hero to me. Her life was more than enough to inspire me. She taught me to dream dreams and work for my dreams. Unschooled, orphaned at a young age, and widowed, she single handedly raised us, her six remaining unmarried children. For my part, she instilled—most especially after my father's death—the thirst and hunger for education as my only way out of the cycle of poverty. She loved and supported me in every possible way so that I could get a good education. She died without even knowing how far her sacrifices and investments will go. To *Nanay,* I offer to you this Ph. D.

degree—the first in our family. I wish you were alive today so that I could let you know and feel how much I love and thank you for all you did for me.

I am deeply indebted to my wife, Novel, for all her love, support, patience, and understanding. She decided to step to the sideline so that I could move forward and fulfill my dreams. I thank her for taking over my responsibility at home, particularly in raising our three children—Kent, Vince, and Kris. To *Ga,* I cannot imagine my life in the U.S. without the assurance of your love and devotion. I hope I can equal and if possible give more love and devotion to you than what you have given me. To Kent, Vince, and Kris, I owe you so much. You have inspired me for just being you. The mere thought of you has kept me pushing, even in my most difficult moments. I am sorry for missing my responsibilities at home. I hope I can make up for the lost time. If I can not, thank you so much for your understanding.

My coming to the United States was made possible through the help and support of various agencies. First of all, I would like to thank the Philippine-American Educational Foundation (PAEF), the U.S. Department of State Bureau of Educational and Cultural Affairs, and the Institute of International Education (IIE) for awarding me the Fulbright scholarship. In particular, I would like to thank Drs. Alexander Calata and Esmeralda Cunanan, former and current PAEF directors, respectively, for facilitating a fair screening process and for believing in my potential. Knowing my humble beginnings, I did not expect to be part of the "elite" group to study in the United States. I was nobody in the Philippines but Fulbright gave a "facelift" to my name. I am greatly honored and grateful.

I would like to thank the Department of Mathematics and Science Education at the University of Georgia for providing me graduate assistantships. In particular, thanks to Drs. Thomas Koballa, Jr. and Mary Atwater, former department chairs, and to Drs. Denise Mewborn and John Steve Oliver, current chair and co-chair, respectively, for the assistance and support I got from the Department. I also express my gratitude to the Graduate School of the University of Georgia for awarding me the Dissertation Fellowship. Through this fellowship, I was able to concentrate on my writing and finish my dissertation on time.

I would like to thank the whole West Visayas State University (WVSU) community. I am particularly grateful to Drs. Lourdes Aranador and Pablo Subong, former and current presidents, respectively, for approving my study leave. WVSU has been paying my salary since 2004. It is the university monies that supported my family while I was studying at the University of Georgia. Despite the lure of "gold and glory," I forced myself not to entertain the prospects of getting a job in the United States because I have some commitments to fulfill back home. I cannot just turn my back from the hands that fed me and my family. I am sincere in my desire to be of service to the WVSU community in particular and the country in general.

When I first set foot in Athens, Georgia, Dr. Malcolm Butler and family welcomed me in their home and made me feel at home. Dr. Norman Thomson and family likewise accommodated me in their home until I found a permanent housing. Dr. Deborah Tippins provided me with basic stuff I needed in my new apartment. When I transferred to the Family and Graduate Housing, Dr. Steve Oliver offered his truck to

transport my stuff. I was a stranger but you went beyond the call of duty by providing a welcoming atmosphere in my initial journey to UGA. Thank you very much.

I have been lucky to be placed in a collegial environment in the Department of Mathematics and Science Education. The first time I entered 210 Aderhold Hall, I was met with a welcome smile from Ratna, Soonhye, and Eulsun. As time passed, my circle of friends increased to include Youngjin, Tonjua, Mario, Kiyra, Larry, Regina, Stacy, Rachel, Pat, Aris, Evans, and Tina. I particularly thank Aris Reynold Cajigal for his editorial assistance on my dissertation. But most of all, I would like to give an important space to my best buddy in the department—Samuel O'Dell, Jr. My friendship with Sam is worth a treasure. Thank you very much for the many good deeds and favors—I lost count— you have done for me. Our individual, and even cross-cultural differences, did not hinder the flourishing of a good friendship that has been tempered by time. Sam, my good friend, your name is and will always be mentioned to my wife, children, relatives, friends, and colleagues in the Philippines every time I tell stories of my travel and escapades in the United States.

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I am glad to find a surrogate family in Athens, Georgia. The Wards "adopted" me and made me feel that I am part of their family. Thank you Mrs. Janice Ward for making me feel like one of your children. To Stan, Les, and Alan, you are like brothers to me. The Wards's home has been very comforting. I never felt I was different; you treated me like one of your own. Thanks for bringing me to church every Sunday and for making me part of your every family gathering. Thanks for introducing me to your circles of friend who eventually became my friends—Gene, Susie, Imogene, and Donna. It was fun playing scrabble and phase 10 cards with you guys. I feel relaxed in your presence.

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I would like to focus my acknowledgments to the most important persons in this dissertation—my research committee. I am deeply honored to have Drs. Martha Alexsaht-Snider; Malcolm Butler; Thomas Koballa, Jr.; and John Steve Oliver as members of my research committee. Your comments and suggestions have been insightful. You helped me think deeper and further in my research. Most of all, I would like to thank Drs. Deborah Tippins and Norman Thomson for their guidance and assistance in making this dissertation the best that it can possibly be. Under your direction and mentorship, I saw myself growing as a beginning scholar. I am lucky to have both of you as my major professors.

Most importantly, Dr. Deborah Tippins deserves a special place in this litany of thanks. Her impact on my growth as a neophyte scholar is tremendous. She placed a heavy burden on my shoulder and pushed me beyond my perceived limits. What I like about Dr. Tippins is that she never left me in all my difficulties and challenges. She walked with me in all the steps of the way so that I could achieve my goals, finish my dissertation, and reach my best potentials. She demanded so much from me but never failed in her obligation to give me the best possible support so that I can grow as a scholar. As I look back at my dissertation writing experience, I feel happy and fulfilled because I know it is the best opus that I can possibly give. Dr. Tippins must be credited for that. Thank you very much. I know you worked hard so that I could get the best Departmental support. I am biased in saying this but there is nobody in the Department who can equal Dr. Tippins's support in terms of travel assistance so that I could present papers in various research forums and conferences. For that, I am forever grateful.

Finally, I would like to express my profound gratitude to members of my research team—whose name I am not allowed to mention in this dissertation—for helping and participating in the entire process of my study. Thank you so much for giving yourself to this research. The richness of my data is a testament to your all-out cooperation and dedication. With your help, I was able to complete and finish this dissertation. I also acknowledge the secondary participants of the study whose community immersion experiences and stories truly enriched the findings of my research. *Madamu gid nga salamat kag mabuhay kamo tanan*!

Above all, I thank God for all these gifts that I receive in life. God has been kind to me in my journey and never left me in all of my trying moments. To God be the honor, glory, and praise! Amen.

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INTRODUCTION AND RATIONALE

Introduction

Pre-service science teacher preparation is faced with multiple and legitimate challenges in the 21st century. There is a call for a broadening of viewpoints in science teacher preparation due to the dominance of psychological perspectives and a dearth of sociocultural dimensions in pre-service science teacher education (Anderson & Mitchener, 1994). In addition, there is a growing sentiment among teacher education scholars on the need to make school learning relevant to the lives of students outside the classroom (Barton & Yang, 2000) in the context of collaborative, culturally centered, and supportive school-community relations (Ladson-Billings, 1995; Matthews, 2003).

Various scholars in teacher and science teacher education have recognized the need for curricular programs to connect with the public (Murray, 1996), to link academic and experience components (Northfield, 1998), and to bridge the gap between college-based and field-based experiences (Arends & Winitzky, 1996). Similarly, some teacher education scholars have called for a "culturally relevant" (Aikenhead & Jegede, 1999; Ladson-Billings, 1995) and "culturally responsive" (Gay, 2000) science teaching and learning—one that takes into consideration the creation of a practicing culture of science (Fusco, 2001), socially mediated knowledge (Lemke, 2002), and the inclusion of indigenous science or local knowledge in science classrooms (Ogawa, 1995; Snively & Corsiglia, 2000). By extension, Aikenhead and Jegede (1999), Bryan and Atwater (2002),

and Cross (1995), stress the need for culturally sensitive curricula, materials, and resources that are locally available. Similarly, Aikenhead (2001), Brand and Glasson (2004), and Solomon (2003) emphasize the importance of addressing issues and concerns that are socially relevant in order to facilitate students' successful "border crossings" into the culture of science. However, Nichols and Tippins (2005) point out that for the most part, socio-cultural studies in science classrooms and teacher preparation contexts have focused on creating goals and practices that are intended to reproduce canonical science knowledge and/or scientific practices. This study calls into question the epistemological assumptions that underpin notions of cultural border crossing. Instead, it considers what meaningful science teacher preparation might look like in relation to life worlds beyond traditional university-based or K-12 classroom settings. Science teacher preparation must address the need for pre-service science teachers to connect their school learning experiences to real life situations, particularly in communities that they will serve in the future.

In the United States, the National Science Teachers Association (2003, p. 20) has outlined standards for science teacher preparation that focus on community, culturally relevant teaching, the use of local resources (Atwater, Crockett & Kilpatrick, 1996), the examination of community values relevant to science teaching and learning, and the role of community experiences in science teacher preparation (Cochran-Smith, Davis & Fries, 2004). Toward this end, several attempts have been made to include "community" in undergraduate teacher preparation through a focus on service learning (Poohoff, Dinsmore & Stirtz, 2000), cultural immersion (Aguilera & Pohn, 1998; Zeichner & Milnick, 1996), and project-based science (Hanes & Sadler, 2005; Pruett & Pruett, 2005;

Sedlacek, Young, Acharya, Botta, & Burbacher, 2005; Seier & Goedeken, 2005; Tompkins, 2005). However, for the most part, these initiatives have been undertaken without the involvement of pre-service science teachers. According to Arends and Winitzky (1996), reform efforts at the pre-service level have been focused primarily on a broad program of study instead of specific, micro-components of the curriculum and little progress has been made in reforming science teacher preparation at this level.

In the Philippines, there have been several attempts to infuse culturally relevant community perspectives and experiences into pre-service science teacher preparation. For example, Arellano, Barcenal, Bilbao, Castellano, Nichols, and Tippins (2001) used case-based pedagogy as a "tool" for engaging pre-service science teachers in a critical analysis of dilemmas challenging the teaching of science in local community contexts. To create a community-based approach in teaching and learning, Nichols, Tippins, Morano, Bilbao, and Barcenal (2006) explored the use of memory banking as a mediational tool for understanding science education in the sociocultural context of a rural community in the Philippines. Despite these attempts, there remains a dearth of research aimed at infusing reforms and involving the local community in the preparation of pre-service science teachers in the Philippines.

Rationale of the Study

The community has long been explored as a context for teaching, learning, and research. For example, there are a variety of studies that have investigated students' "immersion" experiences in a "community" (Bradfield-Kreider, 1999; Dale, Danko, Breen, 2001; Ferrence & Bell, 2004; Mahan & Rains, 1990; Maher, 2003; McLaughlin, Hotch, & Sargent, 2002). For the most part, studies of community immersion experiences

have been limited to cultural or language immersion and not conceptualized as an essential component of pre-service science teacher preparation.

In science education, the "community" has been considered as a rich context for teaching and learning science (i.e., Bronfenbrenner, 1993; Hanes & Sadler, 2005; Pruett & Pruett, 2005; Seier & Goedeken, 2005; Sedlacek, Young, Acharya, Botta, & Burbacher, 2005; Tompkins, 2005; Wheeler, McDonough, Gallagher, Soopokakit, & Doungsa, 1997), with studies falling under a broad spectrum of research termed as "community-based science education" (Nichols, Tippins, Morano, Bilbao, & Barcenal, 2005). For example, Gallagher and Hogan (2000) called for the creation, implementation, and systematic study of models of community-based science education programs, with an emphasis on infusing a holistic view of teaching and learning arising from participants' interactions in contexts of interpersonal relationships, activities, settings, institutions, and the larger cultural milieu of a society. In response to such a call, this study was situated under the large umbrella of community-based science education, which has aimed to provide pre-service science teachers with "new understandings about culture, families, and ways of life" (Cochran-Smith, Davis, & Fries, 2004, p. 964) as they planned, implemented, and immersed in the life worlds of community members, and translated their experiences into useful practices in science teacher preparation.

The few studies of community-based science education have been very descriptive but did not rarely focus on what participants learned through the experiences. Even when learning is explored, it is often limited to a specific dimension (i.e. aesthetic, specific content) instead of the multiple and interdisciplinary aspects of learning contextualized in a community-based experience. The majority of studies do not consider

how community-based experience might translate into useful practices in science education and science teacher preparation. Furthermore, although student learning has been the major "business" in science education, other stakeholders' learning in community-based endeavors also needs further exploration. Research studies rarely explore what and how learning takes place when students and teachers work together in a collaborative and community setting. Likewise, community people's learning is typically left out of the conversation in attempts to document the effectiveness of community-based science education programs or activities. For a more holistic understanding of the dynamics of community-centered science teacher preparation, there is a need to examine the learning process from the perspective of multiple stakeholders, who contribute to the totality of the science education experience.

Drawing from Tonnies' ideas (1887/1957), Sergiovanni (1994) advanced the notion of community by kinship, of place, of mind, and of memory. This study was built on Sergiovanni's notions of community and extended Fusco's (2000) notion of "creating a practicing culture of science" in science teacher preparation. In this study, a community immersion model of teacher preparation served as a context for understanding how pre-service science teachers learn relevant science, enact a vision for local change, explore the boundaries of science situated in daily communal life, and translate what they learn into practice.

In addition, this study also explored the development of a model of community-based *service learning* in science teacher preparation. The use of community as a context for service and learning has been explored extensively in the teacher education literature (Anderson, 2005; Bailis, 2001; Bartel, Saavedra, & Van Dyne, 2001; Fusco, 2001; Giles

& Eyler, 1998; Holland, 2001; Jacoby, 1999; Reardon, 1998; Rhoads, 1998; Saltmarsh, 1997; Shumer, 2001; Speck, 2001). In most cases, pre-service teachers in these studies engaged in a traditional notion of service *for* the community. Typically, students carry out service projects while learning from the experience. By contrast, community immersion, as conceptualized in this study, aimed for pre-service science teachers to carry out service projects *with* rather than *for* the community, learn science content in the context of the community immersion experience, and translate these learning experiences into meaningful practices in science education. In particular, community immersion in this study was envisioned as integrating the communitarian (Boyle-Baise, 1999), project-based, and social justice (Fryer & Newman, 2005) paradigms of service learning.

In addition to studies that focus on the community as a context for service learning, an extensive body of research explores school-community partnerships/collaborations in science education (Bouillion & Gomez, 2001; Gallagher & Hogan, 2000; McDonough & Wheeler, 1998; Wheeler, McDonough, Gallagher, Soopokakit, & Doungsa, 1997). However, for the most part, the focus of these studies has centered on school-based learning communities (Mitchell, 1999; Zhu & Baylen, 2005), partnerships with informal science education venues (Sillman & Danna, 2001) , and collective community action for environmental conservation (Donahue, Lewis, Price, & Schimdt, 1998) or content preparation (Thorley & Stofflett, 1996), with limited consideration of the holistic nature of community-based experience. Community immersion, in the context of this study, was envisioned to provide a whole gamut of experience (e.g. academic, social, cultural, political, environmental, etc.) for pre-service science teachers in ways which would enable them to translate these experiences into

useful practices in science education and science teacher preparation. A number of studies in the science education literature highlight partnerships, where students learn science and attempt to tackle environmental issues in the community (Church 2005; Hanes & Sadler, 2005; Pruett & Pruett, 2005; Quitadamo & Campanella, 2005; Sedlacek, Young, Acharya, Botta, & Burbacher, 2005; Seier & Goedeken, 2005; Tompkins, 2005). However, this study was different because it involved pre-service science teachers as co-researchers and participants in the study, included a community stay, and emphasized the integration of community-based service learning experiences into the preparation of pre-service science teachers.

In summary, while notions of culturally relevant pedagogy and practices and models of service learning, community-based science education, and cultural/language immersion serve as backdrops, it is hoped that this study provides deeper insights and unique contributions to pre-service science teacher preparation. At present, few studies of community-centered science education appear in refereed journals, particularly in science education. The inclusion of community immersion as a practice in science teacher preparation in the Philippines might serve as a model for creating a relevant, socially mediated, culturally responsive, and practicing culture of science teacher preparation in other locations throughout the world.

Background of the Study

In the Philippines, the sense of community is situated in the *barangay*, a basic territorial and political unit comprised of a group of people with shared goals, values, culture, and tradition (Panopio & Rolda, 2000). Using the *barangay* as a context for students to "dialogue with life" (Almeda, et al., 2002), community immersion was

initially designated as a prescribed subject offered in teacher education preparation by virtue of a memorandum issued by the Commission on Higher Education, a policy making body for tertiary education in the Philippines (CHED Memo No. 11, s. 1999). Since 2001, third year pre-service science education students have been required to take a semester of a community immersion course, which includes a one-week community stay in a Filipino *barangay.*

The course was designed to enable prospective teachers to experience the social, cultural, political, and true-to-life realities outside the university halls; gain insights and experiences from the community that might be useful in future teaching; and render a community service/project (Almeda, Andora,Bilbao, Cabag, Delfin, Handa, Prizas, et al., 2002). To achieve these goals, a university in central Philippines collaborated with local government units and community members to develop a successful course experience for undergraduate students. However, the notion of community immersion extended far beyond the concept of a course with a community field experience. Rather, it was envisioned as a set of activities that are woven together to create an experience which fosters prospective teachers' confidence in content knowledge, skills, and attitudes in the enactment of community immersion activities, broadens their understanding of the relationship between school and community, and enables them to transform their experiences into useful practices in science education and pre-service science teacher preparation.

Research Purpose and Questions

The purpose of this study was to create an inquiring and learning community (e.g. pre-service science teachers, teacher educators, and community members), who make

sense of the community immersion experience to inform the theory and practice of community-based science teacher education preparation, not only in the Philippines, but in the international science education community in general . This study was designed to explore the following questions:

1. What are participants' notions and experience of community and their beliefs about the purposes, values, and goals of community immersion? How do they make meaning of their experiences in relation to their notions and beliefs of community and community immersion, respectively?
2. What and how do participants (e.g. pre-service science teachers, science teacher educators, and community members) learn through their participation in the community immersion experience? In particular, what and how do participants learn as they integrate the communitarian, project-based, and social justice service learning paradigms in their community immersion experience?
3. How is pre-service science teachers' learning through community immersion assessed? Specifically, how are portfolios used as an assessment/evaluation tool for the community immersion experience?
4. How do participants translate the community immersion experience into useful practices in science education (e.g., use of cultural memory banking, development of culturally relevant lesson plans)?

Overview of the Theoretical Framework

The theoretical framework of the study was informed by a two-pronged body of knowledge, namely: (1) a review of literature on community and science teacher preparation that leads to the development of a "Framework for Community-based

Science Teacher Education" and (2) multiple layers of theoretical ideas grounding the study from specific concepts to epistemology leading to the development of a "Theory of Negotiated Meanings."

Informed by a six-year experience of community immersion in the Philippines, the Framework for Community-based Science Teacher Education (FCSTE) is the product of an intensive review of literature that examines the (1) historical legacy of community immersion in the Philippines; (2) field experience research focusing on the context of professional development schools, cohorts, service learning, and community-based early field experiences; and (3) community-based education research converging on theoretical ideas surrounding notions of community in science teacher education.

The framework is informed by a convergence of research on "community hotspots" and "notions of community" in science teacher education. Review of research on professional development schools, cohorts, service learning, and community-based early field experiences point to these contexts as emerging hotspots for community formation and development. In addition, research on community-based science teacher education is often driven by theoretical ideas surrounding notions of community as a place, e.g., village, territory, niche, locality, physical space (Agrawal & Gibson, 1999); community as a social group, e.g., kinship, sense of community to include membership, influence, integration and fulfillment, and shared emotional connection (McMillan & Chavis, 1986; Sergiovanni, 1994); community as a process, e.g., inquiring and learning community, interaction, participation (Clark, 1937; Hester, 2004); and community as a culture, e.g. community of practice, memory, mind, norms, beliefs(Sergiovanni, 1994,

Wenger, 1998; Sergiovanni, 1994). The Framework for Community-based Science Education is outlined in Figure 1.1

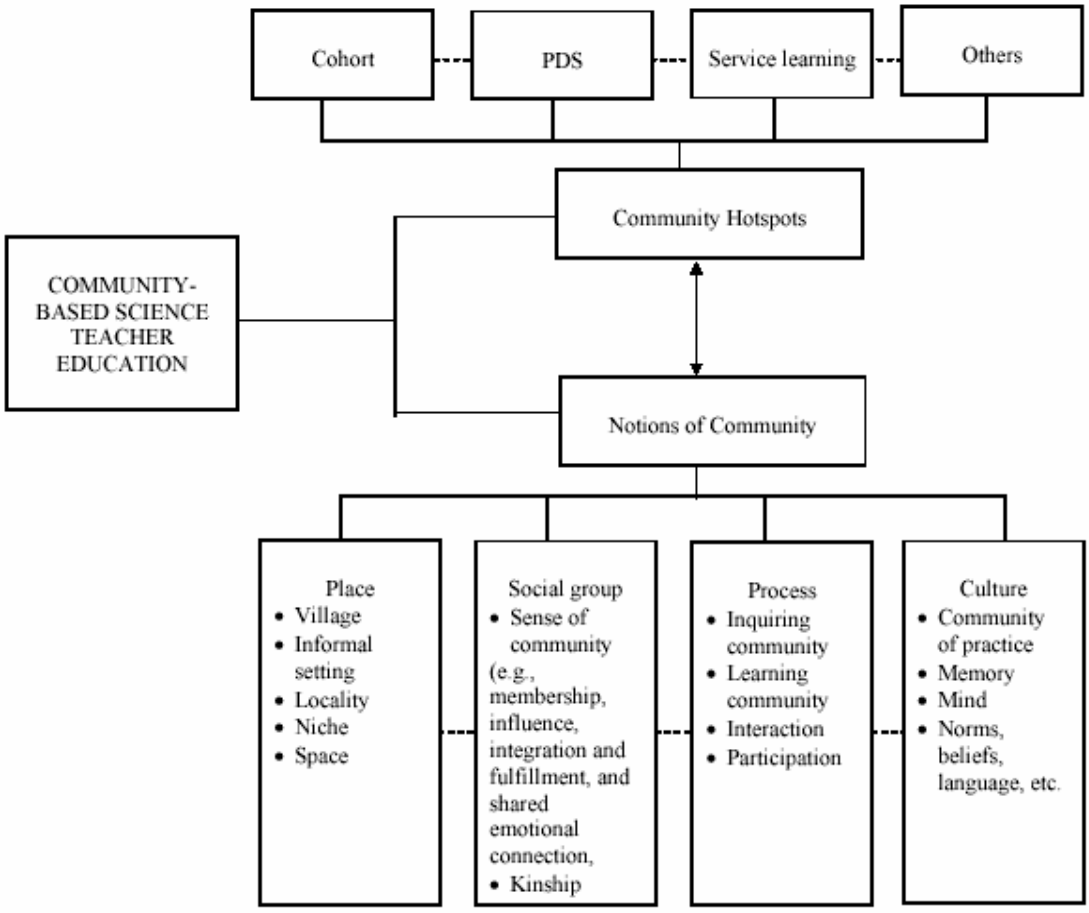

Figure 1.1. Overview of a framework for community-based science teacher education.

The theoretical framework of the study was also informed by multiple layers of theoretical perspectives ranging from conceptual to epistemological levels. The overarching epistemology of the study was grounded in constructionism (Crotty, 2004) utilizing the variants of constructivism and social constructivism. The "grand theory" grounding the research was informed by symbolic interactionism (Esterberg, 2002) and constructivist theoretical perspectives (Cuba & Lincoln, 1995; Denzin & Lincoln, 1995). Culturally relevant pedagogy (Ladson-Billings, 1995a, 1995b) and community funds of

knowledge (Gonzales, Moll, & Amanti, 2006) served as midrange theories to explain the socio-cultural contexts surrounding and influencing individual and group meaning constructions. The substantive theories underpinning the service learning dimension of community immersion were drawn from Warren's (2005) framework in understanding school-community collaboration (Warren, 2005), particularly on notion of social capital, and from Boyle-Baise's (1999) communitarian and Fryer & Newnham's (2005) social justice and project-based service learning paradigms. Finally, the conceptual framework of the study was informed by assumptions surrounding notions of community (i.e., Arensberg & Kimbal, 1968; McMillan & Chavis, 1986; Sergiovanni, 1994), teacher beliefs (i.e., Keys & Bryan, 2001; Nespor, 1987), teacher knowledge (i.e., Shulman, 1987; Henze, van Driel, & Verloop, 2007), cultural memory banking (Nazarea, 1998/ 2001; Nichols, Tippins, Morano, Bilbao, & Barcenal, 2005), and co-generative dialogues (Tobin, 2005; Tobin & Roth, 2005).

The integration of the aforementioned theoretical ideas and the reiterative process of flipping back and forth from the data to the literature resulted in the development of an evolving theory that informed and was informed by the analysis of data. Tentatively named "The Theory of Negotiated Meaning" (Figure 1.2), this theory stemmed from the failure of the initial individual theoretical framework to completely and holistically explain the required theoretical underpinnings of the study. The "Theory of Negotiated Meaning" was an attempt to integrate relevant conceptual ideas; substantive, midrange, and grand theories; and epistemological perspectives into a one size, fits-all theoretical framework. This was the researcher's way of finding a closest fit between his theoretical framework and his data.

As an overview, the "Theory of Negotiated Meanings" attempts to explain the individual, group, and shared meaning constructions in the context of sociocultural lifeworlds, particularly between the worlds of school and the worlds of home and community. Most educational theories explain learning as an individual process or an individual learning in a sociocultural context. Unique to this theory is the inclusion of group learning and the notion of negotiated shared meanings, an overlap between individual and group meaning constructions. Negotiated shared meanings take place in a zone of negotiation where boundaries are fluid and porous. Shared meanings are dependent on how an individual and/or the group produce successful transactions of ideas, pushing each other's boundaries in negotiation and meaning construction. Since shared meanings are fluid, there is a need to capture them to give permanence to ideas. As applied in the current research, cultural memory banks, group portfolios, and culturally relevant lesson plans are examples of permanent products of negotiated shared meanings.

Research and conceptual literature supporting the Framework for Community-based Science Teacher Education and The Theory of Negotiated Meaning are presented in Chapter 2. The theory and the framework are the two major theoretical contributions of the study discussed in Chapter 7.

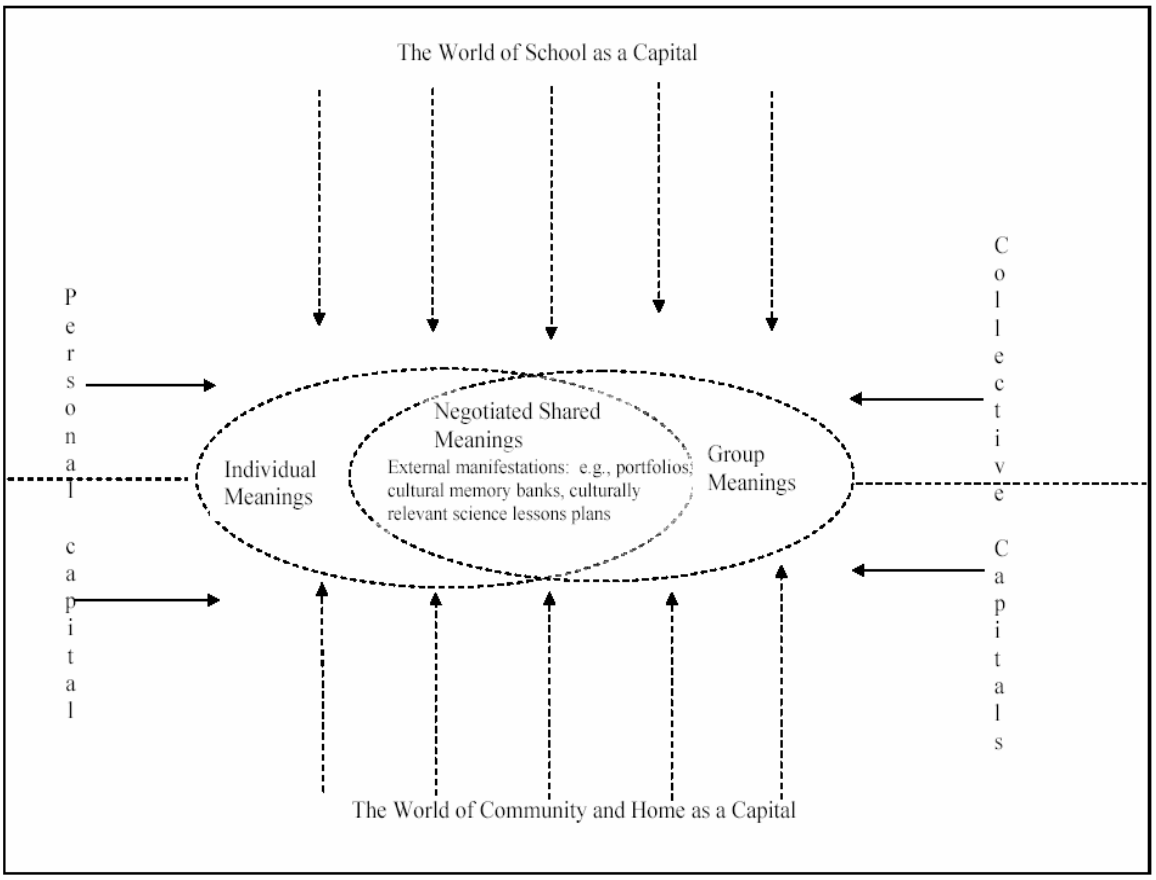

Figure 1.2. Overview of the Theory of Negotiated Meanings.

Overview of the Methodological Framework

Dubbed as a collaborative action ethnography (Erickson, 2006), this study drew upon a hybrid of action research and ethnography as its methodology. Action research is broadly described as a "family of approaches to inquiry which are participative, grounded in experience, and action-oriented" (Reason & Bradbury, 2001, p. xxiv). Traditionally designed to increase research participants' capacity for self-determination and influence in decision making (Boog, 2003), this study specifically operated on the notion of "co-operative inquiry" (Heron & Reason, 2001), which advances research *with* rather than *on* people. In addition, the data collection methods and tools of ethnography were used to

"uncover meanings and perceptions on the part of the people participating in the research, viewing these understandings against the backdrop of the people's overall world view or culture" (Crotty, 2003, p.7).

This study was framed from a constructivist perspective (Cuba & Lincoln, 1995; Denzin & Lincoln, 1995). The theoretical framework of symbolic interactionism (Crotty, 2003) guided the inquiry as it sought understanding from the perspectives of participants who interpret their community immersion experience through and in social interactions. This study assumed that meanings are handled and modified through an interpretive process used by the participants in dealing with things they encounter in a social setting (Esterberg, 2002).

Primary participants of the study included a research team consisting of a "cohort" of ten pre-service chemistry teachers, a teacher educator, and a science teacher educator/science education doctoral student. Secondary participants of the study included nine faculty members with prior experience in teaching community immersion and/or supervising a cohort of students for their community immersion, seven pre-service/in-service teachers with prior community immersion experience, 31 pre-service science teachers who are part of the large physics-chemistry cohort outside the research team, 21 pre-service teachers in other cohorts who took community immersion parallel with the research team, and 36 village people who participated in interviews and focus group discussions conducted by the entire cohort and the research team.

The community immersion classes were conducted in a university in central Philippines. The university is a regional leader in teacher, nursing, and medical education in central Philippines. For their immersion site, prospective science teachers

lived for one week in a rural coastal village where residents are engaged in fishing and farming as primary economic sources of living.

Procedures of the study revolved around three phases, namely (a) preparation phase, (b) community stay, and (c) integration and summative assessment phase. In phase one, activities of the research team focused on understanding the "community," exploring community immersion, and understanding the different models of service learning paradigms with a focus on communitarian, project-based, and social justice approaches.

In phase one, members of the research team participated in research activities that heightened their understanding of the research process (methodology and framework) and products (e.g. portfolios, journals, exhibits, lesson plans, etc.). They were also involved in the negotiation of the research activities and other preparations for the data gathering procedures and analysis. They visited the community, participated in a community survey, conducted preliminary individual and focus group interviews with community people, developed an action plan, negotiated and fine-tuned the plan with the community people, and developed assessment tools.

In phase two of the study, prospective science teachers lived with the community people for one week. In this phase, students implemented the action plan, participated in the data collection, and made sense of the on-going community activities and research process. They were involved in formative assessments as well as in the negotiation and revision of the action plan, based on continuous feedback. They participated in the on-going interpretation of data, collected artifacts for their portfolio, and began to develop culturally relevant science lesson plans.

Phase three of the study was the integration and summative assessment phase. In this phase, the research team assembled and organized portfolios, conducted focus-group debriefing, continued the on-going data analysis and interpretation, developed a community immersion exhibit, finished culturally relevant lesson plans, and conducted demonstration teaching and summative assessment.

The primary sources of research data included transcripts of interviews and focus-group discussions, field notes, journals, portfolios, and cultural memory banks. The secondary sources of data included archival data, photographs, video clips, minutes of meetings, and artifacts.

Narrative approaches were used for the analyses of data. In particular, narrative analysis was used to generate specific individual and schematic group stories. Specific individual narratives took the form of vignettes, learning episodes, and case studies while schematic group narratives were used to depict the "grand story," drawn from individual narratives and focus group discussions. The analysis of narratives was used to generate themes for the study using the dialectic of paradigmic reasoning and inductive analytic procedures of grounded theory.

Subjectivity Statement

The lead researcher's previous experience as a supervising faculty of community immersion at the university where the study was conducted could have posed a strong bias on the interpretation of results. In addition, his current status as a United States educated researcher could have created an artificial effect with respect to his relationship with members of the research team. Furthermore, his presence as a male researcher among mostly female team members could also have affected the dynamics of their

relationship. In addition, his "advanced" education and position as a faculty member could have created an unequal power structure in the study, particularly in terms of planning, interpreting, and implementing the research plan. The lead researcher also acknowledges that his experience of growing up in a rural *barangay* in the Philippines could have influenced the research team's conceptualization of community and funds of knowledge.

Definition of Salient Terms

For the sake of clarity, the following terms are conceptually and operationally defined in this study: *barangay*; cohort; collaborative action ethnography; community; community immersion; cultural memory banking; culturally relevant science lesson plans; research team; and theory, models, and framework..

A *barangay* is a basic territorial and political unit in the Philippines comprised of a group of people with shared goals, values, culture, and tradition (Panopio, 2000). In this study, the *barangay* is given a pseudonym of "Baybay," a rural coastal village located in the Southern part of a large central island in the Philippines. Residents along the coast engage in fishing and fish-related activities as a source of living while those living on the elevated plateau of the village farm rice, corn, and vegetables to augment their income from occasional fishing.

Cohort refers to a group of students that undergo a course of study together, create a shared purpose, and engage in other activities intended to bind the group together (Ohana, 2000). In this study, the term cohort is used with multiple meanings depending on its context in the text. Sometimes, it is used to refer to the "big" group of 41 students who participated in community immersion in *Barangay* Baybay. In other cases, it is used

to refer to a group of about 10-15 students who live together as a group in the immersion site. For example, the student members of the research team and their parallel groups are sometimes referred to as cohort in the study.

Collaborative action ethnography is defined as research "alongside" in contrast to bottom-up or top-bottom approaches (Erickson, 2006). As applied in the study, the researcher utilized a combination of participatory action research and ethnography in the development of specific procedures for the study. The methodological framework in Chapter 2 reflects the hybridized nature of the research methodology.

Community is defined in the literature in many ways (e.g., Agrawal & Gibson, 1999; McMillan & Chavis, 1996; Sergiovanni, 2004; Wenger, 1998). As used in the study, the term community carries different meanings depending on the context in a sentence or paragraph. Sometimes, it is used to refer to the research team (e.g., community of learners and inquirers). Sometimes, it refers to a place (*barangay*) or group of people (residents of the village). As a rule of thumb, the meaning of community, as used in the study, is found in contextual clues embedded in the sentence or paragraph.

Community immersion is a three unit professional education course in a teacher education program with a field experience component in a rural community. The course is designed to enable prospective teachers to experience the social, cultural, political, and true-to-life realities outside the university halls; gain insights and experiences from the community that might be useful in future teaching; and render a community service/project (Almeda, Andora, Bilbao, Cabag, Delfin, Handa, Prizas, et al., 2002). In this study, community immersion was envisioned as a set of activities that are woven together to create an experience which fosters prospective teachers' confidence in science

content knowledge, skills, and attitudes in the enactment of community immersion activities, broadens their understanding of the relationship between school and community, and enable them to transform their experiences into useful practices in science education and pre-service science teacher preparation.

Cultural memory banking stems from Virginia Nazarea's (2001) technique of memory banking, a tool to preserve indigenous plant varieties. Nichols, Tippins, Morano, Bilbao, and Barcenal (2006) adapted memory banking in science education as a tool to preserve indigenous cultural practices in the community relevant to science teaching and learning. In this study, cultural memory banking was used to locate a cultural practice at the intersection of community life. As an extension of Nichols's, et al. idea, cultural memory banking was used as a transactional and meaning negotiation tool in the process of understanding the research team's shared experience with respect to cultural practices in the community. The individual- and group-generated cultural memory bank was made up of three major sections, namely: (a) a memory bank chart showing the pervasive influence of a local practice (e.g., *ginamos* making, a shrimp preservation technique) in the social, economic, political, religious, and cultural life of the people in the community; (b) a narrative about the practice drawn from interviews, observations, and participations in community life through community immersion; and (c) a relevant science section connecting the local practice in science and science education concepts, theories, processes, and practices.

The notion of a culturally relevant science lesson plan was informed by theoretical ideas surrounding the notion of "culturally relevant," "culturally congruent," and "culturally responsive pedagogies" as applied in science education (Tippins &

Ritchie, 2006). In this study, culturally relevant science lesson plans were one of the research team's end products in their attempt to transform their community immersion experience into useful practices in science teacher preparation. Since their development was a result of successful group transaction, culturally relevant science lesson plans were examples of externally manifested, negotiated, and shared meaning construction.

The research team refers to a group of people who mutually agree to work together on a certain problem or project (Spector, Greely, & Kingsley, 2004). As used in the study, the research team referred to the primary participants of the study—ten prospective science teachers, a teacher educator, and a science education doctoral student.

Theory, model, and framework are used in this study and defined in the literature in multiple ways. For example, Wacker (1998) defines theory as comprised of four basic criteria such as conceptual definitions, domain limitations, relationship-building, and predictions. He further contends that a theory "provides a framework for analysis, facilitates the efficient development of the field, and is needed for the applicability to practical real world problems" (p. 361). On the other hand, Policastro and Gardner (1999) contend that theory building occurs when a person "constructs a set of concepts that account for existing data and organizes them in a way that sheds new light on—and points to a new directions in—the domain in which he or she works" (p. 220).

As applied in qualitative research, Preissle (2004) conceptualizes theory in multiple levels ranging from empirical generations (theory grounded from the data) to epistemological standpoints. In this study, the Theory of Negotiated Meanings adopted Preissle's notion of substantive theory (see also Glaser & Strauss, 1965) in qualitative research, which is defined as an interpretation and explanation of human experience

limited by time, space, and particulars. The Theory of Negotiated Meanings attempts to explain learning in three dimensions—negotiation of personal, shared, and group meanings— in a collaborative context.

The American Heritage College Dictionary defines model as "one serving as an example to be imitated or compared" (p. 876). In science and science education literature, a conceptual model is defined as a set of ideas describing a natural process, a representation of a system, e.g., maps or diagrams, and including mathematical algorithms and formulas (Passmore & Stewart, 2002, p. 188). As used in the study, model is operationally defined in the context of the Community Immersion Model in Preservice Science Teacher Preparation. The community immersion is both a conceptual and experiential model because it contains elements, stages, and procedures that can be replicated, followed, or emulated. Preservice science teacher education practitioners may adopt or adapt the community immersion model as a protocol to fit with their local settings.

Framework, on the other hand, is defined as an outline for possible courses of action, or an approach for analysis (Botha, 1989). According to Botha, a framework is built around sets of concepts to guide methods, relationships, and functions. As used in this study, the Framework for Community-based Science Teacher Education (FCSTE) is envisioned to guide science teacher education researchers, practitioners, and policy makers in planning and implementing of programs and projects integrating notions of community in contexts that promote community building and formation in science teacher preparation. The framework, as used in the study, is different from a model because the former allows for the application of ideas in different contexts. For example,

the FCSTE suggests the application of the framework in other contexts besides community immersion—e.g., professional development schools—and the use of one or more theoretical definitions of community to guide the process of community formation and building in science teacher education.

Summary and Preview

Prospective science teachers live in two worlds—the world of school and the world of home and community. A community immersion model of preservice science teacher preparation offers the possibility of bridging these parallel but often times conflicting worlds. This chapter introduced the need for community-centered and culturally relevant pedagogies in the preparation of prospective science teachers. The study offers the possibility of putting into practice the messy and often conflicting theoretical ideas surrounding the notion of community in order to create a framework for community-based preservice science education.

The study attempted to create an inquiring and learning community through collaborative action ethnography—a rich context to inquire how learning takes place as an individual and as a group, how meanings are constructed and negotiated between them, and how the external sociocultural lifeworlds influence the learning and meaning making process. The study offers the promise of extending current understanding of learning and knowledge construction as a negotiated process—all influenced by personal capitals, group collective capitals, and institutional capitals such as schools, universities, home, and communities.

This study is organized into six chapters. Chapter 1 is the introduction and rationale of the study. Chapter 2 is the review of literature. Chapter 3 describes the

methodology. Chapter 4 includes findings part one: specific narratives focusing on the community immersion experience of three case students. Chapter 5 includes findings part two: schematic group narratives focusing on the collective experience of community immersion participants. Chapter 6 includes an analysis, discussion, and interpretation of narratives. And finally, Chapter 7 highlights the theoretical contributions and implications of the study.

Chapter 2

REVIEW OF LITERATURE

Introduction and Organization of the Chapter

Community immersion is a relatively unexplored terrain in preservice science teacher education literature. An intensive literature review using the major academic search engines (e.g., google scholar, education fulltext, ERIC, web of knowledge, web of science) did not yield significant results on the topic. Except for very few studies on language and cultural immersion in teacher education, the practice of community immersion in preservice science teacher preparation requires the robust practical, theoretical, and research-based underpinnings, hence this review of literature.

In view of the absence of its direct citation in science teacher education literature, community immersion in this chapter is situated in more established, relevant practices and frameworks in preservice science teacher education such as field experience, service learning, community-based science education, cohorts, community funds of knowledge, and culturally relevant pedagogy. Due to their relevance to the current research study, they are reviewed in this chapter to inform the theory and practice of community immersion in preservice science teacher preparation.

Given the multiple fields of inquiry informing the practice of community immersion, this literature review—except for the historical legacy of community immersion in the Philippines— utilized several Boolean search terms and their derivatives such as “science teacher education” OR “teacher education” AND “field

experience," "field study," "service learning," "community," "cohort," "portfolio," "teacher knowledge," teacher beliefs," "funds of knowledge," and "culturally relevant pedagogy." As literature built up for the review, additional search terms were added to expand the basic search terms— to mention a few— such as "student teaching," "early field experience", "laboratory school," "professional development school," "community of practice," "social justice," "communitarian," "place-based education," "culturally responsive," "memory banking," etc. The order of priority in literature is given to "science teacher education" and "teacher education," respectively. However, the researcher inevitably consulted literature outside teacher and science teacher education, particularly those studies involving theoretical ideas relevant to the study. For example, studies highlighting notions of community, community funds of knowledge, and memory banking are copiously discussed in anthropology, anthropology of education, and sociology literature. They richly informed the theoretical underpinnings of the study. In general, many theoretical ideas in this chapter came from literature outside of teacher education; unless otherwise mentioned, the review of research to support theoretical ideas came from teacher and science teacher education literature.

Other parameters for the review involved elements of time and space. For instance, this literature review spanned from 1945 to the present on the basis of the availability of the web of knowledge archival documents. However, most of the journal articles retrieved online dated back in the late '90s to the present. Although this review was intended to cover literature around the globe, most especially in the Philippines, much of the published research and theoretical literature available was dominated by European and American authors.

This chapter is made up of two major parts, the review of literature and the theoretical framework of the study. The review of literature was intended to provide a comprehensive body of knowledge—research-based, theoretical, and practice-based— to anchor the community immersion practice in science teacher education. In this section, community immersion served as the "nuts and bolts" connecting the multiple, diverse theoretical and research literature ranging from field experience, service learning, community-based science teacher education, cohort model in teacher preparation, portfolio assessment, etc. The review of literature suggested a "Framework for Community-based Science Teacher Preparation," integrating hotspots for community formation and notions of community relevant to science teacher education.

The second major part of the chapter is the theoretical framework of the study. In this section, multiple theoretical frames were used to shed light on and inform the research questions of the study. Using Preissle' (2004) Empiricist Model of Theory, the theoretical framework of the study is located from the level of concept to epistemology. The epistemology of constructionism and the theoretical perspectives of symbolic interactionism served as the overarching framework of the study. The theory of culturally relevant pedagogy and the framework for community funds of knowledge were the midrange theories explaining the social-cultural contexts influencing the individual, group, and negotiated meaning constructions of research participants.

The framework in understanding school-community collaboration (Warrenn, 2005), particularly on notions of social capital, and social justice, communitarian, and project-based service learning paradigms (Boyle-Baise, 1999; Fryer & Newnham, 2005) served as the substantive theories underpinning the service learning dimension of

community immersion. Finally, the conceptual framework of the study was informed by assumptions surrounding notions of community (i.e., Arensberg & Kimbal, 1968; McMillan & Chavis, 1986; Sergiovanni, 1994), teacher beliefs (i.e., Keys & Bryan, 2001; Nespor, 1987), teacher knowledge (i.e., Shulman, 1987; Henze, van Driel, & Verloop, 2007), cultural memory banking (Nazarea, 2001; Nichols, Tippins, Morano, Bilbao, & Barcenal, 2005), and co-generative dialogues (Tobin, 2005,; Tobin & Roth, 2005). The rich epistemological, theoretical, and conceptual underpinnings of the study resulted in the development of the "Theory of Negotiated Meanings," an emerging theoretical framework that informs and is informed by the analysis of data.

Prior to connecting with major relevant research themes in preservice science teacher education, it is imperative to locate the historical beginnings of community immersion. The discussion that follows is centered on the Filipino notion of community schools and how it foreshadowed the community immersion practice in preservice science teacher preparation. The purpose of the succeeding section is to trace the evolution of community-centered educational practices in the Philippines and how they have influenced the current reform efforts regarding community-based preservice science teacher preparation.

Historical Legacy of Community Immersion in Philippine Science Teacher Preparation: A Blast from the Past

The United States and the Philippines share a common interest in the inclusion of "community" as a reform agenda in the preparation of prospective science teachers. For example, the standards for science teacher preparation of the National Science Teachers Association (2003) recognize the importance of community as an important strand in

science teacher preparation and the role of science teachers in connecting relevant science to local and regional communities. A parallel reform agenda is taking place in the Philippines particularly with respect to the inclusion of community immersion and early field experiences in preservice science teacher curriculum as outlined in the curricular guidelines for teacher education by the Commission of Higher Education (CHED Memorandum No. 97, s. of 1999; CHED Memorandum no. 30, s. of 2005).

What is the historical legacy of community immersion in preservice science teacher preparation? The succeeding discussions are focused on locating the theory and practice of community-based science teacher preparation from the distant past of the Philippine educational system. There are historical undercurrents that foreshadowed the community-centered reforms in science teacher education. For example, the Philippine Community School Movement (Aguilar, 1952; Bernardino, 1956) has been considered the most dominant historical theme linking community immersion practice to science teacher preparation. The evolution of community schools provides a rich context in tracing the historical legacy of community immersion as an integral part of a community-based science teacher education.

The Philippine Community School

The practice of community immersion in science teacher preparation is anchored in a rich historical legacy of Philippine community schools. Contrary to the notion of research-informing-practice in teacher education, community schools did not evolve from the academe, neither in practice nor research in preservice teacher education. The Philippine community school movement originated in the basic education of the then Bureau of Public Schools, circa 1946, right after the Philippines got its independence

from the United States of America (Bernardino, 1956). Fueled by their desire for a true Filipino education, a group of nationalistic school superintendents conceptualized community schools as a tool for rural reconstruction by educating not only the students but also the adults in the community. Community schools were also envisioned as a decolonizing tool to counter the overwhelming presence and influence of western education in schools brought about by previous colonial governments (e.g., Spain, 1521-1898; United States of America, 1900-1946 with brief interruptions from Japanese occupation in 1944-1946) by focusing on native culture and vernacular as centerpieces of instruction (Aguilar, 1954 &1956).

The basic tenets of community schools were centered on a tripartite function of education for the child, youth, and adult not only in schools but also in community settings wherein community resources were utilized for the maximum mutual benefits of all stakeholders. School instruction was centered on native culture (e.g., customs, traditions, practices, mores) at the intersection of life needs, problems, and activities. Using the vernacular as a medium of instruction in lower grades, community schools emphasized the interconnection of knowledge, skills, and abilities in functional life applications particularly on the enshrinement of democratic principles and practices in teaching and learning situations and interpersonal relationships.

Bernardino (1957) traced the history of the first community school in Sta. Barbara, Iloilo (1946-1948). Due to its success, the community school model was later adopted by other provincial schools. In 1949, the community school became a centerpiece of discussions in national conventions of school superintendents. Dubbed as a bottom-up approach to curricular reform, the grassroots practice of community schools in

provinces eventually became a national policy when the Bureau of Public Schools launched a ten-year nationwide community school program to improve basic education in rural areas. Eventually, the movement also served as a platform in the rural reconstruction and development programs of the newly formed republic under the late presidents Ramon Magsaysay (1953-1957) and Diosdado Macapagal (1961-1965).

Dubbed as the golden years of true Filipino scholarship, the success stories and challenges of community schools were reported in over a hundred fifty scholarly publications from 1950 to 1960 (i.e., Tupas, 1956; Vega, 1954; Manaligod, 1953; Vizconde, 1952; Garcia, 1952; Lorenzo, 1953; Gargarita, 1952; Agorillo, 1953; Zamora, 1952). For example, several studies were conducted to assess the efficacy of community schools after their first few years of implementation. To mention a few, Sumagpao (1952) evaluated the first community school in Sta. Barbara, Iloilo after its first three years of operation. Using the students, teachers and community people as informants, he reported on the benefits of the community school in terms of promoting closer contact, harmonious relationships, and mutual understanding among teachers, community people, and local officials. The community school also provided an avenue for local agency among its participants as it paved the way for social progress and reformation in the community. A similar study was conducted in Sta. Catalina, Ilocos Sur (Felizmena, 1952) and Miag-ao, Iloilo (Napud, 1955). The findings of these studies supported the efficacy of community schools in the improvement of rural education as they resulted in an increased cooperation and civic consciousness among students, teachers, and village people. They promoted harmonious relationships between the school and the community.

In addition, students in community schools were more active participants of learning, conscious of their civic and social responsibility.

In the late ‘50s onwards, the Philippine community school became the centerpiece of interest among education scholars in East Asia. Graduate students from other countries came to study in the Philippines and investigated how the theory and practice of community schools might be applicable in their respective countries. For example, Najmabadi (1969) and Aboltofouh (1964) explored community improvement practices in community schools and how they might inform the army of knowledge in Iran. Puekham (1962) and Sedtheetorn (1966) conducted case studies of community schools and considered implications for Thailand’s educational system. Thanh (1959) examined the adaptation of community schools in Vietnam, analyzing their goals, principles, organization, and operation. Doanh (1971) reported the contribution of community schools in rural development and analyzed their implications in the teacher education of Vietnam. And finally, Kosyungan (1965) crafted a teacher education program for the preparation of community school teachers in Indonesia based on her study of community school trends and practices in the Philippines.

Teacher Preparation for Community Schools

The preparation of teachers was a huge challenge during the community school era. An ordinary public school teacher played the dual role of educating the child and the community for rural improvement. The teacher also became a rural community worker facilitating the service and learning activities of students in the community. Parallel to the current community immersion practice in preservice teacher education, community school teachers and students immersed in the lifeworlds of the rural village people; their

realities became the context for teaching and learning. Lorenzo (1954, p. 108), in his analysis of trends in community schools, wrote a teaching-learning vignette describing the community-centered activities of students as facilitated by a community school teacher. A striking aspect of this account is the parallelism between community-based activities conducted by students and teachers participating in the current community immersion course and the former community schools.

> *At 8:00 o'clock, a group of 40 to 50 children leave the school carrying with them the Philippine flag, a portable blackboard, a copy of the Code of Ethics promulgated by his Excellency, the late ex-President Quezon, and small chairs or stools. They go out walking, smiling, and laughing. They stop at a place probably half a kilometer away from school. With the permission of the owner, which they secured the previous day, the children enter the yard of a home. You will notice that the yard, which is usually dirty, is now very clean as the owner after being informed that the off-campus class is to be held in his place, cleans his surroundings.*
>
> *The teacher gives a briefing to the children as to the manner of entering somebody's home. They are divided into groups and spread among 50 to 60 houses. They survey the purok [organizational and geographical divisions within a barangay]. What do they do in the survey? They have forms to fill in with such items as number of toilets, number of piggery projects, number of homes with vegetable garden projects, number of homes with fences umber of homes with Philippine blossoms, number of homes with fruit trees, number of homes with fishponds, number of compost pits, etc. Each group is under the leadership of a*

bright pupil. They have information sheets on which they record their observations. After 30 to 40 minutes, they return to the spot in the purok where the recitation is being held. The parents of the children are invited to attend. First they either pray silently or verbally. What do they pray? Nothing but the recitation of the Lord's Prayer....The next number is the salute to the flag. The children ask their parents to salute the flag. They inform their parents that this is the way to salute the flag….Then comes the song, the Philippine National Anthem in the vernacular. Then the fourth is the pledge of allegiance to the Philippine flag. The fifth is the singing of the theme song (in vernacular). Then comes the discussion, which is held within hearing distance of the parents in attendance.

Given the challenge faced by a community school teacher, several reforms were instituted in preservice teacher education. One important reform effort in the '50s was a shift from a two-year normal certificate to a four year degree program (Casas, de la Cruz, Lamigo, Manala, Belen, Fajardo, et al., 2001). The first two years in the teacher education program were designed to focus on general and liberal education subjects in order to ground prospective teachers in basic content knowledge. The remaining years were devoted to learning the professional education subjects. All throughout the teacher preparation program, teachers were prepared to teach in community schools through community block subjects in the general and professional education courses. According to Dunhill (1954), a UNESCO consultant for community schools, the realignment of subjects in teacher education was based on the shortcomings of the previous curriculum that offered educational psychology and teaching methods in the early years, a remnant of the old, two-year teacher certificate program. It must be noted that during this period,

science was neither a major nor a specialization in elementary teacher education, as the subject was “hidden” in farming, home economics, and trade courses of the basic education (Casas, de la Cruz, Lamigo, Manala, Belen, Fajardo, et al., 200; Fresnoza, 1957; Sibayan,1992).

How did teacher training institutions take up the challenge of preparing prospective teachers for community schools? Naval (1954), then president of Philippine Normal College, reported the curricular realignment in teacher education to include community block subjects—to name a few— Child Psychology, Adult Education, Child Relation to the Curriculum, Rural Sociology, Audio-Visual Education, Guidance and Counseling, Economics. In teaching methods courses, prospective teachers were trained to master the integration technique (Lorenzo, 1954), an interdisciplinary approach wherein everything was taught (e.g., reading, social studies, science, arithmetic, history) using the community setting and context. Off campus student teaching was held in rural communities under the guidance of a supervisor and a school superintendent. Off campus teaching was preceded by a four-week orientation training before student teachers were deployed in rural areas for twelve weeks. During this period in the field, “they confront school problems, live with the people, eat with them, sleep with them, and come to know the life and problems of rural areas” (Naval, p. 116)—scenarios that still echo in the current practice of community immersion. Afterwards, student teachers returned to the college for another four weeks of seminar for integration and sense making of their community-based field experience.

Beginning in the late ‘60s, the preparation of teachers for community schools lost its spark as new reforms were instituted in the Philippine educational system. The science

teacher education community responded to the challenge of globalization brought about by the "space race" between the United States of America and the United Soviet Socialist Republic as triggered by the launching of Sputnik I in 1957. Science teacher education shifted its focus from local to global; new institutional policies veered away from the traditional ideals of community schools. During this period, science teacher education curriculum was loaded with science subjects (Casas, de la Cruz, Lamigo, Manala, Belen, Fajardo, et al., 2001) while community blocked subjects were phased out. In addition, the Educational Act of 1962 adopted the bilingual policy institutionalizing Filipino and English as the medium of instruction and displacing the use of the vernacular language in the lower grades. Although the '60s and '70s were considered to be a giant leap in science teacher preparation in terms of loading the curriculum with core science subjects, the preparation of community school teachers was no longer a priority in preservice science teacher education. Community improvement, previously integrated in all levels of school instruction, was relegated to non-formal divisions of the public school and in extension offices of the university.

Mindful of this glorious past, the Commission on Higher Education, the highest policy making body in teacher education in the Philippines, still conscious of the goal of producing globally competitive science teachers, crafted a national curriculum that is also rooted in indigenous knowledge, culture, and realities. The inclusion of community immersion in science teacher preparation (CHED Memorandum No. 97, s. of 1999) and the integration of early field experiences all throughout science teacher education programs are just a few of the reform efforts aimed at grounding teacher preparation in

local, cultural realties while responding to the challenges of global science and science education community.

Review of Research on Field Experience: Grounding Community Immersion in the Teacher Education Curriculum

> Three critical components of [a teacher education program]….include tight coherence and integration among courses and between course work and clinical work in schools, extensive and intensely supervised clinical work integrated with course work using pedagogies that link theory and practice, and closer, proactive relationships with schools that serve diverse learners effectively and develop and model good teaching (Darling-Hammond, 2006, p. 300).

Field experience has been recognized as an important part of preservice (science) teacher education programs (Bowman & McCormick, 2000; Burant & Kirby, 2002; Giebelhaus & Bowman, 2002; Metcalf, Hammer, & Kahlich, 1996). Field experiences are growing in popularity as evidenced by an increased number of hours devoted to school-based experiences, not only for student teaching but throughout the teacher education program (Metcalf, Hammer, & Kahlich, 1996). Despite its growing popularity and established tradition in preservice teacher education, field experience research is somewhat messy. Its nature and scope is unclear and findings are contradictory. There is no agreed upon convention as to its purposes, values, and goals (McIntyre, Byrd, & Foxx, 1996), hence this review attempts to clarify this confusion.

The traditional notion of field experience is often associated with student teaching, both in laboratory settings or in schools outside the university. In their review of field experience research in teacher education, McIntyre, Byrd, & Foxx, (1996)

devoted a great deal of their discussion on the role of laboratory schools and student teaching in providing clinical experience for prospective teachers—a somewhat limited view of the nature and scope of field experience in preservice teacher education. "Developed out of convenience and tradition" (Guyton & McIntyre, 1990, p. 517), student teaching and laboratory exposures, however, have been criticized and viewed as inadequate in bridging theory and practice in teacher education. Current reforms in teacher preparation show emerging practices that integrate field experiences not only at the end but also throughout the teacher education program (Metcalf, Hammer, & Kahlick, 1996). For example, student teaching and early field experiences are currently linked with professional development schools (Scharmann, 2007), cohort-based organizational structures (Sapon-Shevin & Chandler-Olcott, 2001), and community-based field experiences (Gallego, 2001). These emerging practices in teacher preparation provide alternative contexts for prospective teachers to link learning theory with teaching practice.

At the outset of this review, an organizing framework of research on field experience is presented in Figure2.1. The research on field experience is divided into a two-pronged category. On the left side of the fork is student teaching, a traditional way of providing clinical experience for prospective teachers. This experience may take place in a laboratory school within a university, in a school outside the university, or in combination of both settings (McIntyre, Byrd, & Foxx, 1996). On the right side of the fork is the review of research on early/expanded field experience, an alternative mode of inducting prospective teachers to the teaching profession. In particular, the professional development school, the cohort-based organizational structure, and the community-based

field experience are emerging models in early field experience in science teacher education. Teacher and science teacher educators (Crawford, 2007; Burant & Kirby, 2002; Eick, Ware, & Williams, 2003; Gallego, 2001) have drawn from one or more of these models in providing clinical exposures to prospective science teachers prior to their student teaching. Most often, these contexts for early field experience are integrated in science methods and professional education courses. As shown in the Figure 2.1, early field experiences are still capped by student teaching, a curricular practice commonly found in many teacher education programs. The figure also shows the connections between professional development schools and cohorts. These contexts may be simultaneously integrated within student teaching or may serve as milieus for an early field experience.

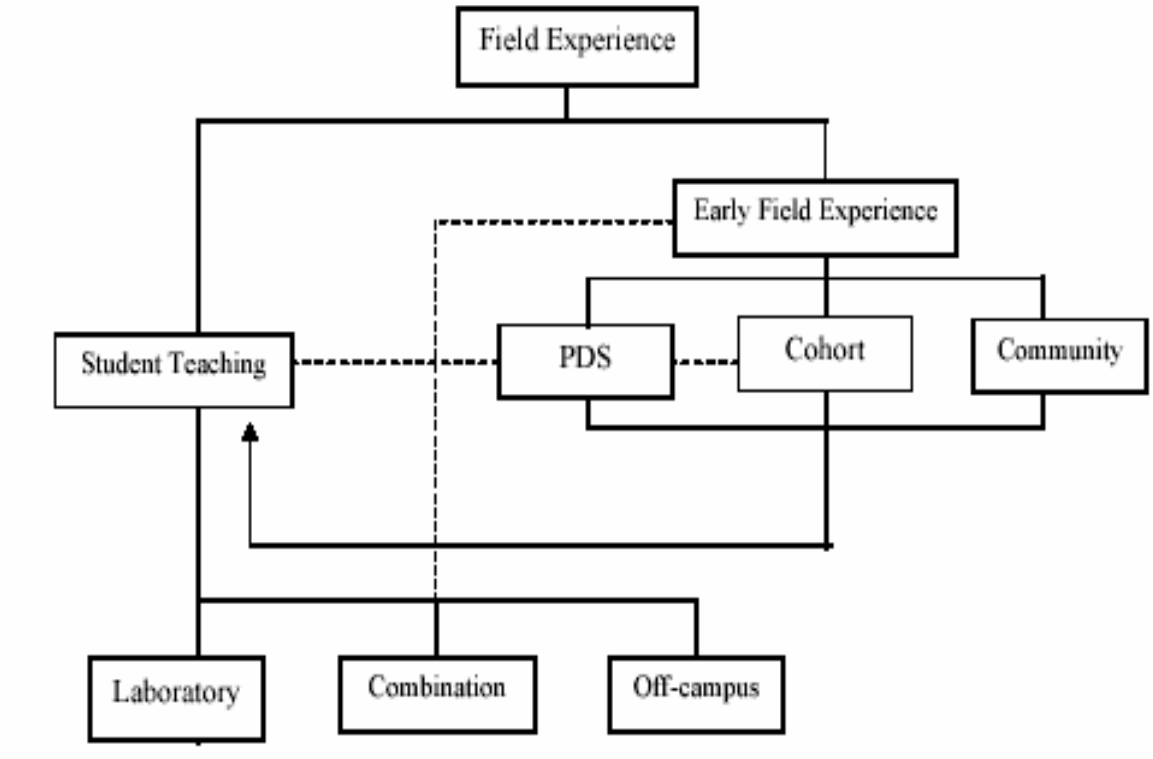

Figure 2.1. Categories of research on field experience.

Although teacher education scholars have recognized field experience as an effective context for prospective teachers to integrate learning theories with teaching practices (Moore, 2003), results of its efficacy are contradictory and confusing. For example, the field experience has been criticized as "fragmented, lacking curricular definition, and appearing disconnected from other components of the teacher preparation program" (Graham, 2006, p. 1118). Metcalf, Hammer, and Kahlich (1996) argue that field experience is not only "ineffective in enhancing professional performance" but may also "lead to less desirable teacher ability" (p. 272). There is evidence indicating that field experience may result in negative attitudes towards teaching among prospective teachers and may diminish their ability to make sense of their profession and professional practice (Fenstermacher, 1992). These findings are contrary to the benefits of field experience as reported in some teacher education literature. For example, Darling-Hammond (2006) argues that there is no other way, except field experience, through which prospective teachers are inducted into the existing teaching milieu wherein they learn the "tricks of the trade". According to McIntyre, Byrd, and Foxx (1996), field experience provides opportunities for prospective teachers to practice instructional decision making and reflective practice and to be physically and emotionally engaged in the teaching profession.

What accounts for these conflicting perceptions and findings about field experience? Central to this conflict is the nature and context to which field experience is defined and situated. The succeeding discussions draw the line on different modes of field experience research ranging from traditional to alternative clinical exposures for prospective science teachers. Teasing out research on field experience into finer

categories might shed light on its nature, purposes, and efficacy in contrast to the sweeping generalizations and conclusions concerning field experience alone. The succeeding discussions focus on student teaching and early field experience as major categories in organizing research on field experience.

Research on Field Experience through Student Teaching

Student teaching has been considered an important component of preservice teacher education. It "has been thought as an opportunity for preservice teachers to apply knowledge and skills, gained in the university, in actual classroom settings" (Sadler, 2006, p. 218). Levine-Rasky (1998) considers it as a "fulcrum around which teacher candidates organize their knowledge, needs, and identities" (p. 93). Graham (2006) views it as an important rite of passage, a "capstone experience" in the teacher preparation program of prospective science teachers. But what does research say about student teaching? What accounts for a successful student teaching experience? How does research on student teaching inform early field experience? In particular, what role might community immersion play in preparing prospective teachers for a successful student teaching experience?

There are three themes that emerge from research accounting for a successful student teaching experience of prospective teachers. The first theme emphasizes the roles mentors play in the field experience of prospective teachers (Zembal-Saul, Krajick, & Blumenfeld, 2002; Awaya, McEwan, Heyler, Linsky, Lum, & Wakukawa, 2002; Giebelhaus & Bowman, 2001; Sadler, 2006). The second theme points to the context where student teaching takes place (Graham, 2006; Mule, 2006). And the third theme suggests the importance of prior knowledge that might help shape prospective teachers'

student teaching experience. Illustrative examples of research along these themes are discussed in the succeeding section.

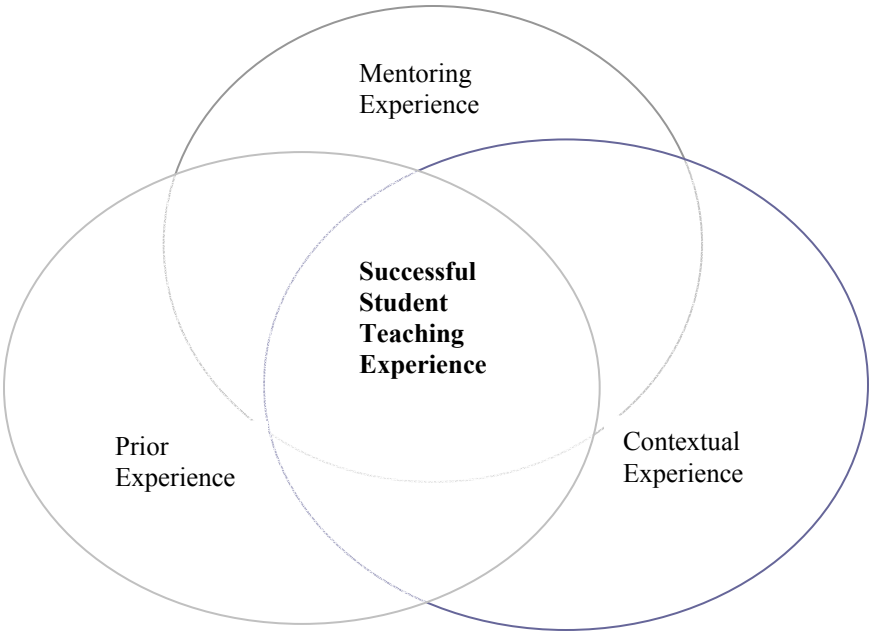

Figure 2.2. Three themes emerging from research accounting for a successful student teaching experience.

A critical factor accounting for a successful student teaching experience of prospective science teachers is the cooperating or mentor teacher (Zembal-Saul, Krajick, & Blumenfeld, 2002). Contrary to the traditional conception of inservice teachers as cooperating teachers, Awaya, McEwan, Heyler, Linsky, Lum, and Wakukawa (2002) used the label "mentors" to emphasize the guiding and nurturing roles they play—possibly beyond student teaching—in the developmental process of prospective teachers. Mindful of this shift in roles and role expectations, Awaya, et al., examined the mentor-student teacher relationship, instead of focusing on their traditional duties and

responsibilities. The findings of the study revealed five themes commensurate with mentor-student teacher relationships. The "journey" metaphor served as the central image to describe the mentoring process—one that is built on "equal relationships" between the student and the mentor teacher "characterized by trust, the sharing of expertise, moral support, and knowing when to help and when to sit back" (p. 45).

In view of the important roles mentors play in the experience of prospective teachers, Giebelhaus and Bowman (2001) suggested a mentoring training for cooperating teachers to maximize gains in the student teachers' field experience. This recommendation was borne out of their research findings reporting the effectiveness of mentor training in promoting effective planning, classroom instruction, and reflective practice among prospective teachers. Using a quasi-experimental design, student teachers who worked with mentors with training on the constructivist framework of student supervision—a similar framework that prospective teachers were trained in their coursework— demonstrated statistically significant gains in performance in 11 out 19 variables investigated. Although the findings of this experimental study are convincing, the epistemological assumptions surrounding the goal of student teaching is not clear. What is the purpose of student teaching? Is it for student teachers to learn from practice in the field or for the mentors to align their practice with the way prospective teachers were prepared in their preservice teacher education program?

Through a phenomenological study, Sadler (2006) examined the student teaching experience of prospective secondary science teachers. Individual interviews, group seminar sessions, and written reflections were used to construct a picture of the shared experience of 13 student teachers. Findings of the study revealed five overarching themes

focusing on the challenges, successes, supports, knowledge gains, and ideal teaching images of prospective science teachers. The role of cooperating teachers stood out in multiple areas of taxonomy generated across cases suggesting both positive and negative effects of the mentoring experience and the need for training and support—not only for prospective science teachers but also for their cooperating teachers— on topics such as critical feedback, negotiation of classroom control, and significance of encouragement.

Another emergent theme in student teaching research focuses on the context in which student teachers gain their field experience. The conventional view of providing clinical experience for prospective science teachers is situated in what has been traditionally known as laboratory schools (McIntyre, Byrd, & Foxx, 1996). For example, Dewey (1965/1904) as cited by Graham (2006, p. 1119), envisioned a laboratory model in teacher preparation as one that fosters "careful observation, examination, interpretation, and analysis of classroom events in a sheltered environment." However, this tradition has long been displaced by new models in student teaching that look into the practice as a complex process outside a carefully controlled environment. The changing context for student teaching (e.g., professional development schools) has resulted in shifts in roles, relationships, and expectations between student teachers and their cooperating teachers.

In connection with the laboratory school, a parallel clinical experience for student teachers exists in Japan. Framed from an interpretivist perspective, Tippins, Kemp, Ogura, Akiyaman, Ikede, Isozaki, et al. (2000) examined prospective science teachers' student teaching field experiences in Hiroshima's "attached" schools; these are schools outside the university that provide clinical experience for student teachers. In "attached

schools," prospective science teachers prepare one or two "model lessons" under close supervision of a cooperating teacher. Findings of the study revealed themes and tensions in the student teaching curriculum. Student teaching experience in the "attached schools" is characterized by reflection, critique, and traditions of oral discourse that model a cognitive form of apprenticeship. However, Tippins, et al. point out that student teaching in Hiroshima's "attached schools" is filled with "apparent tension between rationalism and holism as competing perspectives of science teaching and learning" (p. 200).

In the United States, professional development schools (PDS) are gaining popularity as an emerging context for the student teaching experience of prospective science teachers. PDSs have been conceptualized as a rich context for communication, research, and collaboration between teacher educators in the university and teacher practitioners in the field. For example, Graham (2006) explored the pedagogical relationships between cooperating and student teachers in the context of the professional development school using multi-layered quantitative and qualitative methods for data collection and analysis. Results of the study revealed four important factors for a successful internship through PDS, namely: (1) strong organizational structures with clearly articulated expectations, (2) affective engagement among participants; (3) cognitive involvement with the complex intellectual tasks of teaching, and (4) professional mentoring. These factors, according to Graham, "provided a more sheltered environment for the creation of zones of pedagogical constructions" (p. 1128) wherein sustained and substantive learning about teaching and learning may take place.

In a similar context, Mule (2006) investigated the experience of five preservice teachers in the integration of inquiry projects within their student teaching assignments in

a professional development school. Inquiry projects were done in support and/or collaboration with cooperating teachers and university supervisors. Using a phenomenological case study, the findings revealed that, through inquiry projects, there was an increased collaboration and a diminished power differential between mentors and preservice teachers. It also led to deeper insights and reflections among prospective teachers. However, inquiry projects and student teaching within the PDS resulted in some disruptions in the student teachers' normative discourse about learning to teach; they viewed their experience as demanding and overwhelming. Mule argues that a semester of student teaching is not enough in preparing student teachers as inquirers. He suggests some scaffolding activities or programs prior to student teaching that might help prepare student teachers in the nature of collaboration required in PDS.

The need for scaffolding activities or programs prior to student teaching points to the third theme on student teaching research. A successful student teaching experience requires prior knowledge either in the form of scaffolding programs or early field exposures. This need was evident in a case study conducted by Luft, Bragg, and Peters (1999) on Julie, a student teacher who did her student teaching in a school with a different culture from her own. Using multiple sources of data and constant comparative analysis, Julie's experience was characterized by struggles in learning to teach in a school where students' culture differed from her own. Findings of the study revealed her (1) unfamiliarity with her students and their life experiences; (2) experience of marginalization as she tried to create a new lesson for students in science; and (3) desire for science instruction to be more relevant to students. Luft, Bragg, and Peters suggest a

scaffolding program prior to student teaching to help student teachers like Julie to adjust to a complex environment of teaching.

In view of the value of scaffolding program and/or preliminary field exposure prior to student teaching, Roehrig and Luft (2006) examined the experience of beginning secondary science teachers who were exposed to two science methods course with an extended student teaching. They found that teachers from a preservice program with an extended student-teaching experience in two science methods courses held beliefs aligned with student-centered practices and implemented more reform-based science inquiry instruction than did other teachers who participated in a traditional student teaching program. Roehrig and Luff apparently support the need for prospective science teachers to be exposed to some form of early field experience in order to better prepare them for student teaching.

The previously discussed research findings seem to highlight the need for an early field experience for prospective science teachers in order to better prepare them in meeting the challenge and demand of student teaching. A detailed analysis of the nature, scope, purpose, and effectiveness of early field experience in preservice science teacher preparation is further discussed in the succeeding section.

Research on Early Field Experience in Preservice Science Teacher Education

The traditional notion of clinical experience for prospective teachers is something that is typically found at the end of a teacher education program. However, Darling-Hammond (2006) suggests that a clinical experience should not only be found at the end of the program but should also be integrated in all aspects of the teacher education program. The provision of early field experience in teacher and science teacher education

has been gaining popularity as evidenced by a growing body of research showing the effectiveness of early field experience in preservice teacher and science teacher education (Adams & Krockover, 1997; Eick, Ware, & Williams, 2003; Metcalf, Hammer, & Kahlick, 1996; Samaras & Gismondi, 1998).

There are three emerging patterns from research on the provision of alternative clinical experience for prospective science teachers prior to student teaching. The professional development school, the cohort-based organizational structure, and community-based field experience have been closely associated with research on early field experience. The succeeding discussion focuses on the role of these contexts in the early field experience of prospective science teachers. It must be recalled that professional development schools, in the early part of this section, were discussed in the context of student teaching. The cohort-based model and the utilization of community-centered ideas in preservice science teacher preparation will be treated as separate sections in the latter part of this chapter. As a caveat, the professional development school, cohort, and community-based field experience are discussed purely under the framework of early field experience in this section with representative samples of research under each category.

Early Field Experience within PDSs. Research on early field experience has been closely linked with professional development schools. PDS has been increasingly viewed as a powerful site for the preparation of future teachers. According to Mule (2006), PDS is conceptualized both as a place and as a concept. As a place, PDS is situated in schools where various stakeholders (e.g., university, school district, professional association) are engaged in collaborative relationships to reform teacher and teacher preparation practices

through experience and research (Abdal-Haqq, 1995). As a concept, PDS evolved from the vision of the Holmes Group (1995) of building a collaborative relationship between schools and teacher training institutions to inform practices in preservice teacher education, providing continuing professional development for inservice teachers, and improving achievement of students in local or district schools.

Using the PDS as a context and the situated model of co-teaching as a framework, Eick, Ware, and Williams (2003) integrated the early field experience in the secondary science methods course of prospective science teachers. Students were paired with a classroom teacher for two consecutive periods of the same subject. In the first period, students served as peripheral participants as they observed and assisted the classroom teacher in teaching a science lesson. With the teacher's assistance, students taught the same lesson in the next period. Findings of the study revealed that the situated learning model of becoming a teacher produced positive results among science methods students. Through PDS, students were placed in a comfortable situation in learning to teach as they developed critical reflections, confidence in teaching and managing students, and positive attitudes in observing and doing inquiry lessons.

Reynolds, Ross, and Rakow (2002) conducted a comparative study exploring the influence of PDS and non-PDS preservice teacher preparation on graduates' retention in teaching, teaching effectiveness, and perceptions of professional preparation. Research methods included telephone and written surveys and open ended questions, which were both quantitatively and qualitatively analyzed. Data analysis made use of descriptive and inferential statistics and qualitative categorization to generate themes. Results showed that PDS graduates had the same teaching retention rate with non-PDS graduates.

However, they were rated higher in some aspects of teaching effectiveness although the researchers contended that the effectiveness was more dependent on the individual than the program. Graduates with early field and student teaching experiences in PDS felt more satisfied with their preparation than non-PDS graduates. Evidence also revealed "small but significant differences favoring PDS over non-PDS teacher education programs" (p 289).

Scharmann (2007) examined the evolution of a traditional on-campus science methods course into a dynamic field –and school-based collaboration within the theory and practice of professional development schools. Prospective science teachers were provided the clinical experience prior to student teaching through the integration of professional development in a science methods course. For example, professional seminars and specific areas of concern such as interpersonal relationship, classroom management, reading strategies, and multicultural education were interwoven as part of the professional development program within the science methods course. Central to the implementation of the model was a collaborative climate to investigate the benefits of simultaneous reforms in preservice science teacher education and the professional development of inservice teachers. Aimed at implementing reform in preservice science teacher preparation and professional development for inservice teachers, the model was pilot tested through a series of action research studies involving documentation and reflection for further improvement and refinement. Results of the study were presented through vignettes showing the challenges encountered while implementing the model. Extension of the model included three alternative forms of field experience within a methods course, namely: (a) direct participation, (b) visitation, and c) combination of

both. In direct participation, prospective science teachers work with PDS cooperating teacher to include assignments such as small- and large-group instruction, tutorial opportunities, professional collaboration, team teaching, and reflective observation. In the visitation model, prospective science teachers visited model classroom teachers implementing best instructional practices and participated in field trips to informal education sites. In the combination model, prospective science teachers conducted rotational formal visits in different school sites and observed at least four teachers demonstrating unique teaching skills before they implemented a carefully sequenced, field-based lesson.

Windschitl (2002) investigated the inquiry experiences of prospective science teachers in a science methods course and how they influenced students' conceptions of inquiry. Prospective science teachers were observed during their two-month inquiry projects prior to their participation in a nine-week early field practicum using inquiry-based teaching methods. Using a multi-case study method, the findings showed that conceptions of inquiry influenced the conduct and interpretation of their inquiry projects and vice versa. Results also showed that prospective science teachers with prior authentic experience of inquiry implemented inquiry-oriented teaching and learning in their classrooms. The results suggested a need for prospective science teachers to be trained or exposed in inquiry research, possibly outside a science methods course, in order to promote conceptions and integration of inquiry in science classrooms. Windschitl contends that clinical experience should not only be limited to teaching, but should also include experience on inquiry research—that is if one wants inquiry to trickle down in classroom teaching practices of prospective science teachers.

Still in the context of a professional development school, Chastko (1993) examined the nature of postlesson discussions that prospective science teachers received from their mentor teachers during their early field experience in a science methods course. Drawing from the framework of science teacher thinking, the study revealed a complex postlesson interaction between mentors and their students. Some teachers were actively involved in helping students solve practical problems while others were passive in attending to the needs of students. Some mentoring interactions were focused on the generalized maxim of teaching while others were centered on the specifics of the subject matter, purpose, and teaching strategy. Chastko argues that field experience in a professional development school is a complex process that requires the troubling of unproblematic assumptions surrounding the process of learning to teach.

In summary, research on early field experience through PDS offers a promising context for prospective science teachers to practice learning theories, gain experience for student teaching, and participate in collaborative endeavors such as research and inquiry projects. Windschitl's (2002) suggestion to expand clinical experience for prospective teachers outside teaching is relevant to the current community immersion research. This suggestion supports multiple ways of inducting prospective teachers into the practice of the profession. The integration of action research and service learning in community immersion activities expands the clinical experience of prospective science teachers beyond teaching. After all, a professional teacher is not only confined to the task of teaching as he/she is also, to mention a few, a researcher, community worker, counselor, planner, and organizer.

The cohort structure in early field experience. Sapon-Shevin and Chandler-Olcott (2001) define cohorts as "groups of students who move through their teacher education program together, sharing coursework and developing sense of community and support" (p. 351). In the context of an early field experience, cohorts are viewed as an organizing structure and a support mechanism for prospective science teachers to walk together and learn from each other in an atmosphere of trust and cooperation as they practice group skills and experience sense of community. According to McCaleb, Borko, and Arends (1992), the cohort structure of sharing coursework and fieldwork promotes the development of professional norms, offers mutual support, and encourages reflection on theory and practice in preservice teacher education. This essence is clearly articulated in a Holmes Group report (1995) as cited by Bullough, Clark, Wentworth, et al. (2001):

> We recommend that [teacher education should] organize its students into what we call "cohorts," the members of each cohort journeying together along a common path of professional learning and socialization that leads to lifelong personal and professional growth and development. No longer should any student in a school of education lack the support of a group of students who form their own small learning community. Each student would be part of a group in which fellow students take an interest in each other's attainments. We expect that the members of a cohort will form a mutually supporting network that endures for many of them throughout their professional careers (Bullough, Clark, Wentworth, et al., 2001, pp. 97-98; see also Holmes Group Report, 1995, p. 50).

Research in early field experience most often highlights the value of cohorts in the preparation of prospective science teachers. Most often, the early field experience of

prospective science teachers is not held in isolation but is done within the context of a group. For example, Akerson, Morrison, and McDuffie (2006) integrated the cohort model of preservice science teacher preparation in the early field experience of prospective science teachers through a science methods course. Prospective science teachers worked as a cohort in conducting interviews with elementary students to shed light on their misconceptions on the target science content they planned to teach. From interviews and group interaction, prospective science teachers developed, taught, and evaluated a lesson to address the misconceptions they drew from interviews. The cohort structure in a science methods course apparently supported the learning activities and outputs of prospective science teachers in their early field experience.

Crawford (2007) utilized the combination of a cohort and professional development school as a context for examining the knowledge, beliefs, and efforts of five prospective teachers to enact teaching as inquiry, over the course of a one-year high school field experience. The study utilized multiple case methods and cross-case analysis to explore the depth of prospective science teachers' understanding of inquiry and their views of teaching as inquiry. The study found that the prospective teachers' complex set of personal beliefs about teaching and views of science was the most critical factor influencing their intention to teach science as inquiry. Throughout their student teaching, the future teachers showed an entire spectrum of teaching strategies ranging from traditional, lecture driven lessons to innovative, open, full inquiry projects. Some students, however, did not feel fully equipped to successfully conduct inquiry-based lessons. Crawford recommends the scaffolding of students in the framing of questions, grappling with data, creating explanations, and critiquing explanations—the role that

cooperating teachers and teacher educators must play in order to engage cohort students in scientific habits of mind and action in professional development schools.

Ohana (2004) investigated the influence of cohorts and expanded field experience in the reflective thinking of prospective science teachers. In this study, two science methods classes were compared. A group of prospective science teachers was exposed to an expanded field experience organized as a cohort. Another group was exposed to a traditional class structure with limited field experience. Grounded theory was used as a methodological framework in understanding the experience of prospective science teachers. Results of the study revealed that cohort students tended to build on group interaction and learning as a reference point in the interpretation of their field experience. Students from the traditional structure tended to interpret their field experience using the authoritative lens of course materials. The added advantage of working as cohorts allowed prospective science teachers to work as colleagues thereby promoting a sense of community not only among themselves but also with members of the school community. Ohana contends that cohort structures in early field experience allow prospective science teachers to engage in reflective activities in a supportive learning community.

In summary, research on early field experience utilizing the cohort structure offers unlimited possibilities for learning, reflection, interaction, knowledge and skill development, and professional growth. The concept of cohort in this study is used as an organizational structure, not only as a support and social group during the community immersion course, but also as an organizing and community-building tool, since participants of the study have been taking previous classes together in their professional education and major science courses.

Community-based early field experience. Teacher education scholars (Burant & Kirby, 2002; Gallego, 2001; Zeichner & Melnick, 1996) suggest an expansion of early field experience outside the traditional classroom setting. Most importantly, there is a growing call for early field experience in a community, an area of research that has received little attention in teacher education literature (Zeichner, Melnick, & Gomez, 1996). For example, Gallego (2001) contends that early field experience should provide prospective teachers the "opportunities to live in a distinct cultural community" that may promote "cultural awareness and solidify aspirations to teach within such communities" (p. 315). By extending early field experience outside the school, Burant and Kirby (2002) argue that prospective teachers might look at families and communities as key resources for extending the curriculum, rather than impediments for learning. From this perspective, the community-based early field experience is conceptualized in preservice teacher education as an opportunity for service learning and cultural immersion and as an avenue for clinical experience in the lifeworlds of the community, an important milieu to concretize understanding of the teaching and learning process.

The suggestion of providing clinical experience for prospective teachers in a community setting has been positively received in literature. For example, Schauble and Glaser (1996) contend that the community context affords prospective teachers with varied settings to revise, reconstruct, and redefine schools since it provides a laboratory for testing innovative approaches to teaching and learning (Schauble & Glaser, 1996). In practice, Zeichner and Melnick (1996) utilized cultural immersion, also known as "cultural plunge," as an avenue for prospective teachers to develop cultural awareness and solidify their aspiration to teach in communities such as Native American

reservations. As an extension, Gallego (2001) suggests the coupling of classroom and community-based field experience in cultural immersion practices. The experience, she argues, is advantageous and desirable to prospective teachers as it provides contrast "between the unfamiliar community setting and the familiar classroom environment" (p. 315).

In Gallego's (2001) study, prospective teachers participated in concurrent early field experiences, one in a school and another in a community setting, as part of their early field experience in a methods course. Dubbed as the coupling of the community and classroom field experiences, the study examined the prospective teachers' understanding of the learning context in classrooms in the light of their participation in a community-based field experience in a multicultural, underserved neighborhood. Findings of the study revealed three features of a community-based field experience in relation to teaching and learning contexts. First, the successful field experience was dependent on the integration of community-based learning activities and academic content in contrast to the separation of culture and pedagogy in teacher education. Second, the physical separation of the school from the community-based field setting resulted in distinct norms of interaction that could not be found in a normal classroom situation. And third, the success of early field placement was dependent on the opportunities for prospective teachers to reflect and examine their experience in the light of reform efforts. Through their participation in concurrent and contrasting field sites, prospective teachers became familiar with the school, roles of teachers and students, and standards of the curriculum as true contexts rather than as an accepted practice or knowledge.

Burant and Kirby (2002) examined the urban school and community-based early field experience of preservice teachers as part of the requirement in foundations of education and methods courses. Dissatisfied with the narrow exposure in schools and the disconnection between course work and larger community contexts, Burant and Kirby conceptualized an early, extended field experience that included not only an urban school but also its surrounding communities. Prospective teachers were involved in school and community activities that included publication of school-community newsletter, community interviews, community-based projects in collaboration with teachers and the principal, provision of child care during parent-teacher meetings, etc. Through school-community field experience, prospective teachers were able to develop understanding of children as learners and of parents as major players in the education of their children. Prospective teachers discovered that the community around a school is a rich resource for gaining knowledge about students and for understanding contextual factors significant to learning. However, Burant and Kirby warn against the danger of treating the community as a tourist destination. Instead they advocate a community-based field experience that allows prospective teachers to examine school structures that might perpetuate social inequity in the community.

Gayle and Cordes (2005) conducted a research study utilizing a community-based early field experience in a science methods course. Their study was conducted using the community organization facilities as contexts in preparing prospective elementary and middle-science teachers to meet the needs of children from underserved populations. Dubbed as an informal field experience, 19 prospective science teachers taught inquiry-based science activities to elementary and middle school students living in a homeless

shelter. These children experienced domestic violence and had no available placement in foster homes. The study utilized both quantitative (e.g. pre-post questionnaires) and qualitative methods (e.g. written reflections, field notes, etc.) to document and assesses participants' learning experiences. Gayle and Cordes argue that the community-based, informal field experience led to the desired outcome of their research. However, their efforts were met with impediments such as the disconnection between science activities in the field and the standard curriculum and the insufficiency in critical reflections among pre-service science teachers who participated in the informal field experience.

Barton (2000) described an early field experience using the fusion of community service learning and multicultural education. In a science methods course, 24 preservice science teachers were required to spend time with children in a homeless shelter in order to create a science curriculum that was deeply connected in the lives of students within the community. In particular, in collaboration with their university teacher, they designed science lessons, which they eventually co-taught in the shelter. Findings of the study revealed that the community service learning model, infused with a multicultural dimension, provided preservice science teachers the opportunity to (1) explore education in out-of-school settings; (2) develop relationships with children and families in non-school contexts; (3) learn about children as children rather than as students; (4) develop ties with the community; (5) develop social and interaction skills; and (6) gain greater awareness of other cultural and social norms and values as well as their own beliefs, strengths and weaknesses.

In general, research on community-based early field experience offers a new ground for expanding the clinical experience of prospective teachers. This experience

provides prospective science teachers opportunities to examine educational issues at the intersection of pedagogy, culture, and community. Through early field experience in a community setting, prospective teachers might be able to locate the theoretical ideas they learned from the university at the intersection of social, cultural, economic, political, religious, and environmental realities found in a local community. It is from this context that community immersion is envisioned in this research.

Synopsis of Findings: Locating Community Immersion in Field Experience Research

In this section, community immersion is grounded in the curriculum of field experience in preservice teacher and science teacher preparation. The need for prior field experience before student teaching—not only in schools but also in community settings— has been highlighted in research literature. For example, Mule (2006) and Luft, Bragg, and Petters (1999) highlight the inadequacy of student teaching alone as a source of clinical experience for prospective teachers. They suggested scaffolding programs and activities such as early field exposure to better prepare prospective science teachers for the demands of student teaching and other collaborative activities in a professional development school.

In early field experience research, the community immersion model of preservice science teacher preparation is directly connected to literature on cohorts and community-based field experience. The spirit of collaboration and team work in a cohort organizational structure echoes the same intention of the community immersion course. The element of cohort structure through community immersion is envisioned as creating a sense of belonging, trust, and collaboration among its participants. In fact, one intention of this study was to create a learning and inquiring community of prospective science

teachers, teacher educators, and community members through collaborative participation in community immersion.

On the basis of previous discussions, community immersion in teacher education literature is anchored on a solid foundation of community-based early field experience, a relatively new but challenging venue for providing clinical exposures to prospective science teachers. Teacher education scholars have agreed that this is the most neglected aspect in field experience research. It is hoped that this study will not only inform the practice of community immersion as a form of early field experience but will also expand theoretical ideas surrounding early field experience. In particular, the integration of service learning in the community immersion experience of prospective science teachers merits a strong theoretical underpinning. The succeeding section examines service learning literature both from the practical and the theoretical dimension.

A Review of Literature on Service Learning in Science Teacher Preparation

A salient feature of the current research is the integration of service learning in the community immersion experience of prospective science teachers. Service learning has been viewed as an effective way of fostering communication and interaction between universities and local communities. Through service learning, prospective science teachers become active participants of community life as they engage in activities that might bring improvement and change in the community. But what does literature say about service learning in preservice teacher preparation? How do service learning paradigms and research inform the practice of community immersion?

Service Learning Paradigms

There are several overarching frameworks, paradigms, or theoretical perspectives that guide and inform the practice of service learning in preservice teacher and science teacher education. Several service learning scholars (e.g., Boyle-Baise, 1999; Donahue, 1999; Fryer & Newnham, 2005; Butin, 2002; and Barton, 2000; Rhoads, 1998, 2003) have articulated these frameworks and their ideas are presented in this section.

Boyle-Baise's (1999) philosophical orientations on community-based service learning. Boyle-Baise identified the five philosophical frameworks for community service learning, namely: (1) functional-spiritual, (2) liberal, (3) communitarian, (4) radical democratic, and (5) postmodern.

Dubbed as a conservative view, the functional-spiritual framework of community service learning positions "the volunteer as a benefactor to the 'needy' others, making the person who helps another feel better for the experience" (Boyle-Baise, 1999, p. 1). From this perspective, service is viewed as a social obligation and a moral mandate. Through service, the volunteers can demonstrate personal generosity to others for the betterment of society. The core values of this framework are charity and magnanimity. However, Boyle-Baise contends that this type of framework is problematic as "it can advantage the giver, humble the receiver…[and] circumvent [a] substantive change " (p. 2).

The liberal perspective of service learning is grounded on the goal of helping shape a just and fair society. From this perspective, service learning becomes the means for volunteers to make resources and social services available to the disadvantaged group. The core values of the liberal perspective are equality and justice as it teaches students to work toward the alleviation of social and economic disparities, develop civic awareness, and participate for social justice.

The communitarian service learning paradigm places much emphasis on shared responsibilities that support the common good. According to Boyle-Baise (1999), shared standards for public action must be built on the core values of respect for human dignity, appreciation for cultural diversity, and regard for equality. Communal decision making is at the heart of the public action. The communitarian service learning paradigm embraces plurality that aims for common good through "unrestrained interaction and robust cross-group communication" (p. 3).

The radical democratic perspective is closely attuned to issues of culture and power as it aims for "social equality and multicultural recognition that reflect the impact of one's cultural identity on claims to justice and equality" (Boyle-Baise, 1999, p.3). Service learning from the radical democratic perspective seeks to extend the values of liberty and equality to areas of social life as it seeks to protect individual rights and fights against racial, ethnic, and sexual orientation discrimination. It also challenges the dominance of power, encourages multiple views of freedom, and supports multicultural education as a social movement.

The postmodern perspective of service learning views society as pluralistic, decentered, and humanistic and individuals as relational, empathetic, and border-crosser. Community service learning is perceived as a "process of building connections across differences…It offers opportunities to grapple the 'self-other' dichotomy and fosters the dialogue across cultural and social boundaries" (Boyle-Baise, 1999, p.4). It demystifies differences, builds trusting relationships, and develops the caring self.

Donahue's (1999) theoretical foundations of service learning. In his review of the moral and political basis of service learning, Donahue identifies the underlying foundations of service learning, namely: (a) philanthropic, (b) civic, (c) change, and (d) charity.

Drawing from ideas of Battistoni (1997), Danahue defines philanthropic service-learning as an exercise of altruism and character building among prospective teachers. It is built on the notion of a compensatory justice wherein those who have more in life give back in the form of service to those who have less in life. The server-volunteers are perceived to be more privileged in life, thus they are in a position to serve and give. Prospective science teachers who draw from this paradigm may live in a community different from where they serve.

Civic service learning is characterized by mutual responsibility and is interdependent of rights and responsibilities between students and the community they serve. The focus of civic service learning is on the enlightened self-interest of both parties. Its goal is to connect students to the community in order to create a shared sense of purpose. Both students and the people they serve work together as partners in addressing the needs of the community.

Donahue (1999) makes the distinction between charity-oriented and change-oriented service learning. Drawing from Kahne and Westheimer's (1996) ideas, he describes charity-oriented service learning as an antidote to self-centeredness. Its core value is giving. It fosters responsive citizenship by allowing students to give back to the community the authentic service it deserves. This is believed to be an active and authentic means of service learning "because it has the potential to raise students' self-

esteem" (p. 687). Meanwhile, the change-oriented service learning is one that places emphasis on "caring over giving." Its aim is to develop reciprocal relationships with persons being served, to apprehend the reality of persons, and to build a greater sense of community. From this perspective, service learning is viewed as a tool for social transformation by addressing the causes of social injustice.

Fryer and Newnham's (2005) philosophical approaches to service learning. Fyer and Newnham describe four general philosophical approaches to ground notions of community-based service learning, namely: (1) the charity approach, (2) the social justice approach, (3) the community development approach, and (4) the project-based approach.

According to Fryer and Newnham (2005), the charity approach focuses on meeting short-term, immediate needs through the direct provision of the basic necessity of individuals. Sample activities under this approach include the giving of free meals, clothing, or shelter to people. On the other hand, the social justice approach to service learning addresses the underlying structural causes of social inequity by advocating policy changes to meet the social change. Sample activities under this service learning paradigm include the lobbying for policy changes for increased welfare benefits and subsidy to housing programs.

The community development approach aims to empower individuals in identifying appropriate solutions to their problems and to work with them in realizing the answer to their problems. Assisting the community people in putting up and running a cooperative is an example of this type of service learning. The project-based service learning approach focuses on the identification of a specific goal or problem in a community and the design and implementation of projects to meet the specific objective.

Putting up a communal herbal garden in a community is an example of a service learning activity under this paradigm.

Butin's (2003) service learning perspectives. In order to clarify the practice and theory of service learning, Butin advances four distinct conceptualizations of service learning, namely: (1) technical, (2) cultural, (3) political, and (4) poststructural. The technical perspective focuses on the "efficacy, quality, efficiency, and sustainability of both the process and the outcome" (p. 1679) of service learning. It links service learning with student outcomes- such as personal efficacy, moral development, social responsibility, civic engagement, academic learning, transfer of knowledge, and critical thinking skills. The technical perspective also takes into consideration program characteristics of service learning such as "the quality of placement, the frequency and length of contact hours, the scope and frequency of in-class and out-of-class reflection, the perceived impact of the service, and students' exposure to and integration with individuals and community groups of diverse backgrounds" (p. 1679).

The cultural perspective in service learning emphasizes the individual's "meaning making within and through the context of "innovation" and "normative questions of acculturation, understanding, and appropriation of innovation" (Butin, 2003, p. 1680). From this perspective, service learning is viewed as a means of repairing the frayed social networks of an individualistic and narcissistic society. Its goal is to support and extend civil engagement, foster academic renewal, and enhance individual's sense of community. The core values are respect and tolerance of others, awareness of societal concerns, strong moral and ethical standards, volunteerism, and civic engagement.

The political service learning perspective emphasizes the "issues of competing constituencies and how these issues are manifest[ed] through power (im)balances, through questions of legitimacy, in allowed or silenced perspectives, and in negotiations over neutrality/objectivity" (Butin, 2002, p. 1681). From this perspective, service learning is viewed both as a transformative and repressive tool. As a transformative tool, service learning practitioners can make use of the cultural, social, and human capital of the university to make a difference in the community they serve. As a repressive tool, it can reinforce the dominant deficit perspective and the culture of poverty of others while maintaining inequitable power relations of those who serve under the guise of benevolent volunteerism.

Finally, the poststructural perspective of service learning is "concerned with how an innovation constructs, reinforces, or disrupts particular unarticulated societal norms of being and thinking" (Butin, 2002, p. 1683). From this perspective, service learning becomes a tool for border crossing, which is either physical, social, cultural, or intellectual .Students interact with individuals and with reality previously unknown to them. It becomes a fruitful occasion for students to view the fragmented, partial, and undecipherable nature of knowledge and meaning and to see the truth attached to particular presuppositions, contexts, and modes of thoughts. A postructural perspective, according to Butin, "suggests that service learning is a site of identity construction, deconstruction, and reconstruction with profound consequences of how we view the definitions and boundaries of the teaching process" (p. 1684).

Barton's (2000) multicultural dimension of community service learning. Barton advances the notion of community service learning that can address the issue of multicultural education in preservice science teacher education preparation. Specifically, she examined the influence of community service learning on preservice science teachers' views of multicultural science education and how service learning might be used to promote the inclusive and liberatory multicultural science teaching practice.

Rhoads' (1998,2003) critical-feminist paradigm of service learning. Rhoads advances a critical community service learning paradigm that combines the "feminist ethic of care" with the issue of social justice and equality. In this paradigm, service learning is viewed as a transformative tool in restructuring higher education into a more caring and democratic form of education though an "ethic-of-care philosophy" in the academe. This ethic of care is a cornerstone in promoting social change in the community though mutual engagement to address local problems. Table 2.1 summarizes all of the paradigms that influence the nature, process, and outcomes of service learning in preservice science teacher preparation.

Table 2.1

Summary of Paradigms Underlying Service Learning Research, Programs, and Activities

Paradigm/ Perspective	Salient Feature
Boyle-Baise's (1999) Service Learning Framework	
Liberal	Goal: Just and fair society Core values: Equality and justice Activities: Alleviation of social and economic disparities, development of civic awareness through participation for social justice activities.
Communitarian	Goal: Common good Core values: Respect for human dignity, cultural diversity, equality Activities: Communal decision making, public action, unrestrained interaction, robust cross- group communication.
Radical democratic	Goal: Challenge the dominance of power, recognition of one's identity and culture as claims to justice and equality Core values: Liberty and equality through multiplicity of viewpoints Activities: Multicultural education; protection of individual rights and fight against racial, ethnic, sexual orientation discrimination
Conservative	Goal: Promote service as a social obligation and moral mandate Values: Charity and magnanimity Activities: Gift giving and sharing of one's blessings
Postmodern	Goal: Create a pluralistic, de-centered, and humanistic society and a relational, empathetic, and border-crosser individuals Values: Shifting and context dependent Activities: Dialogue across social and cultural boundaries; building connection and trust across differences; demystification of differences through building of connection and trust across differences

Table 2.1 (continued)

Donahue's (1999) Service Learning Paradigm	
Philanthropic	Goal: Compensatory justice after realization of one's state of blessedness Values: Altruism Activities: Giving and service as a form of compensation
Civic	Goal: Share sense of purpose between the individual and the community Values: Interdependence, mutual responsibility and benefits Activities: Engagement in activities for mutual benefits and responsibilities among parties.
Change	Goal: Social transformation Values: Caring over giving Activities: Development reciprocal relationships and sense of community through public engagement and social justice.
Charity	Goal: Responsive citizenship through giving Values: Charity Activities: Giving of resources or service to the less fortunate
Fryer and Newnham's (2005) Philosophic Approaches to Service Learning	
Social justice	Goal: Social change Values: Justice and Equality Activities: Address underlying structural causes of inequality, advocate policy changes
Community development	Goal: Community development Values: Cooperation Activities: Identification of appropriate solutions to problems, collaboration in the realization of solutions to community problems

Table 2.1 (continued)

Project-based	Goal: Solution to a need or problem Values: Collaboration Activities: Identification of a need or problem that leads to the design and implementation a specific project
Charity	Goal: Meeting of short-term needs Value: Compassion Activities: Direct provision of the basic needs of individuals
Butin's (2003) Service Learning Perspectives	
Technical	Goal: Link service learning with personal outcomes such as personal efficacy, moral development, social responsibility, civic engagement, academic learning, and critical thinking Values: Efficacy , quality and efficiency Activities: Focus on the process and outcomes of service learning (e.g., quality of placement, frequency and length of contact hours, scope and frequency of in-class and out-of-class reflection, perceived impact of the service)
Cultural	Goal: Create a culture of understanding and innovation of societal issues Values: Tolerance, sense of community, innovation Activities: Support activities that promote civil engagement, academic renewal, sense of community, respect for tolerance, awareness of societal concerns, stronger moral and ethical sense, and civic engagement.
Political	Goal: Examine issues of power, legitimacy, and perspectives Values: Change and action Activities: Use of the cultural, social, and human capital of the university in making a difference in the community, awareness of service learning as both a repressive and a transformative tool.

Table 2.1 (continued)

Poststructural	Goal: Construct, deconstruct, and reconstruct societal norms of being and thinking Values: Fluid and context dependent nature of knowledge and reality Activities: Examination of the nature of service learning as a border crossing tool; service learning is a tool to examine the fragmented, partial, and undecipherable nature of knowledge and meaning; truth are attached to particular presuppositions, contexts, and modes of thoughts.
Barton's (2000) Multicultural Service Learning Model	
Multicultural	Goal: Promote "liberatory" and inclusive pedagogy practices through multicultural education. Values: Liberatory and inclusive pedagogy Activities: Explore out-of-school settings, develop relationships with children and families in non-school contexts, learn about children as children rather than as students, develop ties with the community, develop social and interaction skills, and gain greater awareness of other cultural and social norms and values
Rhoads's (2003, 1998) Critical Feminist Service Learning Perspective	
Critical-feminist	Goal: Transform education though ethics of care Values: Social justice and equality Activities: Advances the critical community service learning; combines the "feminist ethic of care" with the issue of social justice and equality; promotion of social change in the community though mutual engagement

Summary and Integration of Service Learning Paradigms in a Community Immersion Model of Preservice Science Teacher Preparation

The integration of service learning in a community immersion model of preservice science teacher education has been informed by various previously discussed theoretical underpinnings and paradigms of service learning. In the past, community immersion service learning activities in the university—where this study took place—included giving of gifts to school children, putting up herbal gardens, holding literacy classes for indigenous people, volunteer teaching in local schools, helping farmers on the farm, planting trees along highways and erosion prone areas, testing water quality, etc. (Handa, Tippins, Bilbao, Morano, Hallar, Millar, &Bryan, 2008). Most often, the service learning paradigms applicable to these activities were limited to charity, philanthropic, civic, conservative, liberal, and project-based perspectives (Boyle-Baise, 1999; Donahue, 1999; Fryer & Newnham, 2005).

Charity, philanthropic, and similar other service learning paradigms have been criticized as limited and divisive. Most often, the impact of service learning ends after the program or activities stop. In addition, they create a dichotomy between the giver and the receiver as they perpetuate power differentials—"we are rich, you are poor," so to speak. By focusing on the temporal provision of needs—such as giving fish instead of teaching how to fish—the beneficiaries of service learning activities are left helpless to stand for themselves after the program ends. Boyle-Baise (1999) argues that this situation is counter productive to real developmental changes.

In view of the limitations of some service learning paradigms, the current research draws from social justice, project-based, and communitarian approaches to inform the service learning dimension of community immersion. From the lens of social justice, the community immersion experience serves as a rich context to examine the social justice and inequality issues in the community. Through this approach, it was envisioned that prospective science teachers would address the underlying causes of social inequality instead of the overt manifestations of inequalities. From the communitarian and project-based perspectives, service learning endeavors draw from the power of communal decision making and action in the identification of specific problems and needs and in the planning and implementation of solutions to the problems and needs. These three service learning perspectives also served as the researchers' guide in planning, conducting, and making sense of the community immersion experience.

Review of Research on the Cohort Model of Preservice Science Teacher Education

In the previous section, cohort was discussed as an organizational structure for the early field experience of prospective science teachers. In this section, literature on cohorts is examined beyond the context of early field experience—possibly towards the purpose of creating a sense of community—as viewed from multiple perspectives, contexts, and utilizations in teacher education. The purpose of this review is to examine the nature and utility of cohorts in community-based science teacher preparation. Benefits and disadvantages of cohorts in teacher education are examined in light of the research literature.

At the outset, this study utilizes the preservice science teacher cohort as an organizational structure in placing community immersion participants in a local

community. In addition, the participants of the study were taking courses together in their professional education and science content courses. This context shaped the participants' experience and beliefs about community and community immersion. Mindful of this impact on the current research study, literature on preservice teacher cohorts are examined to inform the research purpose— to create an inquiring and learning community among members of the research team through their participation in community immersion and collaborative action research activities.

Nature of Preservice Teacher Cohorts

In preservice teacher education, the cohort refers to a group of students that "undergoes a course of study together, creates a shared purpose, and engages in other activities intended to bind the group together" (Ohana, 2000, p. 8; see also Basom, Yerkes, Norris, & Barnett, 1994; Huey, 1996). Ohana categorized preservice science teacher cohorts into three types, namely: (1) closed cohort, (2) open cohort, and (3) fluid cohort. In a closed cohort, students take all the course work together at the same time and in a prescribed order. No new members are admitted to the group after its initial formation. In an open cohort, students take similar core courses together. However, they are also allowed to take some courses with other students outside their cohort group. Meanwhile, students in a fluid cohort may leave or join the group at different points in time.

Dinsmore and Wenger (2006) conceptualized the cohort as a culture in which teacher socialization takes place, both in the university classroom and in the field experience site. Cohort as a culture may take the form of a program, a learning group, or a community. Dinsmore and Wenger argue that cohorts create a structural opportunity

for preservice teachers to maximize and develop a community-minded culture that supports the central tenets of preservice teacher learning. The cohort-based preservice teacher education program is designed to create a learning environment based on the notion of the community of learners. Cohort groups are designed to combat student isolation and to infuse learner-centered, task-oriented, and self-initiating reflective practices in preservice science teacher preparation. In particular, community-based cohorts are designed to meet the basic human need to belong, to achieve, and to feel significant. This learning community is created "to model desirable attributes of teachers and relationships in schools such as collaboration and team work" (Dinsmore & Wenger, p. 59; see also Jackson & Leroy, 1998; Koeppen, Huey, & Connor, 2000).

Clarke, Erickson, and Collins (2005) conceptualized the cohort as an intact group of individuals comprised of students and instructors who are engaged in a common experience and who, in a teacher education context, take many if not all of their courses together. In their study, community and inquiry were central principles that operated through and within the cohort. Cohort members supported each other as they participated in all activities within the community. To further enhance the sense of community, all students took the majority of their course work together. In the final year of their program, cohorts were clustered into groups of six students per school for their student teaching. Another feature of the cohort was adherence of its members to the notion of inquiry, a defining feature of professional endeavors. According to Ohana (2000), the development of professional teachers requires the spirit of inquiry, inquisitiveness, and openness to learn new approaches and strategies.

Drawing on the nature of the cohort as a venue for socialization and development of desirable professional norms and practice, Beck and Kosnik (2001) outlined the objectives of a cohort-based teacher education program. Their cohort-organizational structure aimed to create a more coherent program and a stronger link between theory and practice; to achieve a closer relationship between faculty and student teachers; to establish conditions conducive to mutual support among student teachers; and to model a communal, collaborative approach to teaching and learning that student teachers can apply in their practicum settings and in their school and classroom after graduation.

In the context of preservice science teacher education, the rationale for a cohort model is two-fold (Ohana, 2000). First, preservice science teacher cohorts provide the context for students to develop a sense of professionalism in learning to identify problems and create solutions in a collaborative environment. And second, preservice science teacher cohorts "provide a supportive learning environment in which a synthesis between theory and practice is attempted" (p. 10). Ohana emphasized that students in a cohort could support and share with each other as they applied their content and pedagogical knowledge in classroom teaching. However, Ohana contended, "As cohort programs become more popular in preservice teacher preparation programs, a careful examination is needed of how and whether cohorts work and to what effect" (p. 10).

Benefits of Cohort Structure in Preservice Science Teacher Preparation

In this section, benefits of cohort-based preservice science teacher education preparation are discussed based on previous research findings. Four studies on cohorts (Clarke, Erickson, Collins, et al., 2005; McDevitt, Troyer, Ambrosio, et al.; 1995; and Ohana, 2000, 2004) are reviewed and discussed with respect to their relevance in

preservice science teacher preparation. A summary of the benefits of preservice science teacher cohorts is presented in Table 2.2 at the end of this section.

Ohana (2000) conducted a study to examine (1) the influence of cohorts in the development of professional identity and attitudes about teaching; (2) the impact of cohorts on the construction of knowledge in and attitudes towards mathematics and science; (3) the effect of membership in a cohort on student understanding of pedagogy; (4) effects of cohorts in student retention at the university; and (5) the influence of cohorts to intensify or improve the nature of relationships between the university faculty, school faculty, and students. The study focused on three universities as cases for the cohort-based science and mathematics teacher education program. Cohort features, structure, purpose, and effects were examined based on archival information, university visits, and interviews conducted with cohort members, university faculty, and teachers. The data were analyzed using thematic and cross-case analysis. Findings of the study showed that the cohort model in science teacher education preparation helped to develop a sense of community and confidence among preservice science and mathematics teachers. The cohort model improved students' attitudes towards the teaching profession and content area. Cohort membership also improved the retention rate of students in the program. Compared with the traditional program, cohort-based teacher education preparation facilitated closer relationship among faculty members in the university. Ohana contended, "Cohorts, can and do serve as glue between the university and [the] school. In each of the site, there is an intense relationship between the [school] teachers and the [university] faculty, mediated through a shared interest in the cohort" (p. 26).

Clarke, Erickson, Collins, and Phelan (2005) conducted a self-study of their cohort-based elementary science teacher preparation program called *Community and Inquiry in Teacher Education* (CITE). Specifically, the study utilized *complexity science* as a framework to understand a community- and cohort-based teacher education program among 36 preservice science teachers. With its ecological emphasis on learning systems in a community setting, Clarke, et al. argued that *complexity science* as an analytic framework emphasizes the importance of learning potential as a collective rather than an individual endeavor. They contended that the use of a cohort-type structure in teacher education preparation allows for the flexibility and improvisation needed to address the perennial problem of program fragmentation. The study generated six propositions about the role and value of cohorts in science teacher education, namely:(1) allow for improvisation; (2) "seek to articulate what you do not know"; (3) entertain uncertainty; (4) "as we write the text, the text writes us"; (5) value the possibility of slow schooling; and (6) "be alert to cohort knowing". In view of complexity science as a framework, Clarke et al. concluded that CITE as a cohort-based model in teacher education preparation met the criteria of "density and interactivity of ideas" that enhanced group learning. They contended that engagement and interactivity are two features of the CITE program that allowed the preservice teachers the freedom to define their own internal structures.

> In short, the density and interactivity of ideas are two important characteristics of a complex learning system; if we significantly limit or constrain these, then we fail to appreciate an important feature of complexity science. However, the number of participants in a group will affect the opportunity to engage, share, and

> interrogate ideas…For this reason, an optimal group size is one that is large enough to ensure density and small enough to ensure interactivity. We believe that cohorts such as CITE meet these conditions...The processes of engagement and interactivity are prominent features of a self-organizing system, which we believe can be attained through a cohort program such as CITE (Clarke, et al., 2005, p. 174)

McDevitt, Troyer, Ambrosio, et al. (1995) conducted a project evaluation of their cohort-based preservice science and mathematics teacher education program. Using a causal-comparative research methodology, a series of studies were conducted to compare the performance of preservice science and math teachers who were exposed and not exposed to the cohort-based teacher education program. Two batches of preservice teachers (Cohort 1 and 2) were part of a model program in science and mathematics that allowed students to take courses in sequence and to repeatedly work together over time. They were compared with students who were not part of the program (Control 1 and 2) on the basis of their conceptual understanding of science and mathematics, their investigative proficiencies, and their beliefs about effective methods of teaching these subjects. The research instruments included a teacher-made test of conceptual understanding, existing standardized achievement tests, and other instruments devised to elicit conceptions of appropriate ways to teach science and mathematics to elementary children. Specific results of students' performance in each area of study are the following:

- Earth Science

  Cohort students were more proficient in designing an experiment, interpreting graphs, defining variables that affect evaporation rates, and formulating hypothesis (p. 757).

- Mathematics

  Cohort students were more knowledgeable about appropriate equipment and activities for demonstrating mathematical concepts. They advocated for everyday use of mathematics, were more fluent about multicultural origins of mathematical progress, and listed more possible manipulatives for teaching mathematics than did control students (p. 758).

  Cohort students identified more equitable and inequitable strategies in representations of mathematical lessons. Cohort 2 students focused more on project-related concerns (e.g. equitable instruction, hands-on activities). Control students tended to discuss general pedagogic issues more often (p. 760). They also defined basic mathematical concepts more accurately than did control students. They also provided more applications of concepts (p. 761).

- Physical Science

  Cohort students did perform at higher levels in designing an experiment; assessing consequences of a circuit being shorted out; and comparing two vehicles in terms of distance traveled, speed, and acceleration. They were also more aware of appropriate links between instructional activities and underlying concepts (p. 765).

- Teaching Science in the Elementary

  Cohort students were more comprehensive in their analyses of teaching vignettes. They often mentioned positive and negative features relevant to equity (p. 767).

- Biological Science Concepts for Elementary Teachers

  Cohort students more often articulated the value of identifying topics that lead to behavioral change. Cohort 2 students more often selected topics because of the general need-to-know basis. In their analysis of the most effective ways of learning biological concepts and applications, Cohort 1 students more often mentioned cooperative learning and learning cycle methods than did control students. Cohort 2 students often mentioned hands-on activities [while] control students often mentioned multimedia activities. In response to the question about why they choose particular methods, Cohort 1 students more often mentioned students' tendency to relate to the topic. Cohort 2 students more often discussed issues associated with meaningful learning. Finally, cohort students (1 and 2) cited more resources when teaching biology than the control students. They listed more biological concepts that were found personally relevant to them (pp. 769-770).

When taken as a whole, research findings showed that the students in cohort courses were superior in their investigative capacities when compared with students in non-cohort courses (McDevitt, et al., 1995). In addition to their pedagogic concerns with equity, cohort students valued hands-on activities and investigative learning strategies. There

were no significant differences in performance of cohort and noncohort students in standardized multiple choice tests. However, cohort students performed better in alternative assessments particularly, on measures of investigative proficiency and conceptual understanding.

Ohana (2004) investigated the effects of expanded field experiences in a cohort-based science teacher education program. He was particularly interested in how preservice students make connections between their university work in a science methods course and their expanded field experience. He compared students in two science methods classes. One class was organized as a cohort with expanded field experience (experimental program) while the second class was a regular program with limited field experience (regular program). Grounded theory was the framework that guided the research methodology and the inductive analytic procedure. Participants of the study were 21-cohort and 24-noncohort students. Student journals were the primary data sources; informal observations and individual and focus-group interviews were the secondary data sources. Analysis of students' journals revealed some discrepancies in how students made sense of their experience. Noncohort students tended to focus on their coursework experiences while cohort students focused on the more practical aspect of their experience. They also reported on their involvement in community building. They learned how to work with group members. They were able to discern patterns in problematic practices in the field. Ohana contended that the "early and extended field experiences, when coupled with reflections and analysis may help preservice students integrate theory with practice" (p. 251). He also argued that the cohort enabled the students to practice reflection in a supportive, learning community.

Table 2.2

Summary of Research Showing the Benefits of Preservice Science Teacher Cohorts

Author/Title	Design	Result
Ohana (2000) *Preservice teacher cohorts and their implications for mathematics and scie nce education*	Case study, three cohort-based teacher education programs; cohort members, university faculty, teachers; interviews, observation, interview; thematic analysis and cross-case analysis	Cohort-based teacher education preparation helped • develop the sense of community and confidence among preservice teachers; • improve students' attitudes towards the profession and the content area; • increase student retention in the program; and • facilitate a closer relationship among faculty members of the university.
Clarke, Erickson, Collins, and Phelan (2005) *Complexity science and cohorts in teacher education*	Case study, self-study; 36 preservice elementary science teachers; narrative and thematic analysis	• CITE as a Cohort-based structure in teacher preparation facilitated engagement and interactivity that allow - for improvisation, - the articulation of what students do not know, - uncertainty, - everyone to co-influence each other, - the possibility of slow schooling - students to be alert of cohort knowing.
McDevitt, Troyer, Ambrosio, Heikkinen, and Warren (1995) *Evaluating prospective elementary teacher's understanding of science and mathematics in a model preservice program*	Causal-comparative study; cohorts vs. non-cohort students; standardized tests, alternative assessments	• Cohort students compared to the noncohort students - were superior in their investigative capacities, - valued hands-on activities and investigative learning strategies, and - performed better in alternative assessments particularly on measures of investigative proficiency and conceptual understanding.

Table 2.2 (continued)

Author/Title	Design	Result
Ohana (2004) *Extended field experiences and cohorts with elementary science methods: Some unintended consequences*	Grounded theory; 21 cohort students, 24 noncohort students; journals, individual and focus group interviews, observations	• Cohort students tended to - make sense of their experience based on practical and life observations, - experience being part of the community, - work together as a group, - discern problematic situations in the field, and - be more reflective in a supportive learning community

Benefits of Cohorts in Preservice Teacher Education

The second part of this discussion focuses on the benefits of cohorts in the general field of preservice teacher education preparation. Studies included in this review were conducted in other areas in preservice teacher education; however, they are also relevant to preservice science teacher education preparation. A summary of research showing the general benefits of cohorts in preservice teacher education is presented in tabular form at the latter part of this section.

Cohort and community modes of teacher education. Beck and Kosnik (2001) reported on their cohort-based, community-oriented elementary teacher education program. Student cohorts were grouped together from the beginning up until the end of the program, including practicum and community experiences. The researchers used the following steps to build the cohort into a community, namely: (1) establishing the cohort; (2) building the community in the faculty team; (3) initial steps toward cohort

community; (4) community building activities throughout the year; (5) program structures that support community; (6) communication; (7) explicit discussion of community; and (8) modeling. Findings of the study (pp. 396-343) were the following:

1. There was a general positive response towards cohort-based preservice teacher education preparation among students and faculty advisors.
2. There was a high level of participation in whole-class and small-group discussions and activities.
3. There was willingness to take risks in interactions because of the basic sense of security in the group; students were willing to express their point of view, criticize each other's opinions, and work through conflict in the community.
4. There was a shift in focus and identity towards the group as students developed positive attitudes and behaviors toward their cohort members.
5. There was an increased inclusiveness that extended beyond equity and reflected fairness and lack of prejudice among students.
6. Cohort community assisted significantly in the personal growth of the students due to openness, support, and acknowledgement of each other's abilities.
7. There was an increased professional growth among students due to their greater participation, risk-taking, group orientation, inclusiveness, emotional and social development, and confidence and self-esteem.

Beck and Kosnik (2001) also reported the effects of the cohort in the academic and technical aspect of the program, namely: (1) high level of participation in whole class and small group discussions and activities; (2) high quality of the discussion and group work; (3) growth of awareness on the value of collaboration and ability and willingness to

engage in action research; (4) willingness to take risks in practicum settings and implement basic changes in the approach to teaching; (5) willingness of students to express their point of view and to question each other's and the faculty's opinions while maintaining positive relationships; and (6) inclination and ability to foster community and collaboration in their own classroom.

Beck and Kosnik (2001) recommended a cohort size of 60 students in preservice teacher preparation in order to expose students to a range of issues and diversity of colleagues. In addition to benefiting preservice teachers, the cohort-to-community model also afforded many benefits to the faculty members. Beck and Kosnik reported, "Students tend to be more appreciative and more willing to participate in class; faculty colleagues offer advice, support, and friendship to each other; the integrated, cumulative program results in more powerful and satisfying teaching; and collaborative research and publishing are facilitated" (p. 496). Beck and Kosnik's (2001) findings are relevant to science education for two reasons: First, the basic components of the program can be applied to a cohort of preservice science teachers. Second, the findings with respect to the benefits of cohorts may have relevance to preservice science teachers and not just for preservice elementary teachers.

Cohort-based models for technology integration in teacher education. Aust, Newberry, O'Brien, and Thomas (2005) conceptualized and implemented the "Learning Generation," a cohort-based model to support innovations with technology in teacher education. In this model, the cohort included (a) a member of the school of education faculty, (b) teacher education students, (c) a faculty member from the liberal arts, (d) a practicing teacher, and (e) K-12 students. This cohort structure was designed to "bring

together diverse groups who have a stake in the effective integration of technology in a subject area or theme" (p. 173). Salient to the study was the discussion of the cohort process in developing innovations for technology integration in teacher education, namely: (1) genesis of a cohort, (2) consultation with experts, (3) development of a plan, (4) initiation of the plan, (5) action, (6) assessment of results, and (7) celebration and showcase of results. The study revealed that participants successfully developed and implemented technologies that integrated inquiry- and project-based learning activities. The cohort-based model resulted in increased technology literacy competencies among cohort members; improved instructional technology integration in teaching and learning engagement; increased use of information technology to improve communication and collaboration; and greater dissemination of new visions of teaching, learning, and teacher preparation among cohort members.

The results of the study (Aust, et al., 2005) may be applicable in science education because of the following reasons: First, technology integration is considered relevant in preservice science teacher education preparation. Second, aspects of the model can be transferable to science teacher education programs. In addition, the benefits of this particular cohort model in teacher preparation might also hold true if preservice science teachers were used as participants of the study. The study expanded the notion of the cohort to include the preservice teachers and other stakeholders in technology integration such as university faculty members and in-service teachers and their students.

The culture of cohorts in preservice teacher education. Radencich, Thomson, Anderson, et al. (1998) examined the culture of elementary and early childhood preservice teacher education cohorts at a southeastern university in the United States. The

cohort was made up of 25-40 preservice teachers who remained together under the supervision of a team advisor starting in their junior year in college. Primarily a phenomenological study, data sources included focus group discussions, individual interviews, and archival information. The study yielded both positive and negative elements of team cultures. Results showed that the cohort cultures were influenced by the following: (a) family-like context of teams, (b) differential treatment given to some classmates, (c) formation of cliques, (d) group pressure, (e) cooperative assignments, (f) professors, and (g) team supervisors. Positive results of the study included the formation and/or development of a supportive climate, heightened group awareness, cooperative assignments, higher academic achievement, and the development of support networks from professors and team supervisors.

Phenomenological studies on the effect of family-like contexts, group pressure, and clique formation are important in understanding the dynamics of cohorts, not only among preservice teachers in general but also in preservice science teachers in particular. The results of the study may guide stakeholders in preservice science teacher education in deciding the composition of a cohort and in providing the support services to further maximize its benefits.

From cohorts to communities in preservice teacher preparation. Using a qualitative case study, Dinsmore and Wenger (2006) explored preservice teachers' perceptions about their own learning within the culture of a cohort-model teacher preparation program and through their first year of teaching. Cohort in the study provided the structural opportunity to maximize and create a community-minded culture that supported teacher learning. A cohort of 12 preservice teachers served as primary

participants of the study. The sources of data were videotaped individual and group interviews, observations, and archival information. The study found that the cohort model in teacher preparation resulted in the formation of a strong sense of community among the participants. The cohort structure also created a natural environment for students to learn with their peers. Participants reported a positive support system due to their collaborative relationship with the cooperating teacher. They also reported enhanced learning as a result of their field experience and interactions with peers and the class instructor. Presevice teachers got to know each other very well. They learned from each other through their discussions during and outside the cohort classes. They expressed a strong connection as they relied from each other for feedback. The data also indicated that the faculty members were the primary force in generating a united cohort. Group activities fostered the sense of community and encouraged cohesiveness in the cohort. As Dinsmore and Wenger (2006, p.71) note:

> Cohorts must be infused with a strong sense of community to enhance [the] learning of nontraditional preservice teachers. Data also suggest that the program must include well-designed field experiences, opportunities for learning with cohort peers , and [an] easy access to supportive university faculty. Finally, [the] data suggest that the relationships within the field experience, with peers, and with the instructors are important to preservice teacher learning. When the relationship is negative, learning is hindered. However, when the relationships are positive, learning is enhanced.

This study is relevant in science education because the results may provide insights on how to build a sense of community among preservice teachers, an important dimension of a cohort-based science teacher education preparation.

Cohort-based action research in teacher education. Phillips and Hollingsworth (2005) conducted a two-year reflexive action research program to develop teachers as leaders for equity. The cohort model as a program allowed the 25 students to take all their course work together. Basically using an action research methodology, the data from the action cycle became the basis for effecting changes in the program every semester. Student interviews, e-mail correspondence, course notes, classroom observations, questionnaires, and survey results were the sources of data. The study found the collegiality of the cohort was one of the reasons for successful action research and program implementation. Students expressed the belief that the cohort ended their isolation and started their professionalism. A survey conducted with research participants revealed that they had grown as team players. They cited the success of the group work as central to the program design. According to participants, group work fostered their skills to communicate with school administrators and school boards and to sell their action plans to the rest of the school faculty.

The study was conducted among students taking certification courses leading to a master's degree. However, the results are relevant to preservice science teacher education because of the cohort-based nature of the program. Growth in professionalism and in team-player attitude was the result of the students' participation in the action research.

Socializing effects of cohort grouping in preservice teacher education. Mather and Hanley (1999) evaluated the socializing effects of cohort grouping among preservice

elementary teachers. The study utilized a collaborative, thematic approach to teacher education in a curricular context consisting of art, drama, music, physical education, and child psychology. Focus on the learner was central to the curriculum, with methods and content courses taught simultaneously. The study utilized an experimental design to compare cohort and non-cohort students. Interviews were conducted among cohort and non-cohort students to ascertain the socializing effects of group membership. Results showed that the small class size and pedagogical approach had strong socializing effects regardless of cohort memberships. Belonging to a cohort, however, resulted in an earlier socializing effect and the emergence of collective beliefs. Compared with noncohort students, cohort students tended to be more vocal about the quality of teaching they received and the relevance of their course materials. Mather and Hanley contended that the "faculty consensus and collaboration on the program theme generally left little room for student confusion about the curriculum's goals" (p.246). This was considered important in the creation of a learning community among cohort students. Sense of community was fostered by curricular overlap, unified teaching approaches, and frequent group activities. The curriculum among cohort students was particularly found to be effective in promoting pedagogical content knowledge and in helping many students examine their beliefs about teaching.

Like previous cohort studies in teacher education, Mather and Hanley's (1999) research design may be applied to studies with preservice science teachers as research participants. Similar results were confirmed in previous studies with preservice science teachers (Ohana, 2000, 2004). Table 2.3 summarizes the benefits of preservice teacher cohorts gleaned from research evidences.

Table 2.3

Summary of the Research Showing the Benefits of Preservice Teacher Cohorts

Author/Title	Design	Result
Beck and Kosnik (2001) *From cohort to community in a preservice teacher education program*	Case study, interpretivist-constructivist, grounded theory; 60 students at 10-12 each per group; interviews, questionnaires, archival information	• Cohort and community-based teacher education program resulted to an increase in - professional growth, - participation, - risk-taking, - group orientation and inclusiveness, - emotional and social development, and - increased confidence and self-esteem among preservice teachers. • Preservice teacher cohorts had - high level of participation in whole class and small group discussions and activities; - high quality of the discussion and group work, notably in connection with the action research projects; - shown growth in awareness of the value and in willingness to engage in collaboration; - shown willingness to take risks in practicum settings and to implement basic changes in the approach to teaching; - shown willingness to express their point of view and question each other's and the faculty's opinions, while maintaining positive relationships; - shown the inclination and ability to foster community and collaboration in their own classroom.
Aust, Newberry, O'Brien, and Thomas (2005)	Case-action research; a cohort of teacher education and liberal arts faculty, preservice students, practicing teachers, and K-12 students	• The cohort-based model for technology integration in preservice teacher education resulted to an increased - technology literacy competencies; - instructional technology integration in teaching and learning engagement; - use of information technology to improve communication and collaboration; and - dissemination of new visions of teaching, learning and teacher preparation among cohort members.

Table 2.3 (continuation)

Author/Title	Design	Result
Radencich, Thomson, Anderson, et al. (1998) *The use of cohorts: preservice teacher education teams at a southeastern university in the United States*	Phenomenological study; cohort of 25-40 preservice teachers and an advisor; focus-group discussions, individual interviews, archival data	• The cohort culture resulted to the formation and/or development of a/an - supportive climate, - heightened group awareness, - cooperative assignment, - higher academic achievement, and - support network from professors and team supervisors. • Cohort culture was influenced by - family-like context of teams, - differential treatment given to some classmates, - formation of cliques, - group pressure, - cooperative assignments - professors, and - team supervisors.
Phillips and Hollingsworth (2005) *From curriculum to activism: A graduate degree program in literacy to develop teachers as leaders for equity through action research*	Action research; 25 candidates in cohort, 4 case teachers; interviews, observations, survey, questionnaires, archival data	• Collegiality of the cohort was one of the reasons for a successful action research and program implementation. • Students expressed the benefits they got from the cohort: - end of isolation and start of professionalism, and - growth as team players. • Students also cited the success of the group work as central to the program design.

Table 2.3 (continuation)

Author/Title	Design	Result
Mather and Hanley (1999) *Cohort grouping and preservice teacher education: Effects on pedagogical development*	Combination of experimental design and qualitative methodologies; interviews, focus groups, archival data	• Factors associated to strong socializing effect in the cohort are - small class size and - pedagogical approach. • Cohort resulted in earlier socializing effects and emergence of collective beliefs among preservice teachers. • Cohort students tend to be more vocal about the quality of teaching they received and the relevance of their course materials. • Sense of community was fostered by curricular overlap, unified teaching approaches, and frequent group activities. • The curriculum of cohort students was found effective in promoting pedagogical content knowledge and in helping many students to examine their beliefs about teaching.

Research on the Shortcomings of Preservice Teacher Cohorts

In contrast to the benefits of preservice teacher cohorts discussed in the first part of this paper, there are also some studies showing otherwise. These disadvantages/shortcomings of preservice teacher cohorts are discussed in this section.

Shortcomings of preservice science teacher cohorts. Ohana's (2000) study revealed the less positive effects of preservice teacher cohorts. He found that science teacher cohorts in three case institutions were not structured in ways to promote more content learning. Contrary to previous positive findings, Ohana also reported cases of logistical difficulty in extracting cooperation among different departments and colleges in case institutions. His study also cautioned on the formation of a "bloated sense of empowerment" among cohort students. He observed that cohort students can become

"clique-ish, demanding, and elitist" (p. 27). He warned, "Cohort behavior, unless carefully attended, can have a negative impact on building the bridge between theory and practice" (p. 27). Furthermore, there was also evidence of inconsistencies in the faculty leadership of the cohort. Ohana argued the research evidence on the benefits of preservice teacher cohorts must be treated with caution. Most of the research in preservice cohorts was done not in isolation but in combination with other variables. Ohana (2000, p. 28) points out:

> Part of the difficulty in making recommendations about the use of cohorts in mathematics and science education results from the problems in isolating some of the variables involved. Cohorts are virtually always part of a larger reform effort that includes expanded field experiences and curricular reform; so it is difficult to identify the parts that are necessary for effective structuring of preservice cohorts. Mixing increased field experiences and cohorts is especially problematic. It is not clear whether improved attitudes and feelings of professional preparation are related to an increase in comfort in working in schools or due to the support of a cohort structure. Since cohorts demand considerable resources, it is important to discover which elements are most important and have the greatest effect.

Clarke, Erickson, Collins, and Phelan (2005) also caution on the benefits of preservice science teacher cohorts. They contend that the benefit is not found in the cohort per se but rather in the quality of interaction and the number and kind of ideas generated in and through the cohort. Clarke, et al. argue, "It is important to remind ourselves that it is not the number of people in the group, but rather the number of ideas that are generated and the opportunity to engage, share, and interrogate those ideas that are of primary

importance" (p. 162). They also highlight the need to focus on the process instead of the outcome of engagement in cohort-based teacher education preparation.

Ohana (2005) also reported some unintended outcomes as a result of preservice elementary science teachers' exposure and non-exposure to cohorts and field experiences. Ohana found that numeral measures of achievement were not significant among cohort and noncohort students. Based on the analysis of their journals, noncohort students made more reference than cohort students to their university work. Meanwhile, cohort students tended to focus on their field experiences in journals. There was no evidence to demonstrate that cohort students made more connections between the university science methods course and the extended field experience. Students did not use the information from the science methods course to interpret practice in the field. They also did not indicate if "the course [has] changed their conception of teaching or science" (p. 249). Rather, they developed ideas based on their opinions, their colleagues' opinions, and their experiences in schools.

On issues of academic performance, studies found that the cohort and noncohort students did not differ in numeric measures of academic achievement (Ohana, 2005). McDevitt, et al. (1995) confirmed the same findings in a series of studies designed to evaluate the impact of cohort-based teacher education on students' performance on standardized tests. Cohort and noncohort students did not demonstrate a significant difference in standardized tests measuring their performance in earth science, mathematics, educational psychology, physical science, teaching elementary science, and biology.

General shortcomings of preservice teacher cohorts. Studies on preservice teacher cohorts are all relevant to research on cohort-based science teacher education preparation. Research showing the shortcomings of preservice teacher cohorts were conducted in the context of preservice teacher education programs. The first part of this discussion focuses on the shortcomings of preservice science teacher cohorts. The second part of the discussion is more general in nature. It highlights findings of research conducted with preservice teacher cohorts. Results of these studies are not content specific. Nevertheless, the shortcomings found in these studies are relevant and applicable to science teacher education preparation.

Dinsmore and Wenger (1996) reported some negative consequences of preservice teacher cohorts. They noted that formation of cliques in a cohort left some members out of the group. Other students also shared frustrations when group members did not pull their own weight, meet the demands of the schedule, or contribute to the group discussion. Students classified such actions as things that hindered the group learning. The study also reported that not everybody in the cohort experienced the same sense of community. Feelings of exclusion were apparent in cohort groups.

Radencich, et al. (1998) conducted a phenomenological study of the culture of cohorts in preservice teacher education. Elements of team culture generated both positive and negative consequences. For example, the researchers found that the family-like context of a team culture tended to focus the group inward. This resulted in the "otherness" of those who did not belong to the group. The study also found that "otherness" has two forms, namely: (1) the exclusion of non-team members, and (2) outright attacks on persons whose diversity made them different from the group. This

myopic view of relationships in a cohort team culture may hinder the development of the "community of learners where everyone can experience an accepting and risk-free environment, where diversity is seen as enriching the learning and teaching [process], and inclusion is a natural mode of behavior" (p. 123). Cliquishness and lack of inclusion were the two major concerns in a cohort culture that may result in negative consequences in preservice teacher education preparation.

Beck and Kosnik's (2001) "from cohort to community approach" in preservice science teacher preparation also generated some negative issues and feedback in its implementation. Some students preferred a more impersonal or "academic" style of preservice teacher preparation. Participants were apprehensive that the approach might undermine classroom management. Furthermore, not everybody experienced a sense of community, although there were few students who felt excluded in the group. Beck and Kosnik agreed that there is the need for widespread institutional support in implementing community-based preservice teacher cohort programs. Inadequacy of funding resources was also found to be a hindrance to the success of the program. The program also required faculty members to invest a lot of time in doing activities such as cohort coordination, program integration, community building, school liaison, and practicum supervision. This type of work, according to faculty members involved in the program, "has low status and is regarded poorly in terms of tenure, promotion, and merit pay" (p. 946).

Sapon-Shevin and Chandler-Olcott (2001) examined student cohorts as "communities of critique or dysfunctional families". Specifically, the study explored some critical incidents that disrupted the sense of community in a cohort. It also

highlighted the struggles of faculty members in responding to disruptive incidents. Gender and racial issues also affected the group dynamics of the cohort. The researchers reported, "We struggle not only with how we respond to a disruptive behavior but also with how to maintain supportive, appropriate relationships with other faculty members within and outside the cohort" (p.356). The teacher-researchers also reported that the students did not always share their values about the community. Students saw that the processing of conflicts and critical incidents was "painful and undesirable, the mark of an unsuccessful classroom community" (p. 361). In view of these findings, the researchers provided the following recommendations (p. 362):

1. Faculty [members] should discuss with student cohorts the rationale, hoped-for benefits, and possible land mines for the use of the cohort model.
2. The ways in which cohorts function should be an explicit part of the curriculum of any teacher education program. That is, forming community, dealing with differences, and negotiating conflicts within the cohort and in the K-12 classroom should all be explicitly studied as part of [the] preparation for being a teacher.
3. Teacher educators must implement mechanisms for monitoring and assessing the changes within the student cohort. Faculty can use quick writes, journaling, class discussions, and classroom meeting formats to make transparent the functioning of the community as well as to model how these strategies can be used in K-12 classrooms.
4. Faculty members who share a group of students must find ways to exchange information essential to continuity and smooth functioning of the cohort.

Summary of Research Findings on Shortcomings in Preservice Teacher Cohorts

Previous discussions show the shortcomings of preservice science teacher cohorts in particular and of preservice teacher cohorts in general. Table 2.4 provides the summary of research evidences showing the shortcomings of cohort-based science teacher education preparation. Research suggests that there is a need for more science content integration in a cohort-based science teacher education preparation. As far as science content is concerned, research shows that there is no significant difference in the numeric measures of achievement among cohort and noncohort students. The series of studies conducted by McDevitt, et al. (1995) repeatedly showed that the cohort and noncohort students had similar performance in standardized tests measuring concept understanding in biology, physical science, mathematics, science methods courses, and general psychology.

Furthermore, clique formation was found to be common among preservice teacher cohorts. Despite some of its positive consequences, clique formation tended to promote "otherness" within the cohort resulting in the exclusion of some members of the group and the decline of the sense of community among preservice teacher cohorts (Densmore and Wenger, 2000). Cohort students tended to become cliquish, demanding, and elitist resulting in their "bloated" sense of empowerment (Ohana, 2000). There is also research evidence showing that disruptive behaviors and racial and gender biases within the cohort undermine the formation of a real sense of community. Finally, due to the high demand of time and material resources in managing community-based preservice teacher cohorts, faculty members involved in a cohort-based teacher education programs reported the need for administrative support, funding resources, and support from colleagues.

Table 2. 4

Summary of Research Showing the Shortcomings of Preservice (Science) Teacher Cohorts

Researcher	Shortcoming
Ohana (2000)	• There was a need for more science content integration in the program structure of preservice science teacher cohorts. • There were cases of logistic difficulty in extracting cooperation among faculty from other departments. • Preservice science teachers experienced a "bloated sense of empowerment." • There were inconsistencies in faculty leadership and management rules. • Cohort students became "cliquish, demanding, and elitist." • Cohort studies must be treated with caution because cohorts do not exist as an isolated variable.
Clarke, Erickson, Collins, and Phelan (2005	• Cohort studies must not focus on the cohort per se but on the quality of interactions and the kind of ideas generated in a cohort. • There is a need to focus on the process rather than on the product of cohort engagement.
Ohana (2005)	• Cohort and noncohort students did not differ significantly in numerical measures of achievement. • There was no evidence to prove that students in a cohort group made more connections between their university science methods course and their extended field experience.
McDevitt, Troyer, Ambrosio, Heikkinen, and Warren (1995)	• Cohort and noncohort students did not make a significant difference in standardized tests measuring their performance in earth science, mathematics, educational psychology, physical science, teaching elementary science, and biology.

Table 2.4 (continuation)

Researcher	Shortcoming
Densmore and Wenger (2000)	• Clique formation within the cohort resulted to the feeling of being left out for some students. • Some cohort members became a burden to the group learning. • Some cohort members did not feel the sense of inclusion or community.
Radencich, Thomson, Anderson, et al. (1998)	• The family-like culture of the cohort also resulted to the feeling of "otherness". • Cliquishness and lack of inclusion were apparent in a cohort culture.
Beck and Kosnik (2001)	• Some students preferred an impersonal style of preservice teacher education preparation. • The from-cohort-to-community approach in presevice teacher preparation may undermine classroom management. • Not all students experienced the sense of community in the cohort. • Faculty members expressed the need for institutional support and funding. • The from-cohort-to-community approach in preservice teacher preparation was time consuming and demanding.
Sapon-Shevin and Chandler-Olcott (2001	• There were critical incidents of disruptive behavior undermining the sense of community in the cohort. • There were struggles in dealing disruptive behaviors and in maintaining a supportive environment in the cohort. • Gender and racial issues affected the group dynamics of the cohort. • There were differentiations among students and faculty on the values about the community. • Students viewed the processing of conflicts and dissension in the cohort as painful and undesirable.

Review of Literature on Portfolio Assessment in Preservice Science Teacher Education

Portfolios played a significant part in the assessment of the community immersion experience of prospective science teachers in this study. To shed light on the nature of portfolios, this section reviews the general and specific use of portfolio assessment in prservice teacher and science teacher education. In particular, research studies are examined to ascertain the benefits as well the caveats of portfolio assessment.

General Roles of Portfolios in Evaluation

Bloom, Hastings, and Madaus (1971) identified three stages in evaluation, namely: diagnostic, formative, and summative. The first part of this discussion will revolve around the roles of portfolios in serving the diagnostic, formative, and summative functions of student evaluation. The second part of the discussion will focus on specific roles of portfolios in evaluating student performance in science education.

Portfolios as a diagnostic tool. The notion of portfolio as a diagnostic tool is the least explored topic in the assessment literature. There is a deluge of literature expounding the formative and summative evaluation functions of portfolios. However, there is a limited discussion of its diagnostic function. This section explores the role of portfolios as a diagnostic tool and how this notion might inform the practice of portfolio assessment.

According to Palardy (1994), diagnostic evaluation has two key functions. First, it "places students appropriately at the outset of instruction" (p. 90). Second, it helps "establish reasonable instructional objectives" (p. 90). At the outset, diagnostic evaluation determines what students know and do not know prior to instruction. This information could be the basis for placement and grouping decisions. Furthermore,

diagnostic evaluation assists the teacher in setting a realistic set of objectives for students in view of their individual differences. Palardy contends that "appropriate placements without differentiated expectations are basically a waste of professional know how and time" (p. 91). Hence, diagnostic evaluation must revolve around these intentions.

Diagnostic evaluation must start somewhere. However, there are different opinions as to where the beginning should start. Diagnostic evaluation could be done at the beginning of either a lesson, a unit, a semester, a grading period, a course, or a program. These different notions of the beginning and end of an evaluation cycle inform the decisions to be made for placement and goal setting of the next evaluation cycle. Consequently, portfolios as a diagnostic tool might be the end of one evaluation cycle and the beginning of the next evaluation cycle.

There is literature that explores the use of portfolios in diagnosing learners' skills, competence, and awareness of their preferences, styles, dispositions, and learning strategies for informed decision- making (Nunes, 2004). Dubbed as "diagnostic-reflective portfolios", Courtney and Abodeeb (1999) described the case of a teacher educator and his students who collaborated in the creation of diagnostic data to guide instruction. These diagnostic-reflective portfolios helped students to become aware of their own strategies for meaning construction. The diagnostic data, along with the students' work samples and goals, became the springboard for the teacher to discuss the students' needs and competencies and to guide the teacher's courses of action (Tierney, 1998). The aim of the diagnostic-reflective portfolios was to help students understand their own individual learning process as they constructed new goals and directed their

own progress. The continuous refinement of goals enabled the students to make informed decisions about their own learning and allowed the teacher to plan his/her instruction.

Portfolios as a diagnostic tool might be useful in student evaluation that requires the learning process to be broken down into segments. Each learning segment may serve as a separate evaluation cycle where the end of an evaluation cycle may serve as the beginning of the next cycle. Portfolios constructed at the end of a cycle could become a diagnostic tool for the next learning process.

Portfolio as a formative assessment tool. The purpose of formative evaluation is to provide feedback to students and teachers regarding the progress the former made towards the attainment of goals (Palardy, 1994). Formative evaluation includes a repertoire of formal and informal procedures undertaken by the teacher in order to modify and enhance student learning. A successful formative evaluation occurs when students and teachers co-inform each other for the improvement of instruction and the learning process (Cowie and Bell, 1999).

Against this backdrop, Wolf (1993) described the portfolio process as a labor and time-intensive commitment consisting of formative feedback in the form of deliberation and dialogue between/among students and teachers. This notion, according to Delandshere and Arens (2003), is contrary to the traditional idea of portfolios as "collections of work and reflections to be read and evaluated once in a summative manner" (p. 58). As a formative evaluation tool, portfolios are dynamic and interactive. They are constructed in the pursuit of developing understandings among students through the process of constant dialogue and feedback mechanism. They are given to the teacher not at the end but during multiple points of the learning process.

The strength of portfolios as a formative assessment tool lies in their effective capacity to document a process (Barton & Collin, 1993). Portfolios are not an isolated evaluation instrument but a coherent documentation of one's experiences, struggles, tasks, growth, and accomplishments. Students and teachers must be engaged in an ongoing formative-supportive interaction during the portfolio making process (Borko, Michalec, Timmons, & Siddle, 1997). The practice of portfolio as a formative assessment tool was exemplified in Donelly's (2005) model of a "working portfolio." In this model, portfolio preparation was conceived of as developmental snapshots of student learning in the teacher education preparation program. Donelly's working portfolio was initiated at the onset of the program and it continued until a student finished his/her program. Ongoing evaluation took place at various checkpoints in the program that impacted the content and organization of the portfolio. This approach has been dubbed as a "developmental process." It starts at the "preparation of a working portfolio, it continues at meeting the specific course objectives, and it progresses towards the presentation of a final showcase portfolio that serves as an exit requirement" (p. 56).

Portfolios as a summative assessment tool. Like diagnostic and formative evaluation, summative evaluation is very important in the learning process and motivation of students (Palardy, 1994). The basic function of summative evaluation is to judge the worth of something, which is either a process or a product. At the end of this evaluation, a decision is made. This decision may take the form of a grade, which is the teachers' judgment of student progress and an embodiment of the value or worth of something. The grade that a student gets may be assigned in "comparison with [his] peers, in comparison with absolute standards, or in comparison with [him]self" (p. 92).

Portfolios, as a summative assessment tool, should provide evidence of the intended learning outcomes. In science education, these intended outcomes include the "body of content [knowledge] ranging from definitions of terms to conceptual structures that explain and predict natural events" (Collins, 1992, p. 454). According to Collins, the evidence in the portfolio should also include the students' thinking skills ranging from simple science process skills (e.g. evidences of observing, comparing, classifying) to higher order-thinking skills (.e.g. creative thinking, problem solving). Finally, other evidence in the portfolio should include "some social implications of science ranging from working with a group on experiment to realizing how the contributions of science influence lifestyle options" (p. 454). As an exit requirement, portfolios should provide a summative presentation of acquired knowledge and skills required for graduation (Collins, 1992).

Specific Roles of Portfolio in Evaluation

Judging the merit of portfolios against the traditional form of evaluation, Johnson and Rose (1997, p. 10) identified the following characteristics of portfolios as an assessment tool:

- Portfolios provide the link between/among assessment, teaching, and learning.
- They address the importance of student's prior knowledge as a critical determinant to learning by using authentic assessment activities.
- They provide opportunities to demonstrate inferential and critical thinking that are essential for constructing meaning.
- They represent a collaborative approach to assessment involving both students and teachers.

- They use multi-faceted activities while recognizing that learning requires integration and coordination of communication skills.
- They represent the full range of instructional activities that students are engaging in their classrooms. And they can measure the student's ability to perform appropriately in unanticipated situations.
- They measure each student's achievement while allowing individual differences.
- They address improvement, effort, and achievement.
- They allow students' self-assessment as a goal by asking them to monitor their learning.
- They engage students in assessing their progress and/or accomplishments and establishing on-going learning goals.
- They provide students opportunities to reflect upon feelings about learning.

Drawing from the twelve characteristics of portfolio assessment, the succeeding discussion focuses on the thematic roles of portfolios in student evaluation in science education.

Portfolios document student progress overtime. The notion of the portfolio as an assessment tool to probe students' progress over time has been explored in literature (Carroll, Pottholff, & Huber, 1996; McKinney, 1998; Edgerton, Hutchings, & Quinlan, 1994). In this role, portfolios may provide baseline information on students' prior instructional knowledge and may document their learning, growth, and development over time (Caroll, et al., 1996). According to Slater (2004), portfolios are a "student-created purposeful collection of evidence that demonstrates effort, *progress* [itals mine],

achievement, and mastery of specified learning objectives" (p.70). The demonstration of student progress denotes a collection of evidence in a span of time.

As a record of students' growth, portfolios can serve the purposes of both teachers and students (Hanson & Gilkerson, 1999). Students are provided with opportunities to document and reflect on their learning. They can examine their work and reflect on the goals that they meet or do not meet. They can look back at their early efforts and compare with later pieces to see how they have changed in and through time (Wade & Yarbrough, 1996). In the same manner, portfolios can help teachers evaluate students' growth and achievement, which could serve as a basis for grading. They can examine the portfolio and probe the congruence of the set of objectives and the support materials and documents that the students provide.

Portfolios are not limited to students. Teachers can also actively participate in the documentation of students' progress. Some scholars suggest that a portfolio may be collaboratively designed and constructed by students and teachers. According to Glasson and McKenzie (1999), portfolios are "repositories of assessment and documentation processes that display the development of learning as teachers and students become engaged in a dialogue about their investigations" (p. 336). From the teacher's point of view, portfolio assessment can be defined as a purposeful, multifaceted process of collecting documentation of children's growth, progress, and effort over time.

In science teacher education, portfolios can be used as an authentic assessment tool within courses and programs. They can capture the complexities of learning, teaching, and learning to teach (McKinney, 1998). According to Wolf (1991), portfolios can document the unfolding of the complex teaching and learning process over time. For

example, a science teaching portfolio can provide a factual description of the student teachers' major strengths and teaching achievements. Dubbed as an "extended teaching resume," teaching portfolios are repositories of the student teachers' "comprehensive account of [their] teaching activity over a defined period of time" (Edgerton, et al., 1994, p. 695). In a science teaching portfolio, student teachers might highlight salient selections of documents that show their unique approach to science teaching.

Portfolios can promote self-reflection. The theoretical support for portfolios as a reflective tool is strong (Wolf, Whinery, & Hagetry, 1995). According to Wolf (1992), portfolios promote self- analysis and critical reflection in ways that help unpack the complexities of teaching. This view is consistent with a constructivist framework; portfolios help the learners construct their new meanings in terms of what they already know. As a reflective tool, portfolios may help students relive and recapture their experiences in order to make sense of them, learn from them, and develop new understandings and appreciation of them (Knapp, 1993; Wade & Yarbrough, 1996). In teacher education, the portfolio serves as a mechanism for students to think through the connectedness of ideas and to construct meanings based on their own emerging understanding of the personal and professional dimensions of teaching (Biddle & Lasley, 1991).

McKinney (1998) emphasized that preservice science students who create their own portfolios in a teacher preparation program are believed to be more receptive in their implementation once they start working as professional teachers. For instance, Carroll, et al. (1996) created a teacher education portfolio model that enabled preservice teachers to reflect upon their teaching skills, knowledge, and understandings; assist them in melding

theories and practices of teaching and learning; provide representation of their growth as teachers; and establish a foundation for goal setting, reflection, and introspection. This reflective stance is believed to be the outcome when preservice teachers' revisit and revise their ideas over time (Carroll, et al., 1996).

Recently teaching portfolios have received increasing attention among teacher educators for their role in promoting reflection among preservice and in-service teachers (Loughran & Corrigan, 1995; Wolf, et al., 1995; Zubizarreta, 1994). Teaching portfolios are used by beginning teachers to reflect on the what, how, and why of teaching (Edgerton, 1994). According to Richert (1990), student teachers tend to remember classroom events more fully and accurately through portfolios. Their reflections are more focused on content specific aspects of teaching. According to Borko, Michalec, Timmons, and Siddle (1997) teaching portfolios also "create a need for [student] teachers to systematically examine their practice; encourage them to gather information on their practice….; and create a meaningful context in which to link the university and its research-based knowledge with the classroom and its practical demands" (p, 345-346).

Portfolios provide evidence of learning. Dubbed as "portfolio-based learning," there are many benefits of portfolios as an educational activity in the classroom (Challis, 1999). First of all, according to Challis, the use of portfolios is flexible; portfolios allow learners to use different learning styles depending on their preference. Second, portfolios recognize and encourage autonomous and reflective learning, which is important in individual and professional development. Third, they accommodate the evidence of learning from a range of different context. Fourth, they allow assessment to work within a framework of transparent and declared criteria for learning objectives. And fifth, they

provide a process for both formative and summative assessment, based on either personally derived or externally governed learning objectives.

Portfolio conceptualization and design are potential learning experiences for both students and teachers. Collins (1991) explains how the portfolio process affords students and teachers the opportunity to identify instructional goals for the science class, articulate the criteria for success, publicly negotiate what counts as evidence, participate in both the design and development process, express individual strengths, and become self-reflective and co-learners. Consequently, according to Collins, portfolios are a repository for assessment and documentations—they allow the development of learning as teachers and students become engaged in dialogue about their investigations.

McKinney (1998) points out that in teacher education, well-constructed portfolios may help capture the "complexities of learning, teaching, and learning to teach when [they are] used as authentic assessment tool within courses and programs" (p. 85). It is therefore necessary to link portfolios to instructional objectives, make them an ongoing learning and assessment process, and emphasize the performance-based and purposeful nature of learning portfolios (Hanson & Gilkerson, 1999). When these are emphasized, portfolios become an inquiry approach that helps shift ownership and responsibility of learning to the learner (Graves & Sunstein, 1992).

Portfolios combine the learning process with student assessment. Portfolios have been considered as an important avenue for both learning and assessment. Slater (1994) emphasizes that "portfolio assessment has the particular advantage of combining the learning process with student assessment and further clarifies the learning objectives." (p. 370) Slater contends that portfolios are student-created, purposeful collections of

evidence that demonstrate effort, progress, achievement and mastery of specified learning objectives. Slater notes (p. 370),

> Portfolio provides a forum for graded tasks in which more authentic and somewhat lengthy assignments can be encouraged. An authentic task is one in which students are required to address real-life problems. These tasks are typically complex, somewhat undefined, engaging problems that require students to apply, synthesize, and evaluate various problem-solving approaches. Students can use portfolio to demonstrate a holistic view of physics, the reporting and use of scientific methodology, and the manipulation of scientific apparatus when addressing complex and multifaceted problems grounded in real-world contexts.

Slater (1994) further contends that "portfolio style assessments provide students with a specific set of learning objectives for mastery" (p. 370). The learner then creates an individualized assessment portfolio that describes in detail the extent to which the learning objectives have been achieved.

Portfolios as an authentic assessment tool. According to Collins (1992), portfolios can be considered as authentic assessment tools. As an authentic assessment tool, portfolios specify the criteria for success and make these criteria a public knowledge. Portfolios allow collaboration among students and between the students and teacher. Assessment rubrics are contextualized and represent realistic but fair practices of the discipline. The scoring rubric must be complex and multi-paced, which appropriately includes the self-assessment. Collins contends that portfolios must allow persons being assessed to show off what they do well. As an authentic assessment tool, portfolios must be dynamic, multipurpose, and multi-source. They should encourage the integration of

knowledge and skills learned from different sources. They should promote pride in ownership and must include peer evaluation.

Benefits of Portfolio Assessment

There are research studies that support the use of portfolio as a learning, teaching, and assessment tool. The succeeding discussion highlights research evidence which supports the benefits of portfolio assessment. These studies are grouped according to the following themes: (1) portfolio in preservice teacher education, (2) portfolio in the undergraduate science course, (3) portfolio in pre-college education, and (4) portfolio in in-service education. A summary of research findings is depicted in a tabular form at the end of this discussion.

Portfolio in preservice teacher education. Wade and Yarbrough (1996) conducted a survey on the perceived usefulness of portfolios among 212 preservice teachers. To complement the survey data, they examined interview data and essays to probe how students made sense of their community service learning through portfolio construction. Findings revealed that the portfolio-making process prompted reflective thinking in many students. Participants considered the portfolios useful for personal reflection and remembering. They also found the portfolio useful for job interviews and for sharing with friends, family, and classmates. More than half of the students indicated that they were involved in deep reflection through the process of constructing the portfolio. Portfolios helped students develop their abilities to make sense of their service-learning, themselves, others, and service. Students noted that they learned patience, optimism, open-mindedness, self-efficacy, and gratitude through self-reflection.

In addition to linking their community-service learning with their future teaching, students also made connections to other people, interests, and activities outside the realm of the methods course assignment. Preservice teachers, with interest in literature, poetry, and volunteer work, incorporated these interests in their portfolio in a variety of ways. Many of the teacher education students demonstrated reflective thinking in the process of portfolio making. Wade and Yarbrough (1996) concluded, "We found considerable evidence of students making sense of their community service learning experience, developing new understandings and appreciations [of the experience], recognizing links between different aspects of their life experience, and formulating insights for the future actions" (p. 76)

Borko, et al., (1997) conducted an action research study to investigate whether student teachers' construction of portfolios would enhance their reflection during practice teaching. The sources of data were written reflections and semi-structured interviews. The data were analyzed using domain, narrative, and thematic analyses. Results of the study revealed that the students used their portfolios as a tool for reflection. The portfolios allowed them to make connections between theory and practice. Students reported, "The process of putting together a portfolio helped them to think about their strengths and limitations as developing teachers" (p. 351). Portfolios allowed students to become more realistic about their teaching and to identify ways to improve it. Several students commented that portfolios helped them reflect about their individuality, their learning process, and their ideas about teaching.

Reis and Villaume (2002) examined the benefits, tension, and visions that emerged when a college of education in a southern state developed and implemented a

college-wide portfolio assessment in their teacher education program. They utilized a case study approach. Preservice elementary teachers and their cooperating teachers and university supervisors served as participants of the study. A questionnaire, survey, and interview were the sources of data. Results of the study revealed that portfolios resulted in increased reflection and development of practical skills such as lesson planning, organization, and time management.

Portfolio in an undergraduate science course. Slater, Ryan, and Samson (1997) conducted a study on the impact and dynamics of portfolio assessment and traditional assessment in a college physics course. They utilized a two-group comparison design to document the use of student-created portfolios in an algebra, college level, introductory physics course. Sixteen and nineteen students were exposed to the portfolio-style assessment and the traditional objective examination, respectively. The students' exposure/non-exposure to portfolio-style assessment was analyzed based on the impact on the final examination score and the pretest-posttest self-report survey. Focus group interviews were used to support the quantitative data. Results of the study showed that there were no significant differences in the final examination scores and on students' self-report of achievement between the two groups. However, qualitative results showed the benefits of portfolio assessment. First, the portfolio reduced the test anxiety among students. Second, students exposed to portfolio assessment viewed their learning from a broader perspective instead of "memorizing equations". Third, the use of portfolio enabled the students to work more consistently instead of cramming. Fourth, the use of the portfolio shifted students' attention to the application of principles instead of the memorization of facts. As Slater, et al. note,

> Portfolio assessment procedures allowed instructors to view student achievement in a longitudinal and holistic perspective. The college physics classroom learning environment is positively enhanced when students embrace the task of creating portfolios as evidence of their abilities and comprehension. The creation of portfolio requires the learner to go beyond the traditional expectation of concept recognition in the classroom. This process encourages students to devote considerable time to their studies. Moreover, students draw connections to physics beyond the classroom…; their knowledge becomes more broad and less discretely packaged. The learner is encouraged to seek out physics concepts in the physical world and describe these experiences as evidence of learning (p. 270).

Barrow (1993) conducted a qualitative ethnographic study on the use of portfolios to assess student learning in college chemistry. Using the constructivist perspective to frame his research, Barrow compared the performance of students who did and did not use portfolios for class assessment. Findings of the study resulted in two assertions: First, students who constructed portfolios scored a higher overall average in the general chemistry course than the students who were evaluated through the standard paper and pencil tests. Second, students performed better on their portfolios than the traditional pencil and paper chemistry test. Barrow explained,

> Students who developed portfolios perform better in this course than non-portfolio students because they were willing to take responsibility for their own science learning including facing the sometimes odious and even painful task of critical self-evaluation. This was facilitated by the fact that portfolios presented an opportunity for students to investigate the science and science-learning related

problems that the student saw as unique to him/her. Most students who developed portfolios were intrinsically motivated and task-involved (p. 152).

*Portfolio in pre-college education***.** Barootchi and Keshavarz (2002) conducted an experimental study on the effect of portfolio assessment on students' achievement in English as a second language and feeling of responsibility towards monitoring their growth. Participants were 60 Iranian high school students divided into two groups. One group was exposed to the teacher-made test only and the other group was exposed to portfolio assessment and teacher-made tests. Results of the study showed that students exposed to portfolio assessment had higher achievement and feelings of responsibility towards monitoring their progress. The portfolio assessment scores correlated significantly with those of the teacher-made achievement test. The researchers concluded that portfolio assessment is a promising testing and teaching tool. The authors suggest that portfolio assessment can be used in conjunction with the teacher-made test to "provide the continuous, on-going measurement of students' growth needed for formative evaluation and for planning instructional programs" (p. 279).

Underwood (1998) conducted a yearlong, system-wide quasi-experimental study on the influence of portfolio assessment systems on literacy achievement and motivational orientation of students in a northern California middle school. Students in portfolio classrooms were exposed to portfolio making and assessment. They were graded according to a rubric developed by the teachers involved in the project. By contrast, students in nonportfolio classrooms were graded according to the traditional mode of evaluation. Students in both classrooms were evaluated in terms of their reading achievement, writing achievement, and motivational goal orientation. Results showed

that the portfolio assessment system had a significant effect on the achievement of students. Students who were exposed to portfolio making and assessment also registered higher levels of learning goal orientation than did students in nonportfolio classrooms.

*Portfolio in-service teacher education***.** Benson and Smith (1998) conducted an in-depth qualitative study of teachers' experience in the implementation of portfolio assessment with their students. Four first grade school teachers served as participants of the study. The study utilized a combination of case study and action research methods. Based on interviews, observations, and the analysis of documents, the researchers established four benefits of portfolio as an alternative assessment tool. First, portfolios enhanced the communication and rapport between teachers and parents. Second, portfolios facilitated the self-assessment skills of students. Third, the portfolio became the means to improve the instructional decision making of teachers. And fourth, teachers noted the positive impact of portfolios on students' ability to make decisions about their individual growth and development. Students expressed pride in their portfolios and indicated the feeling of ownership and being part of the assessment process.

Zou (2002) described her instructional practices revolving around portfolio assessment. She investigated the benefits and/or disadvantages of organizing instructional practices around portfolio assessment. She also explored students' self-efficacy and attitude towards portfolio assessment. Using her class as a case, a survey was conducted with 24 respondents who were exposed to portfolio assessment. Findings of the study showed an improved student self-efficacy and performance in compiling the portfolio. Students had higher cognitive awareness of their learning process and better understanding of learning as a reflective act.

Table 2.5

Summary of Research Showing the Merits of Portfolios

Researchers	Research Purpose	Research Design	Major Finding
Wade & Yarbrough (1996)	Investigated the perceived usefulness of portfolio in pre-service teacher education	Quantitative-qualitative; survey, interview, essays; 121 preservice teachers	• Portfolios promoted reflective thinking. • Students learned patience, optimism, open-mindedness, self-efficacy, and gratitude through self-reflection. • Portfolios were found useful for personal reflection and remembering. • Portfolios were useful for job interview and for sharing with friends, classmates, and family.
Borko, et al (1997)	To investigate the influence of portfolios in the student teachers' reflection	Action research; elem. certification students; written reflections & semi-structured interviews; domain, narrative, thematic analyses	• Portfolios promoted reflection. • They allow students to - make connections between theory and practice. - think about their strengths and limitations. - clarify ideas about teaching. - identify ways to improve teaching.
Reis & Villaume (2002)	Examined the benefits, tension, and visions in portfolio-based assessment in teacher education	Case study; preservice teachers; cooperating teachers; survey, interviews; questionnaires	• Portfolios resulted to - an increased reflection. - the development of practical skills such as lesson planning, organization and time management. - greater preparation for job interviews.

Table 2.5 (continuation)

Researchers	Research Purpose	Research Design	Major Finding
Slater, Ryan, & Samson (1997)	Studied the impact and dynamics of portfolio assessment and traditional assessment in a college physics course	Two-group comparison design (experimental); portfolio assessment vs. traditional, objective type of examination; focus-group interview	• No significant difference was noted in achievement. • However, qualitative results showed that students in a portfolio assessment class - had reduced test anxiety. - viewed learning from a broader perspective. - consistently worked without cramming. - shifted attention to application of principles instead of the memorization of facts.
Barrow, 1993	Describe the chemistry performance of portfolio and nonportfolio students	Qualitative ethnographic study	• Students who did portfolios scored a higher overall average in general chemistry. • Students performed better in their portfolios than in the traditional pencil and paper chemistry tests.
Barrootchi & Keshavarz (2002)	Studied the effect of portfolios on student achievement and feeling of responsibility	Experimental; two groups, 30 students each; Iranian high school students	• Students exposed to portfolio assessment in combination with the teacher-made test promoted higher achievement and feeling of responsibility compare to students who were exposed to teacher-made test only.

Table 2.5 (continuation)

Researchers	Research Purpose	Research Design	Major Finding
Underwood (1998)	Studied the influence of quasi-experimental study on literacy achievement and motivational orientation.	Quasi-experimental	• Portfolios had significant effects on student achievement and motivational goal orientation.
Benson & Smith (1998)	Studied the teachers' experience in the implementation of portfolio assessment for their students.	Combination of case study and action research; four teachers; interviews, observations, and analysis of archival data	• Portfolios - enhanced the communication between students and teachers. - facilitated the self-assessment skills of students. - helped improved the decision making skills of teachers. - impacted students' ability to make decisions for themselves. - promoted the feeling of ownership among students.
Zou (2002)	Investigated students' self-efficacy and attitudes towards portfolio	Case study; survey and observation; 24 respondents	• Portfolio resulted in - an improved student self-efficacy. - a higher cognitive awareness of the learning process. - higher understanding of learning as a reflective act.

Caveats Concerning Portfolio Assessment

Despite the positive results of portfolio assessment in a community service-learning program, Wade and Yarbrough (1996) cautioned on the use of portfolios in preservice teacher education program. They found that reflective thinking through portfolios did not occur for everybody. Some students struggled with the process. There was confusion, frustration, and misperceptions about the portfolio. They found that students who misunderstood the use of portfolios were also likely to experience confusion and frustration in the process of developing it. Wade and Yarbrough contended that the reflective benefit of portfolios was not universal. They reported, "Some students remained confused and frustrated with their efforts to represent their service-learning experience in a portfolio; their attempts in their own words, were 'haphazard,' 'disappointing,' or 'not the masterpiece I had hoped it would be" (p. 76).

In view of these findings, Wade and Yarbrough (1996) advanced the following recommendations: (1) Focus attention on students' initial understanding of the portfolio process, its purpose in the course, and its role in enhancing reflection; (2) Encourage student ownership, individual expression, and making connections between assignments and outside of class interests; (3) Provide structure in the form of some required portfolio assignments, due dates, specific times for in-class sharing, and constructive feedback from both other students and the instructor; and (4) Evaluate the portfolio process and use of the portfolios by students.

Borko, et al.(1997) also found that portfolio assessment has some limitations. They found that some students considered the process of preparing their portfolio too time-consuming; it drew their attention away from student teaching and students. Some

students reported lack of sufficient portfolio models to follow and the ineffective use of portfolio groups. Another source of tension in portfolio assessment was the difference in value orientation and purpose between teacher educators and students. Several student teachers felt torn between the creation of a document for their own learning and benefit and the completion of an assignment in order to achieve a high grade. In order to maximize learning from the portfolio assessment, students identified three factors that facilitated the process of portfolio construction, namely: (1) support and guidance from the university program, (2) sharing ideas with peers, and (3) support from the cooperating teacher.

Reis and Villaume (2002) examined the benefits, tensions, and visions that emerged when a college of education in a southern state developed and implemented a college-wide portfolio assessment in the teacher education program. Findings of the study revealed three tensions associated with portfolio use. First, portfolio development and implementation was an intensive and time-consuming process. Student teachers reported that a large amount of time was required to complete the portfolio, which limited the kind of reflections they entered in their portfolio. University supervisors commented on the enormous amount of time required to collaboratively develop and revise exit portfolio guidelines and scoring rubrics. Despite the increased validity of the portfolio assessment, participants expressed its weakness in terms of reliability; issues of consistency in scoring continued to surface. A tension also existed between the development of an autonomous stance on the design, entries, and criteria for portfolios among students and the desire to meet predetermined requirements and expectations based on standards. Participants experienced tension between autonomy and compliance.

Herman, Gearhart, and Aschbacher (1994) conducted a series of studies on the state-wide implementation of portfolio assessment and its effects on students' writing. Salient findings of the study revealed some limitations of portfolios:

1. Portfolios were often simply a collection of students' work with little advanced design or thought about what should be collected or how the information should be used.
2. Teachers and administrators experienced difficulty in specifying criteria for judging students' work. In some instances, they clearly did not have sufficient content or curricular knowledge to articulate specific criteria for judging student performance.
3. Teachers often noted a lack of time as a major barrier in implementing portfolio assessment. They needed additional time to design tasks worthy of exhibition; to design or adapt scoring criteria and apply those criteria; to consider the implications of the results and confer with individual students, and provide opportunities for self reflection (Herman, Gearhart, & Aschbacher, 1994, pp. 3-9).

Breault (2004) examined the decision-making processes of preservice teachers as they constructed the student teaching portfolio. Ten preservice teachers participated in the case study. Results showed a confusion of purpose and inconsistencies between the university faculty and the student teacher expectation and use of portfolio. Areas of dissonance revolved around four major themes, namely: purpose, value, perception, and context. There was no faculty consensus on the value and purpose of portfolios. Students had difficulty in conceptualizing a fit between the portfolio and the totality of

the teaching experience; they could not relate the process to the meaningful context of the teacher preparation program. The factors that contributed to the dissonance were "the lack of clarity of stated purpose for the portfolio, the student teaching environment, and the uncertainty of the formative and summative nature of the assessment" (p. 848).

Underwood (1998) conducted a yearlong, system-wide quasi-experimental study on the influence of a portfolio assessment system on the literacy achievement and motivational orientation among students in a northern California middle school. Students in portfolio classrooms were exposed to portfolio making and assessment. They were graded according to the rubric developed by the teachers involved in the project. On the contrary, students in nonportfolio classrooms were graded according to the traditional mode of evaluation. Students in both classrooms were evaluated in terms of their reading achievement, writing achievement, and motivational goal orientation. Despite the students' gain in reading achievement and motivational goal orientation, the portfolio assessment system did not result in a significant difference in writing achievement among portfolio and nonportfolio students.

Wolfe and Miller (1997) reported the barriers to the implementation of a large-scale implementation of portfolio assessment in secondary education. A survey was conducted to 206 teachers distributed across three content areas—language arts, mathematics, and science. Results of the study showed that the most profound barriers to large- scale portfolio implementation are the amount of time required for portfolios and the difficulty of scoring them. The barriers that prevented teachers from using portfolios in their classrooms were related to the amount of time required for planning the portfolio implementation, for the preparation of portfolios for external review, and for

understanding the logistics and concepts necessary for using portfolios. There was lack of money to pay for the release time of teachers involved in the project. The teachers also indicated difficulty in scoring the portfolios, in communicating the scoring criteria to students and parents, and in developing the scoring criteria.

Benson and Smith (1998) conducted an in-depth qualitative study of teachers' experience in the implementation of portfolio assessment with their students. Four first grade teachers served as participants of the study. The researchers utilized a combination of case study and action research. Based on interviews, observations and the analysis of documents, the researchers experienced constraints in portfolio assessment. The four teachers verified the previous findings regarding portfolio assessment—rewarding but time consuming. They reported time and management constraints in the implementation of portfolio assessment. They expressed the lack of time to prepare students for their project and to assess students' portfolios.

Delandshere and Arens (2003) explored the quality of evidence represented in student portfolios and the inferences drawn from them in the preservice teacher education program. Their case study focused on three teacher education institutions with a history of portfolio use in their elementary teacher education programs. Results showed a mismatch between the students' and the teacher educators' intentions for doing the portfolio. Student teachers became more focused on their search for employment and made their portfolios revolve around that goal. Meanwhile, teacher educators emphasized the congruence of portfolios to the standards of the program. The study also found incoherence in portfolio presentations among students who interchangeably used the evidence and artifacts.

Table 2.6

Summary of Research that Cautions the Use of Portfolio Assessment

Researcher	Finding
Wade and Yarbrough (1994)	• Reflective thinking did not occur for everybody. • Students experienced confusion and frustration in the process of making portfolio. • Researchers recommended a/an - focused attention on students' initial understanding of the portfolio process, its purpose in the course, and its role in enhancing reflection. - an encouragement of student ownership, individual expression, and making connections between assignments and outside-of-class interests. - provision of structure in the form of some required portfolio assignments, due dates, specific times for in-class sharing, and constructive feedback from both other students and the instructor. - student evaluation of the portfolio process and the use of portfolios.
Borko, et al (1997)	• Students reported that portfolio/portfolio-making - was time-consuming. - distracted their attention from teaching and students. • There were insufficient portfolio models and ineffective portfolio groups. • There were differences in value-orientation and purpose of portfolio between/among teacher educators and student teachers.
Reis & Villaume (2002)	• Students reported that portfolio/portfolio-making - was time consuming. - was unreliably scored; there were inconsistencies in scoring. - created a tension between autonomy and compliance.

Table 2.6 (continuation)

Researcher	Finding
Slater, Ryan, & Samson (1997)	• There was no significant difference in achievement as a result of expose/non-exposure to portfolio assessment.
Barrow (1993)	• Students who did portfolios scored a higher overall average in general chemistry.
Herman, Gearhart, & Aschbacher (1994)	• Portfolios were simply "a collection of students' work." • Teachers and administrators experienced difficulty in specifying the criteria for assessment. • Teachers considered the lack of time as a major barrier in portfolio assessment.
Breault (2004)	• There was dissonance in purpose, value, perception, and context. • Factors associated to dissonance were the lack of clarity of stated purpose for the portfolio, the student teaching environment, and the uncertainty of the formative and summative nature of the assessment
Underwood (1998)	• No significant difference in writing achievement was found among portfolio and nonportfolio students.
Wolfe & Miller (1997)	• Difficulties met in portfolio assessment were the lack of time and the difficulty of scoring them.
Benson & Smith (1998)	• The barrier to portfolio assessment related to time and management constraints.
Delandshere and Arens (2003)	• There was a mismatch between the students' and the teacher educators' intention in doing the portfolio. • There was an incoherence in the presentation of portfolio.

Locating the Relevance of Portfolio Assessment in Community Immersion

Community immersion in this study extends far beyond the concept of a community stay or a course with a community field experience. It is envisioned as a set of activities that are woven together to create an experience which fosters in prospective teachers confidence in content knowledge, skills, and attitudes in the enactment of community immersion activities; broadens their understanding of the relationship between the school and the community; and enables them to transform their experiences into useful practices in science education and preservice science teacher preparation. Due to the process-based and experiential nature of this research, it requires an authentic and nontraditional way of documenting and evaluating the community immersion experience among members of the research team.

There are nine reasons why portfolios are deemed useful/important in the current study. In this study, the portfolio is conceptualized as a learning and assessment tool—one that documents/ evaluates the community immersion as a/an (1) process; (2) collaborative activity; (3) record of growth and learning over time; (4) holistic experience; (5) constructivist, participant-centered activity; (6) lived experience; (7) personal and meaningful journey; (8) authentic experience; and (9) reflective activity.

Portfolio documents the community immersion experience as a process. The research team considered the community immersion as a process, thus, the unfolding of events could best be documented using the portfolio. As a process, the study was concerned with how each member of the research team went through the experience. The research team hoped to capture difficulties, struggles, dilemmas, joys, and successes in

every step of the action cycle. Portfolios, in addition to other data sources, were used to capture these experiences in detail and in-depth.

Portfolio documents collaborative activity. As a collaborative action ethnography, members of the research team were co-learners and co-inquirers in the study. They planned together their action and worked together on their plans. The portfolio was a tool for documenting the research activities and interactions of the team. Since the research aimed to build a community of co-learners and co-inquirers, the portfolio was an appropriate tool for documenting the collaborative work of the members of the research team in the attainment of the goals in the action plan.

Portfolio documents the record of growth and learning over time. The entire one-semester community immersion course was divided into action cycles. These action cycles contained all the activities and processes that members of the research team participated in throughout the semester. Documentation started at the beginning and culminated at the end of the semester. In the study, the portfolio was conceptualized as both a process and a product. As a process, the portfolio was envisioned as a tool to document the "developmental snapshots" of the collaborative activity and the growth in knowledge and experience of its participants.

Portfolio documents community immersion as a holistic experience. The portfolio was useful in this study because of its advantage in documenting varied learning experiences. Community immersion is an academic activity that allows learning to occur in multiple levels and from multiple sources. The potential of community immersion as an avenue for learning is great. The advantage of using the portfolio as a learning and assessment tool lies in its potential to document multiple learning(s) (e.g. content

knowledge, social activity and interaction, the emotional and psychological learning experience, skills, and the repertoire of values) throughout the community immersion experience.

Portfolio as an authentic assessment tool. Collins (1992) outlined the merits of the portfolio as an authentic assessment tool. This notion of authentic assessment guided the members of the research team in making sense of their community immersion experience. According to Collins, an authentic assessment must (1) specify the criteria for success, (2) make the criteria a public knowledge, (3) allow collaboration among group members, (4) allow the "best" to be shown off, (5) promote pride in ownership, and (6) include peer evaluation. These criteria served to guide the research team's efforts in the development of assessment criteria and in grading community immersion portfolios.

Review of Literature on Community and Science Teacher Education

This section presents a review of literature and theoretical assumptions underpinning the utility of the term "community" in science teacher preparation. The first part of the section focuses on several definitions of community, with an analysis of the disciplinary, theoretical and conceptual foundations and their utility for use in a community immersion course for science teacher education students. The second part of the section builds a research-based literature on community-based science teacher education. It discusses studies that utilize notions of community in preservice science teacher preparation. Part of this section attempts to link conceptual and theoretical ideas on community and preservice science teacher preparation.

Notions of Community

There is no single perspective on the definition of community. Notions of community come from various disciplinary and theoretical orientations. The field of anthropology, ecology, sociology, and psychology and viewpoints coming from feminist, ethical, and postmodern theories have provided rich contextual and conceptual perspectives in analyzing notions of community.

Community from an anthropological perspective. Ecological anthropologists Agrawal and Gibson (1999) explored the conceptual origin of "community" in the context of community-based conservation and resource management. Drawing from various literature, they reviewed conceptualizations of community "as a spatial unit, as a homogeneous social structure, and as a set of shared norms" (p. 633). As a spatial unit, community is traditionally conceptualized as small in size, with territorial affiliation among its members. According to Agrawal and Gibson, this conceptualization evolved from a German word *gemeinschaft* - a village characterized by "intimate, private, and exclusive living together" (p. 633, see also Tonnies, 1955/1974; and Bender, 1978, p. 17).

According to Agrawal and Gibson (1999), community from the outside is perceived to be homogeneous in terms of its ethnic, religious, or linguistic attributions. As a "homogeneous social structure," it is comprised of households or a group of people "with common characteristics in terms of ethnicity, religion, caste, or language" (p. 634). These commonalities tend to facilitate harmony and cooperative solutions in the community and reduce hierarchical and conflicted interactions. However, this conceptualization has received much attention and contestation among scholars. According to Agrawal and Gibson, homogeneous social structure as a label is not clear

because “multiple axes of differentiation” exist even among groups perceived to be homogeneous.

Meanwhile, the conception of “community as shared norms and common interests” (Agrawal & Gibson, 1999, p. 635) is dependent upon perceptions of its members. It is also termed as an “imagined sense of community,” a construct that attracted scholars of community studies. It is the result of individuals sharing common interests and identification arising from shared characteristics, interactions, and processes that take place within communities (Ascher, 1995). These common interests and shared norms promote cooperative decision making and at the same time prohibit some actions within the community.

In their critique of traditional notions of community, Agrawal and Gibson (1999) labeled the above conceptions as “mythic community” because they fail to account for differences within community, threats from external sources, and changes from within as a result of outside interventions. They proposed a shift in emphasis from traditional notions of community (e.g. small size, territorial fixity, group homogeneity, and shared understanding and identities) to a stronger focus on the divergent interests of multiple actors within communities and the influence of institutions that affect the political process inside and outside the community.

Community as sample and object of anthropological studies. According to Arensberg (1961), community is often times the sample and object in/of anthropological and sociological studies. It has served as “a sample or unit of observation for the study of culture or society, as a locus or local embodiment of a wider or general social problem or

phenomenon, [and] as a testing ground for plans of change, amelioration, or development" (Arensberg, p. 241, see also Batten, 1958; Roupp, 1953; Ware, 1952).

Drawing parallels across populations of organisms, Arensberg (1961) contended that community formation is a natural tendency for both human beings and other animals. He argued, however, that human beings tend to develop culture while animals do not, a basic difference delineating human from animal communities. Arensberg explained,

> Human beings, with culture, and animals, without it, equally will divide into communities, establish boundaries, [and] trend toward exclusive memberships; band together for mutual support, defense, and mate choice; establish rhythms of land use, travel, and movement; throw up monuments of one physical sort or another to their co-residential, familial, and communal living; reuse and rework old settlements and their monuments into new shells for living; or, alternately, bud off new colonial and daughter communities duplicating the old ones (p. 250).

Arensberg (1961) also reviewed and critiqued traditional notions of community from ecological, psychological, and sociological perspectives. From an ecological perspective, community can be defined on the basis of its territorial and geographic character (e.g. land-use pattern, territorial unit, form of settlement, or range of environmental exploitation). From a psychological standpoint, community is conceptualized on the basis of human needs to belong and survive through cooperation and solidarity. And from a sociological viewpoint, community can be defined, in combination with locality, as "the maximal group of persons who normally reside together in face-to-face association" (p. 248; see also Murdock, 1949, p.79). Arensberg argued that the ecological, psychological, and sociological definitions of community and their combinations are problematic,

limited, restricted, and unspecific. These conceptions do not provide a complete picture and understanding of community as an object and sample in anthropological-sociological studies.

To clear up misconceptions, Arensberg (1961), and in his succeeding publication with Kimbal (1968), provided comprehensive, definitive, and clearer conceptions of community. From anthropological and sociological perspectives, they argued that a complete notion of community must include spatial, ecological, populational, social, cultural, and temporal dimensions (also found in Arensberg & Kimball, 1968, p. 695). Anthropologists must take into consideration these dimensions in studying community as both a sample and object of research.

According to Arensberg and Kimball (1968), spatial dimensions of a community include a territorial unit for settlement. Ecological dimensions include the resource-use pattern and range of environmental exploitation. Populational and social dimensions include "aggregates of population" forming a "table of organization" which, according to Arensberg, et al., is composed of "three generations and two sexes inherent in the community" (p. 249), a minimal requirement for a population to coexist for the continuance of species. Cultural dimensions include the knowledge and behavior transmitted through customs, traditions, and values. Finally, temporal dimensions refer to the succession of lives within a community characterized by an enduring temporal pattern of coexistences and periodicities in and through time. Arensberg, et al. contended that the community must represent, repeat, and continue its known culture and patterned behavior through a succession of lives:

> The community is the minimal unit table of organization of the personnel who can carry and transmit this culture. It is the minimal unit realizing the categories and offices of their social organization. It is the minimal group capable of re-enacting in the present and transmitting to the future the cultural and institutional inventory of their distinctive and historic tradition. And from it, in it, the child learns, from peers and the street as well as from parents and teachers, the lore of his people and what must be learned to become one of them (p. 253).

Considering various dimensions of community, Arensberg and Kimball (1981) suggested that community studies must meet the demands posed by sampling theory that require community as a sample of society - "that it be a group or unit of the society, which is itself representative, complete, inclusive, and cohesive" (p. 695).

Community from a sociological perspective. Sergiovanni (1994) defined community as a collection of individuals who are bonded together by natural will and are together bound to a set of shared ideas and ideals. Sergiovanni described community as follows:

> This bonding and binding is tight enough to transform then from a collection of 'Is' to a collection of 'we'. As a 'we', members are part of a tightly knit web of meaningful relationships. This 'we' usually shares a common place and over time comes to share common sentiments and traditions that are sustaining (p. xvi).

Drawing from Tonnies' ideas (1887, 1957), Sergiovanni explained the notion of community in terms of a change in values and orientation from *gemeinschaft* to *gesellschaft*, or from community to society, respectively.

Gemeinschaft exists in three forms (Sergiovanni, 1994; see also Tonnies, 1957, 1974), which is translated as *gemeinschaft* by kinship, of place, and of mind. *Gemeinschaft by kinship* comes from the unity of being, the sense of "we" identity that one feels in his or her immediate families or extended families. *Gemeinschaft of place* emerges from the sharing of a common habitat or locale. *Gemeinschaft of min*d refers to the bonding together of people resulting from the mutual binding to a common goal, shared set of values, and shared conception of being. According to Tonnies, "Whenever human beings are related through their wills in an organic manner and affirm each other, we find one or another of the three types *of gemeinschaft*" (p. 42; see also Sergiovanni, 1994, p. 8).

In addition to community by kinship, of place, and of mind, Sergiovanni (1994) added a fourth dimension, "community of memory." This refers to community understandings that survive from one generation to another through and in time. The community memory is embodied in customs, rituals, mores, traditions, and standards of living. Sergiovanni argued that the four forms of community are mutually self-reinforcing:

> The connections that emerge among people from familylike feelings and relationships and from sharing a common place contribute to the development of shared values and ideas. And this community of the mind provides the basis for solidifying the feelings and identities associated with being a community of kinship and a community of place (p. 8).

Community of kinship, of mind, of place and of memory provides the theoretical backbone in understanding community from a sociological perspective.

Community from a psychological perspective. According to Sarason (1974), community is a readily available network of one's relationships that one can call on for support at anytime. McMillan and Chavis (1986) suggest that a community is built on the basis of four elements, namely: membership, influence, integration and fulfillment of needs, and shared emotional connection. This notion is built on a psychological construct called a "sense of community" (Arrigo & Fowler, 2001). Bohus, Woods, and Chan (2005) traced the history of a "sense of community" construct from writings of Sarason (1974), who defined sense of community as a "readily available network of one's relationships that one can call on for support at anytime" (p. 1) . It is characterized by belongingness, interdependence, need for each other, and commonalities in values. Sarason argued that a sense of community is essential in promoting meaningful roles and relationships that will redound to a psychological well-being and quality of life of an individual.

Drawing from the ideas of Sarason (1974), McMillan and Chavis (1986) advanced the notion of "sense of community" on the basis of four elements, namely: (1) membership, (2) influence, (3) integration and fulfillment of needs, and (4) shared emotional connection. From this perspective, a community must be built on these four elements.

McMillan and Chavis (1986) explained that membership is the feeling of belongingness, a sense of personal relatedness and acceptance from the group that encourages self-disclosure and intimacy. It has five attributes, namely: boundaries, personal investment, sense of belongingness and identification, emotional safety, and common symbol systems (Sonn, Bishop, & Drew, 1999). Apparently, McMillan and

Chavis conceptualized membership in terms of boundaries, something which is neither physical nor spatial but rather the feeling that one feels if he or she does or does not belong to the group.

McMillan and Chavis (1986) further explained the idea of influence as the "sense of mattering, of making a difference to a group and of the group mattering its members" (p. 9). In essence, it is the sense that an individual member can influence and be influenced by other group members. In expanding this notion, Obst and White (2005) defined influence as a "bi-directional need for a group to exert influence of its members to promote cohesion, and also for members to feel they have some control and influence within the community" (p. 128).

Bohus, Woods, and Chan (2005) explained how integration and fulfillment of needs could be described as shared confidence that members' needs will be met through their commitment to be together. According to Obst and White (2005), this idea refers to the need of an individual to feel rewarded as a result of his or her membership, which is founded on the achievement of common needs, goals, beliefs, and values. Integration also serves as reinforcement among members - the feeling that their needs will be met by resources received from the group (Arrigo & Fowler, 2001; see also McMillan & Chavis, 1986, p. 9).

Emotional connection is the "commitment and belief that members of the group share history, common places, time together, and similar experience" (McMillan & Chavis, 1986, p. 9; Arrigo & Fowler, 2001, p. 47). This concept is based on a "sense of shared history and identification with the community and the bonds developed over time

through positive interaction with other community members" (Obst & White, 2005, p. 128).

Spirit, trust, trade, and art. In 1996, McMillan revised the sense of community construct and renamed membership, influence, integration and fulfillment of needs, and shared emotional connection as spirit, trust, trade, and art, respectively. McMillan explained the relationship of these elements: "I view sense of community as a spirit of belonging together, a feeling that there is an authority structure that can be trusted, an awareness that trade and mutual benefit come from being together, and a spirit that comes from shared experiences that are preserved as art" (p. 315).

According to McMillan (1996), *spirit* is the spark of friendship that connects members of the community arising from an emotional safety, a sense of belongingness, and boundaries that delineate a member from non-member. He expanded the idea of boundaries to include logistical time, place settings, and content of communication. McMillan viewed trust as an important element of influence that developed out of the community's use and allocation of power. He described trade as the result of a community's economy arising from fair and just exchanges among members. Finally, McMillan described art as the "share emotional connection in space and time" representing "values, courage, wisdom, compassion, and integrity" (p. 322) through stories, music, and other symbolic expressions. From this perspective, according to McMillan, art supports the spirit, thus "the four elements of community are linked in a self-reinforcing circle" (p. 322).

It is worthy to mention that the "sense of place," though not well-emphasized in McMillan's (1996) sense of community construct, is assumed to be important for the self-reinforcing circle of sprit, trust, trade, and art.

Community from a processive and ethical perspectives. The traditional notion of community in ethics and bioethics is divided in to two broad perspectives, "liberalism" and "communitarianism," (Hester, 2004). In liberalism, the focus is on i*ndividuals* who are treated as "autonomous moral agents, rational and at their best, independent" (p. 424). From this perspective, autonomy is taken to be the necessary condition for moral community. Meanwhile, the focus of communitarianism is in the context of community, where all individual needs must be subsumed under a common good. In communitarianism, the context serves as a necessary condition for moral autonomy to take place; the community is viewed as "a constitutive element of moral beings" (p. 425).

Hester (2004) conceptualized the processive community at the middle of two binary poles of liberalism and communitarianism. Community from the processive point of view "takes into consideration the process, methods, and means of interaction in the community and highlights the value of interaction and participation, i.e. community as inquiry" (p. 425). From Engelhardth's (1996) perspective, it is a body of men and women bound together by common moral traditions and/or practices around a shared vision of the good life, which allows them to collaborate as moral friends. As a group of people, a community must be governed by code of ethics governing interpersonal relationships.

What is an ethical community? According to Clark (1937), an ethical community refers to the "growth of criticism in social action" (p. 146). It is a "texture of functionally interrelated human lives exemplifying the general pattern of such growth [in criticism]"

(p. 146). The three important assumptions of community, from an ethical perspective, are: First, community cannot be static, but must be a constantly developing process. Second, community is a complex of criticism. And third, community is a matter of social action.

Processive community. In view of the individual-community dichotomy in a moral relationship among members of the community, Hester (2004) advanced the notion of "community as a processive account." This notion is an expansion of Engelhardt's (1996) definition of community as a "body of men and women bound together by common moral traditions and/or practices around a shared vision of the good life, which allows them to collaborate as moral friends" (p. 7). This concept transforms the individual-community dichotomy into a dynamic notion of ethical community.

Furthermore, Hester (2004) contends that a processive community is founded on the process, methods, and means of interaction among social beings. Its focus is on the process of interaction and participation in community life. This conception has spawned the concept of "community of inquiry," and "community as inquiry." That is, community is "in and of the interactive processes of inquiry itself" (p. 423). Hester assumes that a community is a dynamic process of action instead of a specific individual or community as a whole. Many existing communities in schools are built around this notion, i.e., caring communities, learning communities, inquiring communities.

Community from postmodern and feminist perspectives. There are definitions of community framed from postmodern and/or feminist perspectives. For example, Campbell, et al. (2004) defined themselves as a "community of researchers" yet they felt that they had no community in a traditional sense. Their community members were rape

survivors who had great difficulty in disclosing themselves in society. This conception is founded on the traditional notion of community as a territorial or geographical area; institutions, interactions, or shared perspectives within the area; and sense of belongingness to the area (see also Loftland, 1975). Campbell, et al., advanced the notion of "community without a community." From this conception, they did not completely abandon the notion of "community as a physical space." On the contrary, they conceptualized community from various settings (e.g. familial, personal, professional), which they termed as "multiple physical spaces" (p. 255) that offer an emotional space. This emotional space is closely related to the psychological "sense of community" construct (Sarason, 1974; McMillan & Chavis, 1966).

In Campbell's (2004) community, women do not live in neat categories; they are constantly transitioning across boundaries. Rape survivors are dispersed throughout diverse settings and community is rarely space-delineated. Loftland (1975) called this a fluid notion of community. Recognizing the existence of multiple physical spaces, Campbell, et al. highlighted the importance of emotional space, where members feel that sense of belongingness and fulfillment of needs as a result of their membership in the group.

Community from an ecological perspective. In an ecological sense, community "includes all populations inhabiting a specific area at the same time" (Odum & Barrett, 2005, p. 514). These populations refer to a group of organisms, particularly plants and animals, living together in a specific territory, hence the term, "biotic community" (p. 5). These organisms exhibit complex relationships with reference to the resources available to them for survival and growth. The community plus the nonliving component of an area

is termed as an ecosystem. In an ecosystem, the most dominant among these relationships, according to Odum and Barrett, is competition vs. cooperation. In nature, "cooperation pays when systems get complex and resources are limiting"(p. 478). This definition of community from an ecological perspective has not changed much since Odum's conception in 1953.

Notions of Community and Community Immersion

From the foregoing discussions, different notions of community were presented from various perspectives: anthropological (Agrawal & Gibson, 1999; Arensberg, 1961), sociological (Segiovanni, 1994; Tonnies, 1957, 1974), psychological (McMillan, 1996; McMillan & Chavis, 1986; Sarasson, 1974); ethical/processive (Clark, 1937; Engelhardth, 1996; Hester, 2004); postmodern/feminist (Loftland, 1975; Campbell, et al., 2004) and ecological (Odum & Barrett, 2005; Odum, 1953). Table 2.7 summarizes major ideas on notions of community based on these different disciplinary and conceptual/theoretical orientations.

Table 2.7

Summary of Disciplinary, Theoretical, and Conceptual Definitions of Community

Discipline	*Conceptual and Theoretical Foundation*	*Citation*	*Note and Comment*
Anthropology	Agrawal and Gibson (1999) • Spatial unit • Common social structure • Set of shared norms Arensberg and Kimbal (1968) dimensions • Spatial • Ecological • Populational • Social • Cultural • Temporal •	Arensberg, 1961; Ascher,1995; Bender, 1978; Tonnies, 1955/1974	It fails to account for differences and divergent interests of multiple actors within the community. This conception of community is appropriate only for traditional anthropological studies.
Sociology	Tonnies' (1974) *Gemienschaft* • By kinship • Of place • Of mind • Of memory (added by Sergiovanni (1994)	Tonnies (1957) Sergiovanni (1994)	Community is viewed in terms of *gemienschaft-gesellschaft* continuum, a shift from values and orientation from community to society, respectively.

Table 2.7 (continuation)

Discipline	*Conceptual and Theoretical Foundation*	*Citation*	*Note and Comment*
Psychology	McMillan and Chavis's (1986) Elements of community: • Membership • Influence • Integration and Fulfillment • Shared emotional connection McMillan's (1996) Sense of community • Spirit • Trust • Trade • Art	Arrigo and Fowler, 2001; Bohus, Woods, and Chan, 2005; McMillan, 1996; McMillan and Chavis, 1986; Obst and White, 2005; Sarason, 1974; Sonn, Bishop, and Drew, 1999	The authors made no mention about the spatial dimension of community although it is implied in McMillan's conceptualization.
Postmodern/ Feminist	Campbell, et al.(2004) • "Community without a community" • Multiple physical spaces • Fluid • Emotional space	Loftland, 1975; Campbell, et al., 2004; Sarason, 1974; McMillan and Chavis, 1986;	Emphasis is on emotional space. Community is fluid and territorial unit is replaced by "multiple physical spaces."

Table 2.7 (continued)

Discipline	*Conceptual and Theoretical Foundation*	*Citation*	*Note and Comment*
Ethics and Bioethics	Hester's (2004) Processive Community • Process, methods, and means of interaction • Community as inquiry • Interaction and participation Clark (1937) • Emphasis on process and growth of criticism in social action • Built on a common past, co-operative activity in the present, and common outlook on the future	Clark, 1937; Engelhardth, 1996; Hester, 2004	Processive community serves as a fulcrum against the individual-community dichotomy. Focus is on "community as inquiry."
Ecology	Odum and Barrett, 2005 • Group of organisms (plants & animals) • Territory	Odum and Barrett, 2005; Odum, 1953	

Succeeding discussions are the product of the researcher's effort to make sense of various disciplinary and theoretical notions of community and how they might inform the theory and practice of community immersion in science teacher education preparation. For the purpose of this study, community immersion is defined as follows:

> Community immersion is a three-unit teacher education course that provides an opportunity for students to live with the community, which may not be their own. Conceived as a "dialogue of life," community immersion is an avenue for students to become aware of social, cultural, and economic aspects of living. As students become involved in the process, they learn to deal with people, as well as management and group dynamics (Almeda, et al., 2002, p. ix).

The notion of community immersion for teacher education students participating in the study extends far beyond the concept of a course with a community field experience. It was envisioned as a set of activities woven together to create an experience, which fosters in prospective teachers the confidence in content knowledge, skills, and attitudes in the enactment of community immersion activities, broadens their understanding of the relationship between school and community, and enables them to transform their experiences into useful practices in preservice teacher education preparation.

Utility of anthropological notions of community in community immersion. Doing anthropological studies in a community requires a very strict adherence to anthropology's definition of community. Arensberg (1961) and Arensberg and Kimbal (1968) outlined territorial, ecological, populational, social, cultural, and temporal dimensions of the community as both a sample and object of anthropological research. Without a doubt, the Philippine *barangay*, an immersion site, fits perfectly with Arensberg's notion of

community. A *baranga*y is a basic territorial and political unit in the Philippines comprised of a group of people with shared goals, values, culture, and traditions (Panopio & Rolda, 2000). The *barangay* has a territorial dimension that separates one from another. People in the *barangay* produce their own food for their subsistence and sell surplus to their neighboring *barangays* or in the town. The *barangay* is made up of a population of related families, either by kinship or ceremony that ensures a continuation of species. Social relationships are intimate and personal brought about by community activities and family gatherings. *Barangay* people share some beliefs, norms, values, material culture, and common language, which are adopted and adapted through the temporal succession of lives within the community.

The *barangay* provides a rich context for students to "dialogue with life" through a community immersion course. It can serve as a laboratory for preservice teachers to learn knowledge, skills, and attitudes as a result of their experience in and exposure to *barangay* life. It is a rich source of "funds of knowledge" (Gonzalez, Moll, & Amanti, 2004) that preservice teachers and teacher educators may use in teaching/learning concepts, skills, and values. The *barangay* can be an object and subject of inquiry that may redound to better practices in teacher education.

Sense of community and community immersion. The psychological "sense of community" construct is a handy framework in analyzing students' community immersion experience. It would be interesting to explore how students experience a sense of community through an immersion course, particularly during their actual community stay. Is community immersion an effective avenue for students to develop a sense of community? In what ways does community immersion promote/inhibit the development

of a sense of community among immersion participants? To what extent do the community people provide a sense of community to students?

Community immersion as a course can also serve as a rich context in analyzing specific indicators of the sense of community construct. A cohort of students, working together for the course and living together in a house in the *barangay*, can be used as a context to explore students' experience of a sense of community. For example, how do students conceptualize, negotiate, and experience membership with their group? What are the power structures within the group that encourage/discourage the development of a sense of community? How do students negotiate individual differences and create a shared emotional connection? These are just some of the questions that teacher educators might explore in terms of the depth of students' experience in a community immersion course.

Sociological perspectives in a community immersion course. Tonnies's (1957, 1974) concepts of *gemeinschaft* and *gesellschaft* provide an insightful framework for analyzing shifts in values and orientations of community people in an immersion site. From this framework, a community can be historically analyzed on the basis of how it has shifted from *gemeinscahft* to *gessellschaft*, that is, "from a vision of life as a sacred community toward a more secular society" (Sergiovanni, 1994) or vice versa. Preservice students and teacher educators might want to explore the influence of the economic status of the *barangay* on a shift in *gemeinschaft-gesellschaft* orientations of community living. Is there a loss in *gemeinschaft* as a result of upward mobility among community people? In what ways do community people resist/embrace *gemeinschaft* and *gesellschaft* orientations against the backdrop of technological advances particularly in electronics

and communication? Answers to these questions will help prepare students in their community stay and provide a matrix for understanding the dynamics of community life.

Notions of community by kinship, of place, of mind and of memory are also important areas for students to consider in a community immersion course, particularly in the preparation stage. For example, students in a community immersion course may explore how a *barangay* is built on the basis of kinship. They might explore the existence of clans in the *barangay* and how kinship affects relationships, power structures, and the use of community resources. Furthermore, students might be interested in exploring the notion of "sense of place" among *barangay* people and how this notion affects their decisions (e.g. choice of profession, work, or spouse). Involving students in research along this topic will ground their understanding of the community.

Ethical community and community immersion. Relationships and participation in community life are important ethical considerations in an immersion experience. From an ethical viewpoint, the individual-community dichotomy is an interesting framework to analyze the dilemma of "individual autonomy" versus "common good." An interesting question in analyzing the students' community immersion experience along this frame would be: How do participants of community immersion experience an ethical dilemma of individual autonomy versus common good? To what extent must individual autonomy be sacrificed for the sake of a common good? How does a cohort of students negotiate this conflict in a community immersion course, particularly when they live together under one roof in the *barangay*?

In particular, the most interesting notion in an ethical community is Hester's (2004) conceptualization of "community as inquiry." This idea was very useful,

particularly in the current study, wherein research participants were co-researchers. The research team was conceptualized as a "community of learners and inquirers". It was aimed at increasing the capacity for self-determination and influence in group decision making (Boog, 2003). It specifically operated on the notion of "co-operative inquiry" (Heron &Reason, 2001), which is designed to advance research *with* rather than *on* people. It was characterized by "co-operative" relationships among co-researchers and co-subjects, constant reflection and sense making of the action and experience, explicit attention on viability through agreed procedures, use of a wide-range of inquiry methods from various epistemological stances, and primacy of transformative inquiries that involve action. This study adopted Heron and Reason's (pp. 180-181) co-operative inquiry cycles through four phases of reflection and action, namely: (1) A group of co-researchers came together to explore an agreed upon area of human activity; (2) Co-researchers became co-subjects who engaged in the actions they agreed upon , and observed and recorded the process and outcomes of their own and each other's action and experience; (3) Co-subjects became so fully immersed in and engaged with their actions and experiences that they lost their awareness that they were part of the inquiry group; and (4) Co-researchers re-assembled to share their practical and experiential data , and to consider their original ideas in the light of

Definition of Community: A Synthesis

To provide a more synthesized definition of community, a concept map was constructed on the basis of different notions of community in Figure 2.3.

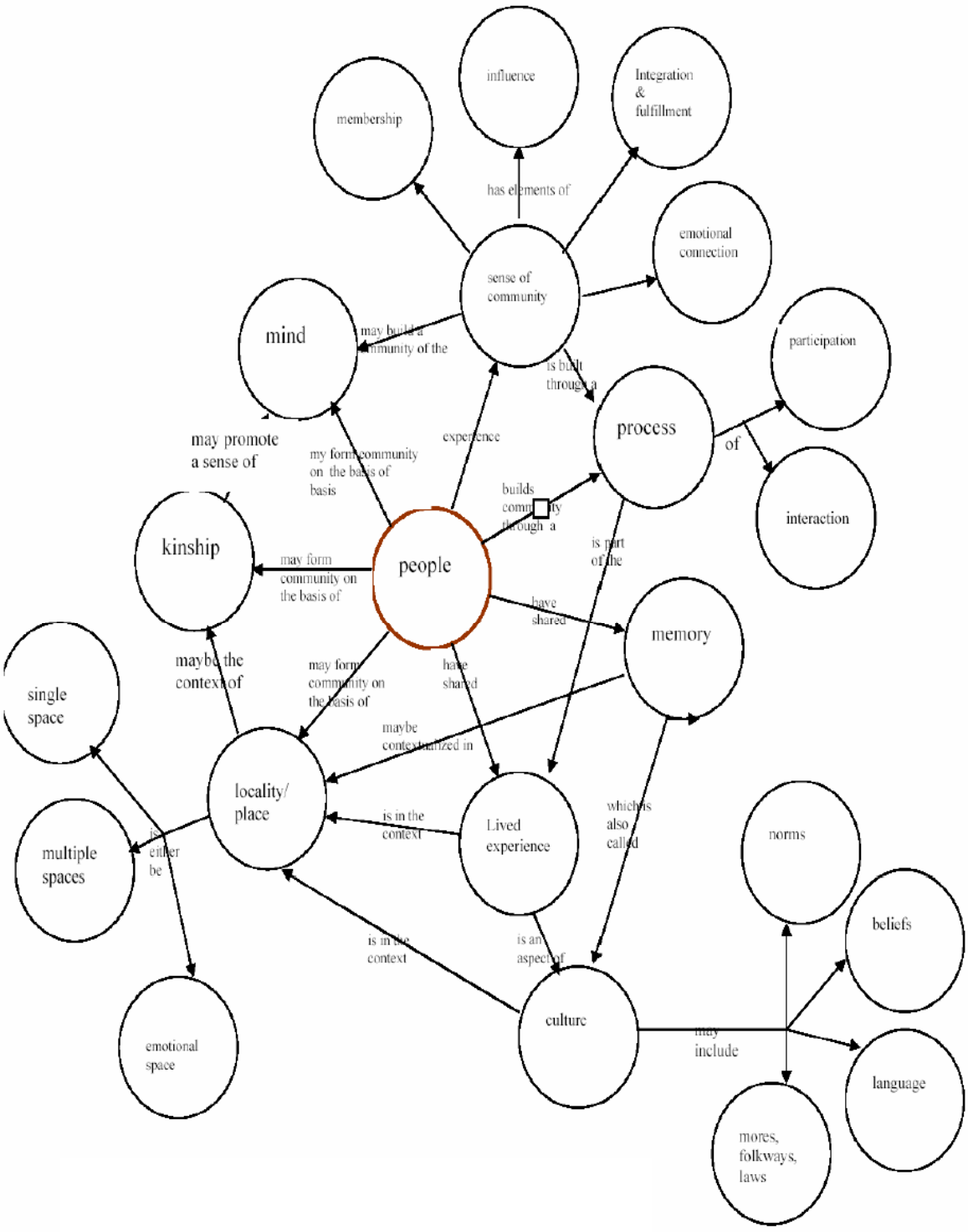

Figure 2.3. Concept map showing a synthesis of definitions of community.

Based on different notions of community discussed in the first part of this chapter, a concept map was constructed to illustrate a synthesized definition of community. Based on this concept map, the primary researcher arrived at a synthesized definition of community to guide the study:

> Community is a group of people, with or without blood relationships, who occupy a space, physical and/or emotional/ psychological; experience the "sense of community"; and share some lived experience that may form a group culture or memory through the process of interaction and/or participation.

This definition captures the different levels of use of the term "community" as applied in this study. First, community was used to refer to members of the research team that included teacher educators, prospective high school science teachers, and *barangay* residents. And second, this community definition also referred to a Filipino *barangay,* an immersion site, wherein preservice science teachers lived for a week for their community stay.

Research team as a community. The research team was described as a "community of learners and inquirers." The team was comprised of a group of co-researchers that included two teacher educators and ten preservice science teachers. Although the community was not built on kinship, it constituted a "community of mind" (Sergiovanni, 1994; Tonnies, 1974) wherein every member would experience a "sense of community" (McMillan & Chavis, 1986). It was envisioned that every member would experience a sense of belongingness within the group. Since the study operated on a participatory action research framework, members of the team co-influenced each other,

providing a sense of connection and fulfillment through their participation in every aspect of the research process.

Members of the research team were not limited to a single space as a territorial unit. Rather, they adopted a postmodern view of community as multiple physical spaces (Campbell, et al., 2004), where relationships and settings are fluid and dynamic. The past experiences they brought into the community and the lived experience they shared during the research process became part of the team's "funds of knowledge. Central to their relationship was Hester's (2004) notion of "community as inquiry." The research team as a community was built on the process of interaction and participation, without which the community could not exist.

Barangay as a community. The Filipino *barangay* is a perfect fit with all notions of community discussed in the first part of this paper. In fact, a *barangay* meets Arensberg's (1962, 1968) demanding notions of a community as an object and subject of anthropological research (e.g. a community with spatial, ecological, populational, social, cultural, and temporal dimensions).

The *barangay* also captures the synthesized definition of community as used in this study. First of all, it is made up of a group of people who are related, either by kinship or ceremony. A typical Filipino *barangay* is clannish (Almeda, et al, 2002), where many close and distant relatives live together in a spatial unit. Intermarriage among different clans is common in a *barangay*, which makes relationships among families even closer. Ceremonial relationships (e.g. serving as a godparent in weddings or baptisms) seal the connections among those who are not part of a network of blood

relationships and in-laws in a *barangay*. These ceremonial and blood relationships further promote a "sense of community" among *barangay* people.

From the outside, a typical Filipino *barangay* is perceived as a homogeneous social structure because of closely similar language, beliefs, and ways of living (Panopio & Rolda, 2000). However, if a *barangay* is closely examined, multiple points of differentiation occur among community members. Despite these differences, community activities such as fiesta, parties, weekend games, religious ceremonies, school activities, and economic activities bring together *barangay* people in a process of interaction and participation.

Review of Literature on Community-based Science and Science Teacher Education

Students live in two worlds—the world at home and the community and the world in school. McCaleb (1994) argues that when these two worlds fail to know, respect, and celebrate each other, learners are placed in a conflicted situation. It is therefore necessary to structure the experiences of pre-service science teachers in order to foster critical perspectives and better understanding of both the home and community and the school world. How might community-based science and science teacher education play a role in bridging these two worlds?

The theory and practice of community-based science education has been influenced by more encompassing themes and conversations in the broad field of education. For example, community education, community-based education, and community science are larger fields of study that subsume community-based science education. It is therefore necessary to review these fields of study in order to inform the theory and practice of community-based preservice science teacher preparation.

Community education. Willie (2000) traces the roots of community education in the ‘20s from writings of sociology scholars at the University of Chicago. At its infantile stage, community education, as an area of research and practice, was largely focused on demographic and ecological organization of urban communities (Park, Burgess, & McKenzie, 1925). In the ‘50s and ‘60s, however, community education was closely associated with the civil rights movement and the issue of school desegregation (Williams & Ryans, 1954). It was only in the ‘70s when schools were conceptualized as communities, providing a framework for understanding students in the context of their learning environment (Stern, 1970). Since then, conceptualization of community education has expanded as it has drawn from continuously expanding notions of community.

The theory and practice of community education is focused on investigations involving the structure and functions of individuals, groups, and populations. Community education also explores how community structures and processes combine and create contextual effects within schools. The goal of community education is to develop interventions that deal with collectivities in real-life situations and promote both individual and community advancement (Willie, 2000).

Community education research becomes an avenue to examine and gain insight into community stakeholders’ participation in the school enterprise. From this perspective, community education theory grows from experiences of ordinary people and social interests that are generated within communities (Tett, Crowther, & O'Hara, 2003). As Martin (1987) explains, this is contrary to the idea that community education is provided mainly by persons of authority and by volunteer organizations. First and

foremost, the goal of community education is the development of core skills and life long learning through popular adult education and community work. Martin identifies three approaches— universal, reformist, and radical paradigms— underpinning strategies and practices in community education. The goal of the *universal model* is harmony through shared values and consensus. In the *reformist model*, the goal is to assist disadvantaged people through selective intervention. And finally, the *radical model* aims to change the existing unequal structure through social actions that target specific issues and concerns in the community.

Community-based education. The major difference between "community education" and "community-based education" lies in a more dynamic and proactive stance of the latter. According to Corson (1998), community education is less concerned with changing the formal structures but more concerned with studying them. In contrast, community-based education begins with people and their immediate reality as it allows them to become meaningfully and actively involved in shaping their own education. Corson dubbed this as a way of putting into practice Freire's (1972) reformist ideas of self-awareness and political activism in education.

The notion of community as a venue for action is the fulcrum of a community-based education agenda. Community-based education is viewed as a form of social action within the framework of "community," which extends far beyond schools as institutions. From this perspective, a community educator is considered as "an agent of social change who does not separate the process of learning from social action" (Tett, Crowther, & O'Hara, 2003, p. 38). Community-based education also allows community members to become self-oriented, active participants in the creation of a learning environment that

promotes social justice. According to Tett, et al., the tradition of community-based education has always stood for educational intervention that promotes social and political change— a move towards more justice, equality, and democracy by being responsive to "community priorities and needs identified *with* people rather than *for* people" (p. 38). Community members are meaningfully involved in shaping their own futures through the school and other agencies in their community. In fact, meaningful school reform often depends on this kind of participation, in which people renegotiate and reconstruct the ways in which a school relates to its community's interests.

It is therefore imperative to discuss the issue of voice and agency in community-based education. Munoz, et al. (1989) argued that teachers and administrators, by virtue of their work and their position in the community, might wrestle with the idea of surrendering their power in the context of community-based education. They have also suggested the use of participatory action research in creating a more equitable power structure in community-based education research. Community members are enjoined to become active participants in knowledge construction and in charting directions in community-based initiatives. After all, the "community is a basic building block for learning and that the community forms the social context within which all learning takes place" (p. v).

Although community-based education is viewed as a radical tool in liberating marginalized communities through education (Munoz, et al., 1989), the concept and experience of community is most often connected to a specific place. However, notions of community are varied and changing. They depend on the context of time, history, and

disciplinary orientation, which takes into account multiple and complex social factors. Munoz explicates this problematic nature of community in community-based education:

> Where each of us feels we 'belong' is perhaps the best measure of what community we are from. Yet even this feeling is often complicated and problematic, since many people can feel the 'belong' to several different communities that may at the same time be in conflict with each other. Thus, when we talk about community-based education, the question becomes: which community are we talking about, and on which community will education be based? (p. v)

The theory and practice of community-based education is anchored in the tradition that champions the interests of peoples living in the margin of power and opportunity (Munoz, et al., 1990). It is deeply rooted in the collective efforts of people determined to transform their realities. Most often, these people are members of communities that have been overlooked by national educational systems. According to Munoz, et al., community-based education begins with people and their immediate reality, because it recognizes people as creators of their own history, not as objects of others' reality" (p. x). Community-based education has emerged as a reaction to systems that do not allow people to be meaningfully involved in shaping their own futures. This movement calls for the "humanization of education" because the "process returns to the human being his or her vocation as creator and subject of his or her own life and destiny" (p. x).

In a thematic issue of *Harvard Education Review* (1989 & 1990), community-based education was viewed as a tool towards the goal of creating a humane society.

Articles published in this issue focused on community-based education as viewed towards producing social change, justice, and greater equality. For example, Young and Padilla (1990) reported on a group of Latina women who collaboratively created a school to educate themselves and to affirm and represent their culture in a predominantly White community. Fasheh (1990), a Palestinian mathematics teacher, discussed the role of education as an agent of hegemony and presented an alternative model of community education that "reclaims people's lives, their sense of self-worth, and their ways of thinking from hegemonic structures, and facilitates their ability to articulate what they do and think about in order to provide a foundation for autonomous action" (p. 19). Also, Magendzo (1990) described a community-based education that empowers poor people for the transformation of society by addressing specific problems encountered in the community and by assisting the participants in carrying out comprehensive educational and social change.

The historical and theoretical foundations of community-based education inform and frame the theory and practice of community-based science education, particularly in teacher preparation.

Community science. Theoretical foundations of community science as a field of study form a relevant framework for understanding community-based preservice science teacher preparation. Community science is a field of study that utilizes multidisciplinary content areas in helping students understand their surroundings and apply their knowledge toward the betterment of households, the neighborhood, and the community (Wandersman, 2003). According to Tebes (2005), it is an encompassing field of inquiry that "seeks to enhance theoretical and practical understandings of human behavior in

community contexts; promote the competence, resilience, and well-being of individuals and communities; and prevent problem behaviors and other harmful outcomes at the individual and community level" (p. 213). Community science advances community-centered models that enable community members to actively participate in community building activities. According to Wandersman, students in community science learn important issues and topics in science-related fields and the relationship of this knowledge in real life contexts; use their learning to improve the quality of their own lives, their families, and their communities; and apply this experience to make their own communities models of community-centered activities/projects for others to follow.

The strength of community science lies in its intention to strengthen community-functioning by investigating how to improve the quality of life of those living in the community. Chinman, et al. (2005) refers to this goal as "community capacity building," which according to Goodman, et al. (1998) includes citizen participation, leadership, skills, resources, social and inter-organizational networks, sense of community, community history, community power, community values, and critical reflections. Community capacity building revolves around meeting relevant issues related to community, resources, skills, and power. In particular, genuine community member involvement, identification and utilization of community skills and resources, and empowerment for collective action are important aspects of building community capacity.

The notion of community capacity building is often the most neglected aspect in community-based science education, particularly in teacher education. Most often, a community is viewed as a curriculum resource that teachers and students might tap for

classroom learning. In fact, Grinberg and Goldfarb (1998) consider the community as an important resource for curriculum development. Tippins and Richie (2006) refer to this practice as a "cultural relevancy in curriculum-centered science," in which teachers and/or preservice science teachers abstract the science curriculum from the information they gather from the community with the goal of meeting the needs of learners living in that particular community. Other scholars might label this practice as "community-based." However, Chiman, et al. (2005) argue that building community capacity is the heart of community-based education.

Griberg and Goldfarb (1998) advance the idea of "moving teacher education in/to community," (p. 131), which calls for classroom practices that are contextualized in the social, cultural, linguistic, and political contexts where students, teachers, and families live. Moving teacher education in/to the community could serve two-pronged functions. It severs the ties from dependency created by those in power and empowers stakeholders involved in learning and working with families and communities. Community-centered teacher education also promotes the teaching for social justice by contesting the perpetuation of silence and by designing curriculum *with* and *for* the community.

Community-based Science Teacher Education

The first part of this section, community and science teacher education literature, is organized into four thematic parts, namely: (1) community as a "place" (2) community as a social group, and (3) community as a process, and (4) community as a culture. The notion of *community as a place* is drawn from science teacher education literature utilizing the community as a context of inquiry and as a venue of service learning. The notion of *community as a social group* in science teacher education is drawn from

literature espousing social groupings as a nexus of community formation. The notion of *community as a process* in science teacher education is explicated within literature surrounding the notion of community as inquiry, community of practice, and collaborative approaches in knowledge formation, particularly involving the use of participatory action research.

In view of the goal for the review of literature— to summarize and organize research literature relevant to community and science teacher education— the second part of the discussion is built on this understanding in order to advance a more comprehensive and inclusive framework for community-based science teacher education by introducing other notions of community not available in science education literature. Along with this intention, a table is constructed to compare and contrast major research studies on community and science teacher education. The table also serves as a framework in identifying gaps in the literature and in advancing the notion of community-based science teacher education.

The phrase "community-based science teacher education" as a search term does not yield any literature in major academic search engines such as ERIC, Education Full Text, Web of Knowledge, Web of Science, and Google Scholar. This finding is surprising because this researcher held a prior belief that community-based science education (CBSE), a broader search term, was a well established framework or construct in science education literature. However, a closer look at studies on CBSE would reveal its even more confusing state-of-the- literature. The word community in science education has been used in multiple contexts and meanings with little explication as to its nature and scope. No attempt has been made to delineate different notions of community

in science teacher education and to explicate them against other competing constructs or frameworks.

The word community has multiple meanings and is used in various contexts in science teacher education literature. For the purpose of this review, research studies on community and science teacher education are hereby grouped into three major categories, namely, (1) community as a "place" (2) community as a social group, and (3) community as a process. The notion of community as a "place" in science teacher education research is grounded in the practice of making the community a venue and/or context of inquiry in science teacher preparation. The notion of community as social group is situated in research in science teacher education involving a group of people joined together by a common interest or shared vision. Finally, community as a process in science teacher education research is based on literature espousing the "action" as the nexus of community inquiry.

As a caveat, research studies on community in science teacher education are not explicit in delineating their position under the aforementioned categories. In fact, some studies cut across boundaries as they belong to more than one category. However, for the purpose of creating a preliminary framework for community-based science teacher education, these three major categories stood out as an organizing theme to delineate research literature on community and science teacher education.

Research on community as a "place" in science teacher preparation. Some literature on community and science teacher education research has direct reference to the former as a venue or place of inquiry. Two competing conceptualizations in this category are relevant to community as a context of inquiry in science teacher preparation: (a) the

notion of school as a community and (b) the notion of out-of-school settings as a venue of science teaching and/or learning. The school as a community, however, is often used beyond the notion of "place,' which warrants a separate discussion at the latter part of this section. Thus subsequent discussions focus on the notion of community as used in out-of-school settings—the venue where teaching and learning take place in pre-service science teacher preparation.

The notion of community as a "place" is often associated with practices or programs aimed at connecting pre-service science teacher education and a local community. Major research studies situated on local communities as contexts in science teacher preparation include literature on community-based field experience in science teacher education (Gayle & Cordes, 2005; Hammond, 2001), community-based content preparation through field experiences (Donahue, Lewis, Price, & Schimdt, 1998; Eves, Davis, Brown, & Lamberts, 2007; Haines & Blake, 2005), community-based service learning (Barton, 2000), community-based projects enacted in out-of-school contexts (Fusco, 2001; Nichols & Tippins, 2006, and community-based science education resources as contexts for informal learning (Lebak, 2007; Tal & Morag, 2007; Thirunarayanan,1997). Foregoing discussions delineate each category with corresponding examples of science education research for each category.

Community-based field experience in science teacher education. The community as a context for science teaching and/or learning is often associated with research in science methods and content courses with a field experience component. In science methods courses, for example, pre-service teachers are often exposed to out-of-school settings where science content and pedagogy are embedded in a socio-cultural matrix.

Meanwhile, the field-based experience in science content courses are often associated with activities conducted in out-of the-school settings where the community becomes a laboratory for prospective teachers to learn science and/or to apply science knowledge, skills, or attitudes in real life contexts. Most of community-based environmental education programs fall under this category.

Gayle and Cordes (2005) conducted a research study utilizing a community-based field experience in a science methods course. Their study was conducted using community organization facilities as contexts in preparing prospective elementary and middle-science teachers to meet the needs of children from underserved populations. Dubbed as an informal field experience, 19 prospective science teachers taught inquiry-based science activities to elementary and middle school students living in the a homeless shelter. These children experienced domestic violence and had no available placement in foster homes. The study utilized both quantitative (e.g. pre-post questionnaires) and qualitative methods (e.g., written reflections, field notes) to document and assess participants' learning experiences. Gayle and Cordes argued that the community-based, informal field experience led to the desired outcome of their research—that of providing prospective science teachers the experience to teach underserved populations. However, their efforts were met with impediments such as the disconnection between science activities in the field and the standard curriculum and the insufficiency in critical reflections among pre-service science teachers who participated in the informal field experience.

Hammond (2001) conducted a similar study involving pre-service science methods students in a literacy program for Asian immigrants in California. Prospective

science teachers collaborated with local school teachers and parents in the conduct of family nights and community cookouts as well as in the construction of a communal garden and a Mien- American garden house. They were also involved in documenting community funds of knowledge, particularly from Asian immigrant parents, and in representing this knowledge through books and displays. To make science relevant to students, they also teamed with school teachers and parents in writing and testing community-centered science curricula and in applying them in the actual classroom situation. Hammond argued that a new kind of multiscience emerged as a result of participants' involvement with community funds of knowledge—one that is "accessible to all collaborating members and responsive to school standards" (p. 983).

Community-based field experiences attached to a science methods course, similar to those conducted by Gayle and Cordes (2005) and Hammond (2001), are geared towards relevancy in science teacher preparation by bridging university-based learning experiences and the local community context. However, a major critique against this approach is the inequality in power structure and in sharing of benefits among its participants. The community, for example, remains as the "field," a location somewhere-out-there to test knowledge or draw on funds knowledge. Pre-service teachers and their supervisors determine what is to be learned and how it will be learned. They continue to be gatekeepers of the knowledge to be integrated into the science curriculum. Once knowledge is drawn from the community, pre-service teachers leave the field with their experience while life remains the same with those they studied. The impact they make in the community remains unsustainable and the connection between the university and local community dies a natural death.

The current study centered around community-based field experience. As part of their coursework, pre-service science teachers participated in community immersion activities in a local fishing village. Community immersion as a course, however, provided a more in-depth experience compared to Gayle and Cordes's (2005) come-observe-and-teach approach and Hammond's (2001) funds of knowledge approach. In Hammond's (2001) study for example, most of the research activities and projects were situated in a local elementary school, where parents were reduced to mere participants in the project—the construction of a school-community garden and a Mien garden house— and enricher of the science curriculum through their contribution to the funds of knowledge of the community. In the current study, pre-service science teachers were fully immersed in the life world of community people, wherein students enriched the whole community, not merely enriching school activities and science curricula. One conceptualization of community in this research is that of a school setting beyond the university, a fishing and farming village in the study, where prospective science teachers live and experience the kind of life of people in the community.

The beauty of community immersion lies in the practice of reducing not merely the physical gap between the researcher and the researched but also in balancing the power structure that normally tips at the side of the academic community by making the local village and its people the nexus of an academic inquiry.

Foregoing literature discussions focused on research involving field experiences in science education courses. Field exposure, however, is not only limited to science education. In fact, it is traditionally associated with science content courses involving field activities or investigations. By exposing prospective science teachers to real life

settings for their laboratory or field activities, students can connect their university science content learning with real contexts available in the community. This is the focus of the subsequent discussion.

Community-based content preparation through field experiences. The conceptualization of community as a place of inquiry is also associated with field experiences to support content learning. Some content courses in science teacher education programs, particularly those related to environmental science/education, have field components comprised of a set of activities in a local community. In this category, prospective science teachers expand their learning environment to include community-based natural resources as contexts for inquiry. The ecosystem and its natural habitats, which relates to the ecological perspective of community (Odums & Barret, 2005), become a laboratory for students to conduct field investigations or part of their laboratory activities. Research studies along this line are often associated with undergraduate content courses, which include other students in addition to pre-service science teachers.

Eves, Davis, Brown, and Lamberts (2007), for example, reported on an interdisciplinary undergraduate course integrating field studies and research in a tropical-marine ecosystem. The coursework involved an eight-week content development and a ten-day, research-based field study in an island in the Bahamas. The community-based field investigation was designed for students to apply their content knowledge through collaborative engagement with teachers and scientists. The authors argued that the coursework provided the students with teaching and learning opportunities that encouraged interdisciplinary work, co-learning, and positive interactions among other participants of the project. In addition, the context of the study—to include an island with

a tropical marine ecosystem— promoted active learning, integration of education and practice, collaboration, respect for diverse talents and learning styles, and integration of experience and learned skills.

Haines and Blake (2005) reported on their course experience integrating community-based experience in a field biology course. The course was designed for prospective elementary and middle school teachers to learn science content and to apply their learning in a classroom setting. Students conducted field activities in freshwater, saltwater, and terrestrial habitats and analyzed the effects of human impacts in each field site. The coursework was highlighted by an environmental action plan wherein students came up with a grant proposal involving classroom teachers and students putting up native plant gardens in locations that best absorbed runoff entering the watershed areas. Based on their course evaluation, authors argued that their field biology course provided prospective science teachers the needed breadth and depth of exposure in their content area and the confidence to teach biology in the field to elementary and middle school students. The field experience provided a context where both content and pedagogy were blended with activities in natural settings wherein prospective science teachers could make connections between science and the community.

Based on previously discussed studies (e.g., Eves, Davis, Brown, & Lamberts, 2007; Haines & Blake, 2005), community is conceptualized in out-of-school settings where the natural habitats became a laboratory for students to learn science content. Community immersion, however, was not designed primarily for science content learning. However, it offers unlimited possibilities of learning science content situated in natural settings and in lives of people in the community. Another conceptualization of

community in the current study is the use of the *barangay* as a nexus of the community experience. The *barangay* is the seat of communal relationships where interdependence among residents was evident in relationships and ways of life. The notion of "community as a laboratory," which is often used in science content courses with a field experience, was also adapted in this study. However, the community immersion course, as conceptualized in the study, went beyond the concept of learning in the "field." Research participants were also expected to approach their experience from the lens of "community-based service learning" (Fryer & Newham, 2005).

Community-based service learning in science teacher preparation What is community-based service learning (CBSL)? Dumas (2002) described CBSL as "a form of experiential education in which students engage in activities that address human and community needs, together with structured opportunities designed to promote learning and development" (p. 249). This conception of CBSL is made up of four basic elements, namely: preparation, service, reflection, and celebration. According to Dumas, prospective teachers, through their participation in community-based service learning activities, are better prepared to become lifelong learners and active participants in community life by acquiring managerial skills, critical thinking skills, and group dynamics skills such as team work and cooperation.

There are few studies on service learning in science teacher education. Barton (2000), for example, utilized community-based service learning as a way of addressing the multicultural dimension of pre-service science teacher preparation. In her study, prospective science teachers were required to spend their time in a homeless shelter. Together with their teacher, they co-taught and co-planned science lessons based on deep

connections between children and their community. This community-based service learning also provided the context for prospective science teachers to enact visions of multicultural science education and to explore science in different ways outside the traditional notion of schooling. Results of the study showed that through community-based service learning, prospective science teachers were able "to explore education outside the university setting, develop relationships with children and their families, learn about children as children rather than as students, develop ties with the community, develop social and interaction skills, and gain greater awareness of other cultural and social norms and values as well as their own beliefs, strengths, and weaknesses" (p. 817).

Hammond (2001) as an extension of her work (see Hammond, 1997) integrated service learning in her science methods course by involving pre-service science teachers in community-based service learning projects. For example, prospective science teachers assisted in the construction of a communal garden in a local elementary school backyard, in the building of a Mien house to complement the community garden, in the conduct of family science night, in organizing a community food cookout, in the documentation of community funds of knowledge of Asian immigrant families, in the development of oral history books and displays based on their interviews, and in development of community-centered science plans that complemented standards-based curricula. Hammond described community building activities for the multiple stakeholders of the community, but little was presented on the learning that prospective science teachers gained from the experience.

Community-based projects enacted in out-of-school contexts. This category of research in science teacher education refers to community-based collaborative projects

outside the school setting, aimed at improving science and/or science teacher education and at the same time leaving a physical legacy in the community. Science teacher educators enact community-based collaborative projects that are neither situated in the context of service learning nor associated with science methods courses. In addition to their research goals, science teacher educators also aim at impacting the kind of quality of the people on the community. Typical examples of this research were Fusco's (2001) community-based science projects with urban planning and gardening and Nichols and Tippins's (2006) community-based science education leadership enacted in a Filipino *barangay.*

In order to create relevant science among teenagers of underserved population, Fusco (2001) enacted a community-based project aimed at creating a "practicing culture of science learning" through urban planning and gardening. The action research was conducted in collaboration with urban teenagers (12 boys, 3 girls) living in a low income housing facility in an urban city. The vacant lot across the street from the shelter became the context of the study for teenagers to engage in the practicing culture of science. From this perspective, science is viewed as a process of discovery (in contrast with the goal of knowledge acquisition) as students created science and science-like performances, tools, and discourses that connected to their personal life, culture, and community. Fusco argued that the after-school, community-based collaborative project for urban teenagers promoted relevant science because "(a) it was created from participants' concerns, interests, and experiences inside and outside science; (b) it was an ongoing process of researching and enacting, and (c) it was situated within the broader community" (p. 860).

Nichols and Tippins (2003) described their longitudinal study using leadership as a framework in understanding their community-based science education research project in Casay, a rural *barangay* in Antique, Philippines. Stemming from a collaborative research study exploring the relevance of local cultural practices with respect to science teacher preparation, the study expanded into a collective community action focusing on the construction of an environmental center within an elementary school. In particular, collaboration among village people, school personnel, and researchers were contextualized through *dagyaw,* a local practice of voluntarism for the construction of the environmental center. The building symbolized the collective effort of research stakeholders to create a deep sense of community in the village—one that is grounded in intergenerational memory of cultural practices drawn from the narratives in the *barangay*.

Another example is a case study of a female science teacher educator, Haleema, in a caste-oriented Pakistan. Zahur, Barton, and Uphadhay (2002) explored how an urban community might serve as venue to connect social justice and environmental issues in science teacher preparation. With reference to science teacher preparation, Haalema believed that pre-service science teachers should be empowered to make physical and political changes in their community. She felt that science teacher education should bridge the divide between the university and the community through approaches that utilize community resources as a laboratory where science becomes more situated and relevant to the lives of pre-service science teachers, school children, and community members. The study highlighted the importance of a community garden in an urban setting as a field site for pre-service science teachers to connect science education to social justice and environmental issues in the community.

Summary of Literature on Community and Science Teacher Education

The review of related literature on community and science teacher education provided a solid theoretical and practical base to underpin the practice of community immersion. Two overarching themes were evident in the literature. One was the dominance of different teacher education contexts by which "community" formation and/or building takes place. Another theme revolved around the different notions of community that inform community building endeavors. These two themes are important elements in the conceptualization of a framework for community-based science teacher education. A detailed discussion of the framework—a major contribution of this study—is found in the last chapter of this dissertation.

Theoretical Framework

In conceptualizing the theoretical underpinnings of a study, Preissle (2004) recommends An Empiricist Model of Theory as an organizational framework in pulling together multiple layers of theoretical lenses ranging from concrete to abstract ideas (Figure 2.4). In this model, theoretical framework relevant to the study may be grounded from concrete data to a more abstract philosophy. In between are layers of theoretical underpinnings ranging from empirical generalization, substantive theory, and formal or midrange theory to grand theory emphasizing the relative boundary and porous nature of each continuum as captured in the statement, "My philosophy may be your theory" (p. 1). This model of conceptualizing a theoretical framework is relevant to the current research because it draws from multiple theoretical perspectives to frame the researchers' understanding of relevant science teacher preparation that bridges community and preservice teacher education.

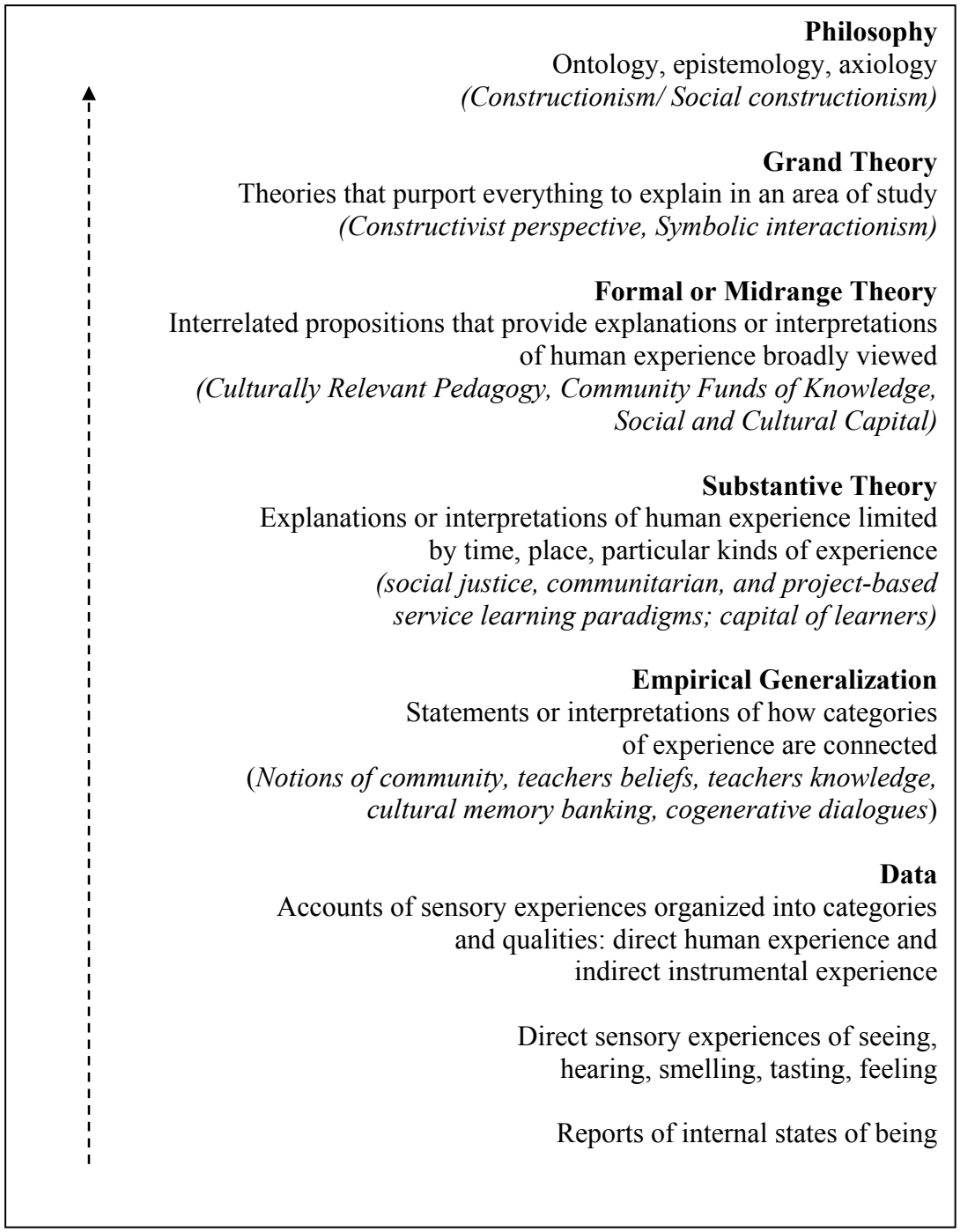

Figure 2.4. An Empiricist Model of Theory adapted from Priessle (2004).

Constructionism

The overarching epistemological framework of the study is informed by constructionism (Crotty, 2004), a middle ground epistemology that balances the extreme epistemologies of objectivism and subjectivism. Constructionist epistemology purports that meaningful reality is constructed within and through personal interaction and engagement with the social world. Meanings are not in objects themselves but emerge when consciousness engages with them. Social constructionism contends that human beings do not create but rather construct meanings by working in the world with the objects in it.

Constructivism versus social constructionism. There are several variants in constructionism. The most common and often interchangeably used in literature are constructivism and social constructionism. According to Shotter (1995), both variants focus on human activities rather than on things or substances; hence, the process of creating knowledge is as important as the process of discovering knowledge. Berger and Luckman (1966) contend that these perspectives do not see knowledge or society being independent from human beings. Rather, knowledge is created by them and they, in turn, become the product of their creation. Instead of addressing the causal relationship, social constructionists and constructivists are both concerned with meanings and significances.

There is also literature that distinguishes constructivism and social constructionism. For example, Hruby (2001) refers to constructivism as a kind of "knowledge formation in the head" (p. 51), whereas social constructionism deals with the "knowledge formation outside the head between participants in social relationship" (p. 51). Constructivism draws from the roots of radical constructivism (von Glasserfeld,

1995), which leans towards the private, more personal way of constructing reality in the social world. In social constructivism, however, the emphasis is on meaning constructions among a group of individuals as they interact with the social world. In other words, the focus of social constructivism is on understanding of meanings that can only be achieved through the interaction between and among the individuals and the object of investigation (Crotty, 1998; Hruby, 2001; Schwandt, 2000). Some scholars consider constructivism and social constructivism as epistemologies. Others consider them as theoretical perspectives. For example, Matthews (2002) considered constructivism as education's version of "grand unified theory." Regardless of its category, constructivism as used in the theoretical framework of the study is still consistent with the fluid nature of the boundaries in the Empiricist Model of Theory.

Symbolic Interactionism

The grand theoretical perspective of symbolic interactionism (Crotty, 2004) guided this inquiry. Symbolic interactionism focuses on how a person sees himself, how he sees others, and how others think about him. It is concerned with the understanding of the social reality and society from the perspective of the actor who interprets his world through and in social interaction (deMarrais & Roulston, 2005). The assumptions surrounding symbolic interactionism (Crotty, p. 72) include the following: First, human beings act towards things on the basis of meanings that these things have for them. Second, the meaning of such things is derived from, and arises out of, the social interaction that one has with other human beings. And third, these meanings are handled in, and modified through, an interpretive process used by the person in dealing with things he/she encounters.

In relation to the current research, prospective science teachers, in their attempt to bridge the worlds of school and community, constructed meanings based on their prior knowledge and stockpiles of experience. However, the interpretation of meanings is not purely personal. In a collaborative context, like the current research, meanings are also negotiated within the inquiring and learning community (also referred in this research as group or research team). The boundary between the personal and group construction is fluid and shifting. In the process of meaning construction, individual members of the research team might be influenced by the group or vice versa. The researcher assumes that there is some sort of overlap between the individual meaning and group meaning as shown in the Venn diagram (Figure 2.5). This overlap is hereby referred to as zone of negotiation, wherein an individual shares a negotiated meaning with the group. Tobin (2005), in his notion of co-generative dialogue, describes this boundary as porous. This researcher argues that the zone of negotiation is the internal space where exchanges and negotiations of ideas take place. In this zone, an individual negotiates meanings that might eventually become part of the group's shared meanings. The researcher contends that individual meanings, group or community meanings, and negotiated meanings are important constructs in examining the issues of relevancy in science teacher preparation.

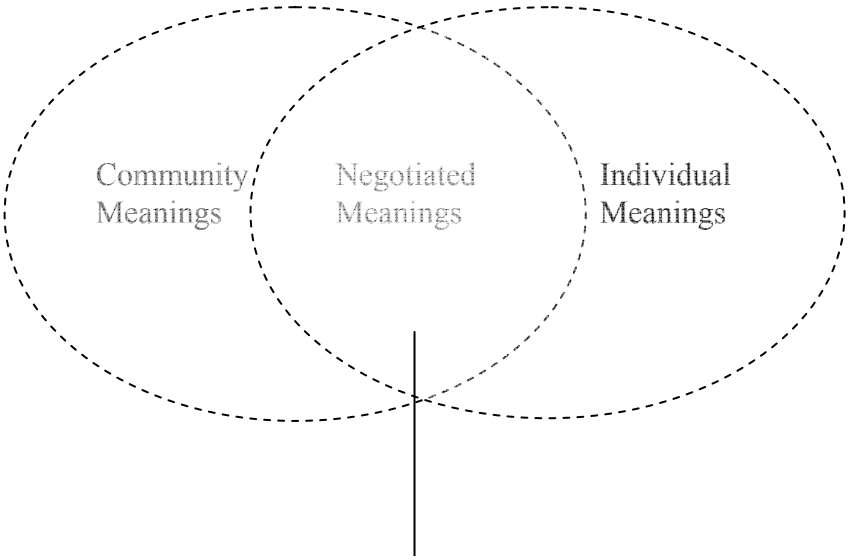

Figure 2.5. Researcher's conception of negotiated meanings with respect to the individual and group meanings in a collaborative undertaking.

Midrange Theories

The midrange theories that inform the current study are drawn from assumptions surrounding culturally relevant pedagogy (Ladson-Billings, 1995; Tippins & Richie, 2005) and community funds of knowledge (Gonzales, Moll, & Amanti, 2005). The researcher believes that these midrange theories inform the researcher's understandings of relevant science teacher preparation because these external loci directly influence the individual, group, and negotiated meaning constructions of prospective science teachers. Outside the individual and group worlds are the social and cultural worlds serving as capitals or funds of knowledge that continuously inform and challenge the individual and collective understandings of relevant science and science education. These external worlds continuously bombard the porous boundaries of personal, group, and shared

realities, thus, creating a space for construction of meanings and for negotiations of relevancy.

Community funds of knowledge. The "community funds of knowledge" framework (Gonzalez, Moll,& Amanti, 2005) is based on a premise that people in the community are competent and have knowledge as a result of their life experiences. It assumes that families and their members in the community are knowledgeable of many things and that they possess many life skills for survival and self-improvement. The emphasis in community funds of knowledge is on elements of daily lifestyle in the community as they contain a repertoire of knowledge and skills serving as legitimate cultural capital and educational resources, which teachers can draw upon for improvement of the educational process in schools (Olmedo, 1997; Velez-Ibanez & Greenberg, 2005).

Gonzalez (2005) conceptualized funds of knowledge as a deviation from the traditional, stereotypical notion of culture. She contended that the notion of culture as a holistic configuration of traits and values is problematic because it tends to advance its immutable characteristics to support the "cultural deficit model" of marginalized groups of people. By contrast, Gonzalez argued that students are not passive receivers of culture; instead, "they are active agents in constructing their own identities and ideologies" (p. 36). Consequently, "funds of knowledge" has been conceptualized as a deviation from the sweeping characterization of a reified culture. It draws upon the "lived experience" of culture as a validated source of knowledge, particularly from households, where students' school experiences can be built upon.

According to Gonzalez, Moll, and Amanti (2005), funds of knowledge can be used as a theoretical framework in developing a systematic approach of collecting, generating, and analyzing knowledge from various aspects of family and community life. For example, in their study of Latino households, Gonzalez, Moll, Tenery, Rivera, Rendon, Gonzalez, and Amanti (2005) utilized community funds of knowledge as a theoretical framework to (1) explore the origin, use, and distribution of funds of knowledge among households in a working-class Mexican community; (2) create a group of teachers as qualitative researchers, mindful of the rich intellectual and pedagogical resources of the community; and (3) utilize these community funds of knowledge for class instructions and innovations.

Velez-Ibanez and Greenberg (2005) contended that funds of knowledge are formed and transformed with households and across families. They emphasized that community funds of knowledge are built on the network of exchange, reciprocal relations, and the creation of *confianza* among families and community members. They are acquired primarily, but not exclusively, through work and participation in diverse labor markets and through participation in family rituals such as baptisms, weddings, and parties, among others; these are "essential cultural practices and information that households use to survive, to get ahead, or thrive" (Moll, 1992, p. 21, as cited by Greenberg, 1989). Funds of knowledge are also considered as "cultural artifacts," which help mediate the teachers' comprehension of social life within households. They serve as a "conceptual organizer" in reducing the complexity of people's everyday experiences, without losing sight of the rich dynamic totality of lives (Gonzalez, Moll, & Amanti, 2005).

By extension, funds of knowledge can be used as a defining pedagogical backdrop in school teaching and learning. Gonzales, Moll, and Amanti (2005) argue that the "educational process can be greatly enhanced when teachers learn about their students' everyday lives" (p. 6). Through a qualitative study exploring the home-classroom connection, Moll, Amanti, Neff, and Gonzalez (2005) developed innovative approaches to teaching by drawing on the knowledge and skills found in local households. To build up their case, they cited the story of Carlos and his rich cross-cultural experience in Mexico. This experience was used as a resource in teaching a lesson, relevant not only to Carlos but also to his classmates who vicariously learn from the cross-cultural experience.

Funds of knowledge are not immutable (Gonzales, Moll, & Amanti, 2005). This conception implies a dynamic aspect in the transformation of "funds of knowledge." When received, they are changed, modified, discarded, or transformed, depending on their utility in real life situations and specific circumstances. By extension, "teachers can modify and adapt these resources as the basis for the creation of new knowledge specific to classroom circumstances" (p. 26).

In summary, "community funds of knowledge" is a theoretical framework that capitalizes on the lived experience, not on reified culture, of people living in the community. It is based on the premise that every member in the community possesses knowledge and skills for life survival. Funds of knowledge are historically developed, shared between/among individuals in a household and among families through systems of relationships. Funds of knowledge may be modified depending on their utility in specific life situations and circumstances. They may also be utilized for class instructions and

innovations. As a framework for teaching, "community funds of knowledge" is built on what students already know instead of what they do not know. According to Olmedo (2001), community funds of knowledge, as a theoretical framework, "facilitates a systemic and powerful way to represent communities in terms of the resources, the wherewithal they possess, and a way to harness these resources for classroom teaching" (p. 625).

Culturally Relevant Pedagogy. Gloria Ladson-Billings (1995) coined the term culturally relevant pedagogy to describe a pedagogy of opposition, not critical but "committed to collective, not merely individual, empowerment" (p. 160). Academic success, cultural competence, and critical consciousness are three major tenets of her notion of culturally relevant pedagogy. According to Ladson-Billings, in order for students to experience success in schools, culturally relevant teaching must, first of all, require teachers to demand, reinforce, and produce academic excellence among students. Second, culturally relevant teaching must require students to maintain cultural integrity by utilizing their culture as a vehicle for learning. And third, culturally relevant teaching must go beyond academic excellence and cultural competence by developing a "broader sociopolitical consciousness that allows them to critique the cultural norms, values, mores, and institutions that produce and maintain social inequities" (p. 162).

Culturally relevant pedagogy offers a promising route to reforms in education as it seeks to promote "academic success centered in students' cultural and community identities and their potential to engage in the critical pursuit of social justice" (Matthews, 2003, p. 62). From Matthews's perspective, cultural relevant pedagogy involves the following: (1) The teachers view themselves as relationship-oriented, political and

caring; (2) The knowledge and curriculum are considered dynamic and fallible; and (3) Classroom, school, and community relationships are considered collaborative, culturally centered, and supportive. Drawing from Ladson-Billings's (1995a, 1995b) theory and Gutstein, Lipman, and Hernandez's (1997) model for culturally relevant teaching of mathematics, Matthews extends the notion of culturally relevant pedagogy in mathematics education to include mathematical thinking and critical consciousness, building on informal mathematical and cultural knowledge, and utilizing empowerment orientations toward students' culture and experience.

In science education, Tippins and Richie (1996) synthesized emerging theoretical ideas on culturally relevant science teaching and emphasized the notion of relevancy as curriculum-centered and community centered science. They contended that Aikenhead's (1996) notion of cultural border crossing, Chin's (2003) and Hammond's (2001) application of "community funds of knowledge" in science education, and Fusco's (2001) creation of a practicing culture of science are not enough to explain culturally relevant science teaching and learning because they lack a reference point for grounding relevancy in science education. In their notion of rethinking culturally relevant pedagogy in science education, Tippins and Richie asked these questions: (1) Where does science originate?; (2) Whose interest does it serve?; (3) To what extent are those who practice science able to originate future scientific investigations without depending on others to frame the experience? For pedagogy to move beyond cultural relevance, Tippins and Richie contend that science education must both emerge from and report to the community it is designated to serve.

Assumptions surrounding the framework/theory of community funds of knowledge and culturally relevant pedagogy informed the researcher's current theoretical underpinnings. The researcher assumed that prospective teachers brought with them their home and community culture to help make sense of their community immersion experience. Their prior knowledge and experience of community and community issues (e.g., social justice, cultural practices, local knowledge and beliefs, family values) were considered as capitals to help them interpret their school and community experience and help them navigate the challenges faced during community immersion.

While culturally relevant pedagogy draws upon prospective science teachers' experience, the notion of community funds of knowledge places emphasis on family and networks of families in the community as the source of knowledge to inform preservice science teacher preparation. Through community immersion, prospective science teachers immerse in the lifeworlds of the community—experience life as lived by the village people—in order to draw on a wealth of knowledge to inform teacher education practices relevant to science teaching and learning and to transform these funds of knowledge into useful resources or products benefiting the community as well. The transformation of community cultural practices into cultural memory banks and culturally relevant science lesson plans are just a few examples where community funds of knowledge are relevant to the preparation of prospective science teachers. Teaching school children in the community culturally relevant science lessons is just one way of giving back to the community their own wealth of knowledge.

Substantive Theories

The substantive theories informing the current research are drawn from assumptions surrounding the framework for understanding school-community collaboration (Warren, 2005), particularly the concept of school as a social capital, and service learning paradigms focusing on social justice, communitarian, and project-based models .

Framework for understanding school-community collaboration. Warren's (2005) framework for understanding school-community collaboration is built upon the goal of improving the social context of education, fostering parental and community participation, working to transform the culture of schools and the practice of schooling, and helping to build a political constituency by addressing inequalities in education. To improve school-community collaborations, Warren identified three types of school community collaborations aimed at overcoming disconnections between communities and schools, namely: service model, development model, and organizing model.

The service model of school-community collaboration, as represented by community schools, aims at providing a broad range of services to children and families through partnerships with community-based organizations. The development model of school-community collaboration such as community sponsorship of new schools stems from the notion of building social capital through partnerships based on a community – oriented vision; it suggests a more direct role for schools as agents for community development. The organizing model of school-community collaboration emphasizes the building of power for social and political change through relationship building, leadership development, and public action.

Central to the framework of school-community collaboration is the concept of social capital. Social capital refers to the set of resources, i.e., money and expertise, which are inherent in relationships of trust and cooperation between and among people in order to better achieve the collective ends. It also serves as a set of links across institutions. As institutions bring networks of people and resources together, they serve as sites for building social capital. In view of this, Warren (2005) contended that schools are rich contexts for social capital building by virtue of their rich resources and networks in forming collaborative relationships.

Conceptual Framework

In the Empiricist Model of Theory, Preissle (2004) defines empirical generalizations as statements or interpretations of categories of experience. The current study utilizes the term conceptual framework to describe specific statements, interpretations, or conceptual categories as the basis for analyzing themes and categories derived from the research. The conceptual framework of the current study is drawn from: (1) notions of community, (2) categories of teacher's knowledge and beliefs, and (4) concepts surrounding co-generative dialogues and memory banking.

Notions of community. Various notions of community were previously discussed in the review of literature section. As a summary, the following notions of community might be relevant in the data analysis (1) Agrawal and Gibson's (1999) conceptions of community as a spatial unit, as a common social structure, and as a set of shared norms; (2) Arensberg and Kimbal's (1968) spatial, ecological, populational, social, and cultural dimensions of community; (3) Sergiovanni's (1994) community by kinship and of place, mind, and memory; (4) MacMillan and Chavis's (1986) psychological sense of

community to include the elements of membership, influence, integration and fulfillment, and shared emotional connections; (5) Campbell, Seft, Wasco, and Ahrens's (2004) notion of "community without a community" describing the community as fluid, as an emotional space, as multiple physical spaces; (6) Hester's (2004) idea of a processive community, which is built upon inquiry, participation, and interaction; and (7) Odum and Barrett's (2005) ecological definition of community centering on territory and groups of organisms.

Categories of teacher's knowledge. Teacher education literature treats teacher knowledge as a big theoretical lens. In this current study, teacher knowledge and/or its categories are viewed as a conceptual framework to understand prospective science teachers' learning through community immersion. The following conceptual definitions of teacher knowledge may help guide understanding and analysis of data from research: personal practical knowledge (Connelly & Clandinin, 1985), situated knowledge (Brown, Collins, & Duguid, 1989), professional craft knowledge (Shimahara, 1998), action-oriented knowledge (Carter, 1990), tacit knowledge (Eraut, 1994 & 2000). Drawing from Shulman and Skyes's (1986) notion of the knowledge base for teachers, Henze, van Driel, and Verloop's (2007) investigation of the three domains of knowledge—pedagogical content knowledge, subject-matter knowledge, and general pedagogical knowledge—are a relevant framework for examining the knowledge that students gain as a result of their participation in the community immersion course. In their study, pedagogical content knowledge was operationally defined as (1) knowledge about instructional strategies, (2) knowledge about students' understanding, (3) knowledge

about ways to assess students, and (4) knowledge about goals and objectives of the curriculum.

Narrative meaning. According to Polkinghorne (1988), narrative is a form of meaning making" (p. 36). Narrative meaning, a cognitive process, organizes human experiences into temporally meaningful episodes. It involves the drawing together of various aspects of human experience in order to create a higher order of meaning. The meaning is an internal process, however, it can be directly observed in stories that emerge in the creation of narratives. The narrative configuration requires meaningful constructions of experience linking together networks of concepts, actions, and events into interrelated aspects of understandable composite. In particular, self-generated narrative brings together an individual life into a purposeful, meaningful, and convincing whole (Sanderson & McKeough, 2005). The student- and group- generated narratives in the study are by themselves reflections of meanings that community immersion participants attached to their experience. They are valuable sources of information of how students think both as individuals and as a group.

Cogenerative dialogue. The term cogenerative dialogue stems from Tobin and Roth's (2005) notion of a debriefing among the stakeholders in a coteaching study that "turned into the collective, dialogic generation of descriptions and explanations (theory) of shared events" (p. 315). Lebak (2007) adapted the cogenerative dialogue term to describe a discussion between stakeholders for the purpose of examining shared events and experiences. According to Moscovici (2007) cogenerative dialoguing can be used as a tool to negotiate issues related to cultural, social, and symbolic capital and their transfer via porous boundaries to ensure successful transactions and science learning. Successful

transactions promote the sharing of individual and group capitals that can be used as resources for further capital production (Roth, 2006). As used in this study, cogenerative dialogue is a facilitative tool to negotiate and share meanings in the context of prospective science teachers' community immersion experience. It also implies the fluid nature of negotiated meanings, depending on the porosity of boundaries between individual and group meaning constructions.

Summary of the Chapter

This chapter provided an in-depth review of literature on the historical, theoretical, research, and practical underpinnings of community immersion. In particular, this chapter examined research literature relevant to community and science teacher preparation. Research and conceptual literature on cohort organization structure, professional development schools, community-based field and early field experiences, and service learning were reviewed and discussed with respect to their relevance in community-based science teacher preparation. Theoretical ideas surrounding notions of community and how they inform science teacher preparation were also discussed. The theoretical framework of the study was also located and discussed— from a more general epistemology to specific conceptions—in light of the demands of research questions.

Chapter 3

METHODOLOGY

Introduction

This chapter is made up of seven parts, namely: (a) the methodological perspective, (b) the context of the study, (c) research participants, (d) the setting of the study, (e) procedures, (f) data sources, and (g) the data analysis.

In the *methodological perspective*, the choice of collaborative action ethnography as a research methodology is described in detail. Due to the hybridized nature of this methodology, the discussion is grounded in the nature of participatory action research and ethnography and how these two methodologies informed the researcher's conceptualization of collaborative action ethnography. In addition, this section also locates the epistemological basis and theoretical research perspectives influencing the choice of the methodology.

In the *context of the study*, a lengthy discussion is devoted to describing the community immersion model in pre-service science teacher preparation. Community immersion is situated from multiple perspectives tracing the legal, historical, social, and curricular contexts that gave rise and support to the practice. As an integral part of teacher education curriculum in the Philippines, community immersion is described using the teacher education milieu that influences the changing practice of community immersion.

In the *research participants* section, members of the research team are categorized as primary and secondary participants. The discussion of the primary participants lends attention to the formation of the research team and the challenges and constraints they faced while doing the collaborative action ethnography. The secondary participants of the study are described as well as the various roles they played such as informants, peer de-briefers, interviewees, and focus group discussion participants.

In the *setting of the study* section, the research locale is described both from micro and macro levels. From the micro level description, this section describes the university where students took their community immersion course and the *barangay* where they spent their community stay. From the macro level description, this section describes the local, regional, and national landscapes that might help the reader understand specific research locations. The description is usually situated in the social, cultural, political, academic, and organizational realities operating outside the specific research localities.

In the *procedures* section, the discussion is divided into two parts. The first part of the discussion provides a more generalized description of steps involved in implementing the community immersion course. This description primarily revolved around the three phases of community immersion, namely, preparation, community stay, and the integration and assessment phase. The second part of the discussion primarily deals with the specific procedures of the collaborative action ethnography needed to satisfy the purpose of the study and to explore the research questions.

In the *data sources* section, the primary and secondary sources of data are described in relation to the research questions and the contexts in which the data were collected. Due to the collaborative nature of the study, the procedure section also contains

information as to who, what, when, and how the data were collected. A matrix was also constructed to provide clearer correspondence between the data sources and research questions.

In the *data analysis* section, the discussion is divided into two major parts. The first part of the discussion provides a theoretical and organizational framework informing the data analysis. In particular, the theoretical bases of narrative analysis and analysis of narratives are described in relation to how they informed the methods of analysis. Specific conceptual and procedural frameworks were also reviewed to inform different aspects of data analysis such as conceptions about the three-dimensional narrative space and formal narrative models in constructing individual, specific narratives. The analysis of narratives is described using the dialectic of paradigmic reasoning and inductive analytic procedure of grounded theory. The second part of the discussion addresses the specifics of data analysis vis-à-vis the research questions. In this section, the detailed analytic procedures are described as an application of the theoretical and methodological frameworks discussed in the first part.

Methodological Perspective

The current research is situated under a broad category of research on the anthropology of science education. The methodology is therefore informed by currents of epistemological issues surrounding knowledge production in anthropology and anthropology of education. For example, there is a call in anthropology for the "distribution of power in productive activity" (Greenberg & Park, 1994, p. 1) in research, particularly in relation to knowledge production and the use of methodological approaches at the intersection of multidisciplinary perspectives. This situation highlights

the need for people-/subject-oriented knowledge production/co-production (Agrawal, 2002; Brown, 1998) using more democratic research methodologies such as participatory, action research (Sims & Bently, 2002); collaborative ethnography, and public anthropology (Lassiter, 2005).

Collaborative action ethnography. The methodology in this study is an adaptation of Frederick Erickson's (2006) notion of collaborative action ethnography, studying "side by side" in contrast to "studying up" and "studying down" approaches in anthropology and anthropology of education research. Collaborative action ethnography provides an alternative to the elitism of traditional ethnography and scientific, policy-oriented research in education by allowing participants to inquire together on issues they mutually define. As co-inquirers and co-researchers, participants are by no means passive partners in collaborative action ethnography; they have reciprocal relations of mutual influence since everyone has "primary control in the process of defining, collecting, and reporting data" (p. 253). Erickson contends that collaborative action research does not remove issues of power difference in the research process; however, they become more visible as power and work responsibility are shared.

Collaborative action ethnography draws upon a hybrid of participatory action research and ethnography for its methodology. Action research is broadly described as a "family of approaches to inquiry which are participative, grounded in experience, and action-oriented" (Reason & Bradbury, 2001, p. xxiv). Traditionally designed to increase research participants' capacity for self-determination and influence in decision making (Boog, 2003), this study specifically operated on the notion of "co-operative inquiry" (Heron & Reason, 2001), which advances research *with* rather than *on* people. It is

characterized by “co-operative” relationships among co-researchers and co-subjects, constant reflection and sense making of the action and experience, explicit attention to viability through agreed procedures, use of a wide-range of inquiry methods from various epistemological stances, and primacy of transformative inquiries that involve action.

In particular, this research adopted Heron and Reason’s (2001) notion of co-operative inquiry cycles through four phases of reflection and action (pp. 180-181), namely: (1) a group of co-researchers come together to explore an agreed area of human activity; (2) co- researchers become co-subjects who engage in the actions they have agreed upon, observe and record the process and outcomes of their own and each other’s action and experience; (3) co –subjects become fully immersed in and engaged with their action and experience such that they may lose the awareness that they are part of the inquiry group; and (4) co-researchers re-assemble to share their practical and experiential data , and to consider their original ideas in light of it.

In addition to action research as a major research methodology, this study also drew from the data collection methods and tools of ethnography to “uncover meanings and perceptions on the part of the people participating in the research, viewing these understandings against the backdrop of the people’s overall world view or culture” (Crotty, 2003, p. 7). The central tenet of ethnographic inquiry rests on the assumption that culture evolves as a result of human interaction and that culture, a collection of behavior patterns and beliefs, sets the standards for decision making (Patton, 2002; Goulding, 2005). Drawing its roots from cultural anthropology, ethnography is a method of inquiry that utilizes everyday experiences as a lens to examine the social and cultural realities. In particular, the research team utilized the tools of ethnography (e.g. ethnographic

interviews, participant observations, etc.) in order to understand the culture in the group and the culture of the people they interacted with throughout the research process, particularly those living in the rural coastal village, the immersion site. Through community immersion, the research team was able to immerse in the lifeworlds of the people in the fishing village and understand their ways of life, thoughts, and thinking of the world around them. Through the cultural memory banking technique (Nichols, Tippins, Morano, Bilbao, & Barcenal, 2006), they conducted a series of mini-ethnographies on cultural practices of people in the community relevant to science teaching. Through narrative representations of the data collected, this study also crossed the border of CAP (creative analytic process) ethnography—a blurred, enlarged, and altered ethnographic genre situated at the margin of social scientific writing (Richardson & St. Pierre, 2005). CAP ethnography is both creative and analytical; its value is judged on the basis of its substantive contribution, aesthetic merit, reflexibility, and impact. Examples of these genres are layered texts, autoethnographic accounts, poetry, fictionalized narratives, readers' theater, performance pieces, among others. Some of these genres are used to represent the narrative data of the research.

Context of the Study

Community immersion is not new in Philippine higher education. It has played an integral part in providing clinical experience for other professions such as social work, nursing, medicine, sociology, anthropology, etc. Recognizing the value of the community as a context for pre-service teachers to learn and to render service to the country, the Commission on Higher Education (1999), the highest policy making body in teacher education in the Philippines, issued a memorandum requiring all teacher education

institutions to offer community immersion under the professional education strand of the teacher education curriculum.

Community immersion model in teacher education

This course was conceptualized as an avenue for students to understand the social, cultural, political, economic, and educational realities outside the boundaries of a university, particularly in communities where students might serve in the future. Dubbed as a “dialogue of life”, the course aimed for students to get in touch with themselves as they interact and relate with other people. It was envisioned to provide an integrating framework linking the formal knowledge gained from the university and the practical knowledge learned from the immersion site (Almeda, Andora, Bilbao, Cabag, Delfin, Handa, et. al., 2002).

Community immersion was also conceptualized as a form of field experience, bridging teacher preparation courses and student teaching. Philippine pre-service teacher education is usually composed of on-campus and off-campus student teaching components. Pre-service teachers most often conduct their on-campus student teaching at the laboratory school of a university and their off-campus exposure in schools of their choice. Most often, they are encouraged to conduct their student teaching in rural areas since most of the basic schools in the Philippines are located in rural communities where their services are mostly needed. Thus, community immersion was envisioned to prepare pre-service teachers for the smooth transition from a university experience into a rural, off-campus student teaching.

Figure 3.1. Representative picture of pre-service teachers helping local farmers in the rice field as part of their service learning activities.

Service learning and community immersion

One important element of community immersion is the integration of service learning in communities where pre-service teachers are placed. Most often in the past, pre-service teachers were engaged in service learning projects based on the perceived needs of the community where they stayed. These service learning projects were conducted in collaboration with community people—from the planning to the implementation stage. This collaborative endeavor was formalized through a memorandum of understanding (MOA) between the university and the local government (Almeda, Bilbao, Cabag, Delfin, Handa, Prizas, et al., 2002). For example, the host

barangay, as represented by its officials, agreed to assist students in the implementation of their proposed action plans, link students to government or non-government organizations needed to accomplish their service learning projects, and address safety and housing concerns of student participants.

In the past, the service learning component of community immersion was guided by various theoretical frameworks such as Boyle-Baise's (1999) functional/ spiritual, liberal, communitarian, radical democratic, and postmodern; Fryer and Newnham's (2005) charity, social justice, community development, project-based; Donahue's (1999) philanthropic, civic, change, and charity; Barton's (2000) multicultural; and Butin's (2003) technical, cultural, political, and poststructural service learning paradigms. However, the underlying service learning paradigms were not made explicit. Students were engaged in service learning projects such as communal herbal gardening, communal vegetable gardening, herbal soap making workshop, community tree planting, demonstration teaching in local schools, medical and dental missions in cooperation with local health officials, literacy classes for indigenous people, feeding of school children, Christmas gift giving, among others.

The current study integrated the social justice, project-based (Fyer & Newnham, 2005), and communitarian (Boyle-Baise, 1999) service learning paradigms in the community immersion experience of pre-service teachers in an explicit manner. The research team aimed at addressing the underlying structural causes of social inequities and in identifying the social justice issues in the community. They also envisioned a community-based project that met the needs of people through communal decision making and action as the nexus of collaborative endeavors.

Figure 3.2. Representative picture of a service learning project in a mountainous agricultural community showing pre-service teachers teaching villagers how to make herbal soap using locally available materials.

Elements of community immersion in pre-service science teacher education

Through a six-year experience of community immersion in pre-service science teacher education, Handa, Tippins, Bilbao, Morano, Hallar, Miller, & Bryan (2008, in press) were able to evolve a model that is currently applied in this research. This community immersion model is made up of the following elements: (1) formation of learning communities, (2) trust building activities, (3) community survey, (4) action research, (5) service with the community, (6) community project, (7) individual and group narratives, (8) memory banking, (9) co-planning and co-teaching, (10) reflection, (11) portfolio assessment, and (12) exhibits and portfolio display.

In this model, community immersion student-participants are divided into manageable numbers, about 8-12 students per group to comprise a basic learning community. Students in a large cohort are given the freedom to choose the members of their group. Most often, friends tend to flock together in one group. During the preparation phase, students attend a regular class to prepare them for the actual community stay and to build their sense of community through trust building activities. In addition, students conduct preliminary community visits and surveys to assess community needs, which inform their proposed service learning projects. Students develop their action plans in consultation with their supervising faculty and *barangay* officials.

During the actual community stay, students implement their action plans. In particular, they implement their community project in collaboration with the community people. In addition, they collect data, particularly on cultural practices relevant to science teaching, through interviews, focus-group discussions, and participant observations. Ethnographic data are then transformed into a more focused narrative through an anthropological tool known as cultural memory banking. Memory banks serves as a mediational tool between ethnographic data and culturally relevant science lesson plans. Using the cultural memory bank, students in collaboration with their supervising faculty develop culturally relevant lesson plans in science.

To reverse the notion of "knowledge mining" from the community, students conducted demonstration teaching to high school students living in the community. Community people also served as resource persons/critics of the demonstration teaching. In addition, in this study, pre-service teachers put up a mini-museum in the community to

display their research findings. They also documented their immersion experiences through journals, portfolios, and exhibits. These were primary sources in assessing students' learning through community immersion.

Participants of the Study

Primary participants of the study included a research team consisting of a "cohort" of pre-service science teachers, an educational psychology teacher educator, and a science teacher educator/science education doctoral graduate student. Secondary participants of the study included faculty members and pre-service teachers who had prior community immersion experience, and fishing village people who shared their community funds of knowledge.

Formation of the Research Team

Prior to his going back to the Philippines, the principal investigator exchanged e-mails with a Filipino colleague in his home university asking her to be his collaborator for the study. She agreed to co-teach the course in the second semester of that school year (November to March). During his preliminary visits in his Philippine university, the principal investigator checked the schedule of classes of his prospective research participants. He found that the teacher-collaborator was assigned to handle the community immersion course. The class schedule was perfect, Monday and Wednesday, 4:30 to 6:00 p.m. There was an hour and a half free time before the start of the community immersion class, which was a convenient time for research meetings and/or focus group discussions. He had an impression that his collaborator had fully arranged the class schedule. During their first meeting, the teacher collaborator expressed some hesitation in teaching the course because of her busy schedule. At that time, she was

recently designated in an administrative position that demanded much of her time and effort. The principal investigator literally begged her to co-teach the course and to participate in the collaborative action ethnography. She eventually agreed.

The student members of the research team were formed by student consensus and through faculty recommendations. The principal investigator's first meeting with the class took place on November 5, 2006. Almost half of the class was absent—that was the second day of the semester—and students were still lined up to register for courses. He approached his prospective participants after their chemistry class, with an hour gap before their community immersion class. Since the principal investigator had been away from this university for more than two years, he expected that the students may not know him. So he introduced himself and his intentions. Below is a detailed description of his first encounter with prospective research team members as documented in his journal:

> *Having obtained their class schedule earlier, I went into the room where my prospective research participants held their class. I had to wait for their class to end before I got into the room. I met their teacher, my colleague in the university, on the hallway and we exchanged our hastened greetings as I was in a hurry to capture my prospective research participants. When I entered, students were about to go out of the room but I introduced myself as a faculty member of the college (on-study-leave). I mentioned that I am pursuing my Ph. D. degree in Science Education at a university in the southeastern part of the United States and that I am interested to collaborate with them for my research.*
>
> *I sat on the chair with a small table in front of me. Students returned to their chairs; the seating arrangement was typical of a traditional class. For the*

next 30 minutes, I gave them the synopsis of my research. I mentioned that I am interested in bridging communities and pre-service science teacher education particularly on the use of community immersion as a context of my study. I discussed the rationale and the theoretical framework of my research. I also introduced my research questions and methodology. Students, as I observed, were interested. At the end, I asked them if they were willing to participate as members of the research team. All raised their hands, except one who was hesitant to join because he said that he is a working student and that his participation in the research will demand much his time. I agreed. I explained that the research will be very demanding and will take much of their extra time. I also explained that they will have extra work to do in addition to their regular community immersion class.

I distributed to the class the consent form. I assured them that my research proposal had gone through a stringent review process by the Institutional Review Board of the university where I study. I discussed the contents of the consent form. Again, I probed who were interested in joining the research team. All 8 students present raised their hands. I gave extra copy of the consent form for their classmates who were absent. I mentioned that I plan to collect the consent form the next meeting. I thought that if everybody was interested in joining the research team, I will select 10 students based on the recommendation of my colleagues who previously taught the class. (Vicente's journal, 11/05/06)

The principal investigator's next meeting with his prospective research participants took place during their orientation to the community immersion class. After a brief

introduction, the teacher-collaborator took charge of the orientation meeting. The cohort had 41 members, with 17 chemistry and 24 physics majors. After the class ended, the principal investigator asked the chemistry majors to stay behind for a meeting. He led a second round of research orientation. At the end of the orientation, 11 students returned the consent forms. At that point, the research team was formed on the basis of the list of students who turned in their consent forms and of those who were recommended by the principal investigator's colleagues in science education who previously taught the group.

Rationale behind the selection of research team members. Ten pre-service chemistry teachers were selected as members of the research team for the following reasons. First, the principal investigator held a master's degree in chemistry education, and thus believed his expertise might be valuable in helping members of the research make sense of their community immersion experience in light of their science content knowledge. Second, the research plan involved the documentation of cultural practices in the community, hence, members of the research team might inform each other in identifying practices relevant to science teaching and learning. Finally, the research plan involved developing culturally relevant science lessons plans; hence, the principal investigator might provide guidance in the co-planning. The principal investigator acknowledged that the choice of chemistry majors as members of the research team might also delimit their view of science in the community. He was proved wrong as students also identified cultural practices that were relevant to biology and physics education.

The Research Team as Primary Participants

The research team was composed of two teacher educators— one specializing in educational psychology and the other finishing his doctoral degree in science education— and 10 pre-service teachers studying for the Bachelor in Secondary Education with a major in chemistry. Research participants personally picked pseudonyms for themselves.

Figure 3.3. Picture of student members of the research team taken during one of their research meetings.

Dianne. Dianne Luna is 19 years old, a chemistry major in an undergraduate Bachelor of Secondary Education program of the university. She is the fifth child among her eight siblings. Her father died when she was 7. Since then, she has helped her mother in doing household chores for their well-to-do relatives. When she was in her secondary education, she stayed with her aunt who paid for her school expenses. Now that she is in

college, she lives at the house of a distant relative, who in turn supports her university education. Dianne describes her childhood community as very rural, far from the town and city. She sometimes goes back to her *barangay*, most especially for special occasions. She dreams that one day, she and her other siblings will live together in a house. When she gets a job, she plans to send her younger brothers and sisters to school.

Vincent. Ben is the nickname that Vincent Zaragoza, a pseudonym, would like to assign for himself. He is 19 years old, a chemistry major in the secondary teacher education program. He originally wanted to become a priest but was denied admission in a seminary because he was born out of wedlock. He said that he had not seen his father since birth. At first, Ben was hesitant to join the project because of his part-time job at his aunt's store. He was only encouraged to join the research team when he saw most of his friends in the group. He has been an achiever, having completed his high school education as class valedictorian. He grew up in a rural agricultural community and is currently living, together with his sister, at the house of his uncle who finances their university education. In return, they render service at his business establishment. He considers his urban community unfriendly and his stay, transient. Eventually, he plans to move somewhere else. After college, he plans to try again his luck with admission to a seminary or abbey as he wants to serve God.

Candy. Candy Ledesma is 19 years old, a chemistry major, and eldest among her two other siblings. She describes her community as suburban, located in a nearby town adjacent to the city. Her father is a government employee while her mother is a housewife. She lives in an extended type of family; it includes her two unmarried aunts. One aunt stays with them while the other works abroad and sends money to help support

the family. She describes her upbringing as conservative. Her father is an active member in the church and her spinster aunt is very strict in terms of morals.

Chennie. Chennie wants to be called Chennie Lyn Mana-ay. She is the eldest among 7 other siblings. She describes her community as rural agricultural; houses are far from each other. In her *barangay*, people sleep very early, about 7: 00 in the evening because some parts of her *barangay* have no electricity. Her father is a farmer and her mother helps in the farm. Chennie temporarily stays in a boarding house in the city and goes home every weekend. Due to her family's difficult economic situation, she receives a stipend from the government to help support her college education. She also acknowledges the financial support of her aunt who gives her allowance for her school expenses. She hopes that someday she can help her parents in sending her younger siblings to school.

Mario. Mario Lerona is 19 years old and the eldest among four siblings, all males. Mario commutes everyday from his *barangay*, about an hour drive to the city. His father is a truck driver while his mother is a school teacher. He describes himself as athletic as he has won district competitions and participated in university sports events. With the help of his grandmother, he became responsible at an early age for taking care of his younger siblings since his mother teaches in a distant town and goes home only on weekends. Aside from sports, his hobby includes gathering *tuba* (sweet coconut sap). He considers this work relaxing, especially when he is on top of a coconut tree. When sold, *tuba* gives him an extra income for his allowance. The unsold tuba is fermented into vinegar for their household use.

Leslie. Leslie wants to be called Leslie Balinas, a 19-year old chemistry major who hails from a distant province. She is the youngest of two siblings. Due to the far distance between the university and her home province, she and her sister go home once a month. Their parents, a school principal and a government employee, send them money every week. She stays in a boarding house owned by a faculty member of the university. Leslie occupies leadership roles in the class and in the university. She originally wanted to study in a military school but her parents would not give her permission. Now she is an active officer in a military training program of the university.

Tomas. Tomas wants to be called Tomas de la Cruz. Tom is also 19 years old, a chemistry major who lives with his father in a rented house in the city. Tom grew up in a distant town in a nearby province. He describes his *barangay* as rural agricultural; the village is located in between mountains. Their house, with a big river at the back, is surrounded by rice fields. Tom is second to the youngest among eight siblings. His father works as an analyst in a government agency while his mother manages their land in the *barangay*. Together with his father, they go home to their village every weekend. Tom was very interested in the research project. In fact, he and Kentoy decided to use part of the research for their undergraduate thesis. Tom plans to teach in a rural community some day and to put into practice his idea of culturally relevant pedagogy in chemistry education

Trixie. Trixie wants to use the psesudonym of Trexie Ann Suarez. Trixie is the only child in her family. She was born in the city, in a *barangay* where many of the people are her relatives. She acknowledged that she has little exposure to rural areas. Like Ben, Trixie is also a high achiever as she received honors in the elementary grades and

won many academic competitions. She considers her childhood very blessed, only to be disrupted by the death of her mother when she was in her fourth year of high school. Most often, she sleeps alone in her house as her chef father works at night in a restaurant in the city. She describes her *barangay* as noisy and crowded; houses are very close to each other.

Ynes. Her pseudonym is Ynes Alba. She is 19 years old and a chemistry major. She finished her high school education in the city. Originally, she came from a fishing village in a distant town where her parents live with her six other siblings. She was adopted by her aunt and uncle when she was young. There are times that her parents come to visit her, however, she feels somewhat detached from them. Although she knows that they are her real parents, she feels bad that she was given away by them at an early age. However, she is also grateful because of provisions and opportunities provided by her aunt and uncle.

Marian. She is a teacher educator handling psychology and educational psychology subjects in the undergraduate and graduate teacher education programs of the university. She holds a bachelors degree in psychology and master's degrees both in psychology and guidance, and sexuality and family education. She is about to finish her doctoral degree in psychology and guidance. She has been a faculty member of the university for the past 18 years and has been designated to various administrative positions in the university. She is well-traveled—in Europe, Asia, and the United States of America. Her involvement in community immersion started when she participated in a collaborative project involving two Philippine and one U.S. universities. She helped supervise a cohort of prospective elementary science teachers in a rural farming village.

She grew up in the suburb and studied in the city from elementary up to her undergraduate and graduate education. She describes her previous community immersion with "many firsts" in her life. For example, through community immersion, she was able, for the first time, to ride on a *carabao* (a water buffalo that farmers used to plow their rice field), drink *tuba* (a sweet alcoholic drink made from freshly gathered coconut sap), and *panggarab palay* (the harvesting of rice using the traditional hand-held, half-moon shaped metal tool). She is the teacher-collaborator of this research project.

Vicente. He is the principal investigator of this collaborative action ethnography, which is a requirement for his doctoral degree in science education in a university in the southeastern part of the United States of America. Prior to his studying in the U.S., he taught science, science education, and professional education subjects at his Philippine university, one of the settings of the study. In particular, he had prior experience in teaching community immersion for three years. His dissertation is an extension of his involvement in a collaborative project between one U.S. and two other Philippine universities that studied community immersion as a context for creating culturally relevant pre-service science teacher preparation. Vicente grew up and obtained his elementary education in a rural agricultural community, and the rest of his education in urban settings.

Figure 3.4. Picture of members of the research team in one of their focus group discussions.

Secondary Participants

Secondary participants of the study are classified into five categories, namely: (1) faculty members with prior experience in teaching community immersion or/and supervising a cohort of students for their community immersion; (2) pre-service/in-service teachers with prior community immersion experience; (3) pre-service science teachers who are part of the large physics-chemistry cohort outside the research team; (4) pre-service teachers in other cohorts who took community immersion parallel with the research team; and (5) people in the fishing village who served as contributors with respect to the community funds of knowledge.

Faculty members with prior community immersion experience. The members of the research team interviewed nine faculty members who served as peer de-briefers, resource persons, and informants on/of/about community immersion. These teacher educators are members of the teacher education faculty and came from departments of educational foundations, psychology and guidance, and human ecology. Seven of these teacher educators are female while two are male. They represented various teacher education disciplines such as social studies, early childhood, science, special education, mathematics, educational management, psychology and guidance, human ecology, home economics, and educational research. They have several years of experience in teaching and supervising students during the community immersion course.

Pre-service teachers with prior community immersion experience. Student members of the research team interviewed seven pre-service science teachers with prior community immersion experience. Of these seven, six were females and one was male. They represented different science education majors—general science, biology, chemistry, and physics. They also came from different backgrounds; some grew up in the city while others came from rural areas. They were placed in different *barangays* for their community stay and were supervised by different teacher educators. Student members of the research team were given the freedom to choose whom to interview, mostly on the basis of convenience, accessibility, and friendship.

Members of the large cohort outside the research team. The large physics-chemistry cohort, where the research team was situated, was made up of 41 students. When grouped as to majors, 17 students were chemistry majors while 41 were physics majors. As to gender, 18 were male and 23 female. Of the 41 members of the large

cohort, 31 were not part of the research team. Of these 31 students, 15 were male and 16 female; 7 were chemistry majors and 24 were physics major. These 31 students formed three separate groups and stayed in different houses in the same *barangay* where the research team conducted their community stay. In collaboration with the research team, they participated in community immersion activities and projects. They also conducted interviews and observations in the community, participated in the construction of the mini- museum for the service learning project, and took part in focus group discussions and interviews with members of the research team. Their portfolios and journals were submitted to the principal investigator, which provided an in-depth picture of the community experience of the entire class.

Pre-service teachers in other sections with parallel community immersion experience. Community immersion is part of the professional education subjects in the teacher education program. Consequently, the other ten cohorts had community immersion experience in other *barangays* at the same time as members of the research team. There were a total of 27 students from ten different cohorts who participated in focus group discussions describing their community experience. These focus group discussions were facilitated by the principal investigator to probe pre-service teachers' notions of community; their beliefs about the purposes, values, and goals of community immersion; and their specific experiences during their community stay. These students represented various specializations in the elementary and secondary teacher education programs of the university, namely, elementary science and health, English, Filipino, social studies, special education, early childhood, mathematics, general science, biology, chemistry, physics, etc.

Coastal village people. Residents of the coastal fishing village were participants in the community immersion experience at the center of this study. They were involved in various capacities such as hosting students in their homes, coordinating community activities, acting as resource persons in student initiated activities, participating in service learning projects, and serving as informants in the data collection. A total of 36 residents participated in individual interviews conducted by students in the class. Of these thirty six, 21 were male and 15 were female. All of these informants were adults with ages ranging from 20 to 60. They represented various sectors of the community such as *barangay* officials, youth organizations, labor groups, farmers, fishermen, bakers, construction workers, fish vendors, etc.

Setting of the Study

This study was conducted in two important settings in the Philippines, namely, (1) the university where the community immersion course was taught, hereto referred to as *University of Central Philippines*; and (2) the *Barangay Baybay*, a coastal village where pre-service teachers stayed for their field experience. As background information, this section discusses the Philippines and the region where the university is located and an overview of the Filipinos' notion of a *barangay* leading to the description of the fishing village where students participated in their community stay.

The Philippines

The Philippines is an archipelago consisting of more or less 7,107 islands. It is located in Southeast Asia, with the Pacific Ocean on the east and Vietnam on the west. The country is a mixture of diverse indigenous cultures and of influences brought about by colonization and interactions with other countries such as China, Indonesia, Malaysia,

Spain, Japan, the United States of America, etc. Spain, for example, colonized Philippines for more than 300 years and ceded the country to the United States after the Spanish-American war in 1998. Colonization and interactions with neighboring countries produced current Filipinos whose lineage is a mixture of Austronesian descent with minority of Spanish, American, Mexican, Chinese, Arab, and Indian ancestry (Constantino & Constantino, 1975, 1992).

The country is divided into 17 political regions and grouped into three major islands—Luzon, Visayas, and Mindano. The study took place in one of the islands in the Visayas, where inhabitants speak in triple linguistic conventions of *Hiligaynon* or *Kinaray-a*, the local dialect; Filipino as a national language, which is basically Tagalog; and English as part of the school instruction and business transactions. Political regions are made up of cities and provinces. The province is further divided into towns, where the *barangay* serves as the smallest political and geographical unit. A b*arangay* is somewhat similar to a village or district with about 50 to 100 households. It is headed by a chieftain called *barangay* captain who governs the *barangay* with his councils, also known as *kagawads* (The Local Government Code of the Philippines, Republic Act 7160).

The University of Central Philippines

The University of Central Philippines (UCP), a pseudonym, is strategically positioned at the heart of the Philippine archipelago; thus, it plays an important role in the educational needs, not only of the people in that region, but also of students in Luzon and Mindanao. Its history can be traced back to 1902 when it was opened as a tributary normal school with secondary school instruction. After a century, it is now a leader in

teacher, medical, and nursing education providing quality education in the central part of the country.

Figure 3.5. Map of the Philippines (Source: http://www.ldb.org/phil_map.htm).

College of Education. The college where this study took place offers four undergraduate degree programs with nine specialization areas in elementary education, ten major fields for secondary education, and three concentrations for special education. It has four master's degree programs in fourteen areas of specialization and two doctoral degree programs in five areas of specialization. Its teacher education programs obtained Level IV accredited status from the Accrediting Agency for Chartered Colleges and Universities in the Philippines (AACCUP). Its elementary and secondary education programs ranked first and fourth, respectively in the country, in terms of the number of board passers in the 2006 licensure examination for teachers. Since 1995, the college has been recognized as a *Center of Excellence in Teacher Education* in the region by the Commission on Higher Education.

There were two important settings in the university where the study took place—the classrooms and offices. Community immersion classes were held in the ground floor of the teacher education building. The class met every Monday and Wednesday from 4:00 to 5:30 p.m. Most often, the research team met an hour before the class for focus groups discussions or meetings. Interviews conducted by student members of the research team were held in various settings depending on the arrangement made with the secondary participants. For example, most faculty interviews were conducted in their offices while student interviews were mostly conducted in one of the classrooms in the university.

Barangay Baybay: The Immersion Site

Baybay is one of the *barangays* in a coastal town located at the southern part of the island. It is about a 45-minute drive from the University of Central Philippines. Baybay has the best of two worlds; it is both a fishing and agricultural village. Its residents live in about 68 households. Most of the houses are located on the coastal area where residents are engaged in economic activities such as fishing, mollusk gathering *(panginhas*), and preserving and selling fish. Its agricultural land is located at the hilly portion of the *barangay* where farmers are engaged in rice and vegetable farming, especially planting mongo as an intercrop in between rice harvests.

The *barangay* has a very rich cultural and historical legacy. At the hilly side of the *barangay* overlooking the sea, one can see remnants of *bantayan*, a pre-Hispanic watchtower made of slabs of stones that was used as a lookout to forewarn the arrival of raiding Moro (Muslim) pirates. Based on the oral history of the community, Moros used to abduct children or young adults from the community who were sold as slaves in Mindanao or in neighboring countries. To signal the arrival of their *vintas* (sail boats) at the horizon, lookouts used to beat a big drum as a sign for residents to run away from the coming enemy. In addition to *bantayan* as a historical site*,* residents are proud of their *barangay* as the setting of the first ambush in the region against the Japanese imperial forces during World War II. A memorial in honor of Filipino casualties and leaders of the ambush was erected across the *Barangay* Hall and residents commemorate the occasion once a year.

Based on the oral and written history of the *barangay,* residents believe that *Barangay* Baybay was once upon a time under water. As time passed by, the water

subsided creating high and low elevations in the *barangay*. Most of the lowlands were flat and swampy, where mosquitoes breed on stagnant water. That explains why the local name of the *barangay* is closely associated with mosquitoes. The remnant of this geological history of the community is reflected in the principal investigator's description of the *barangay* as recorded in his journal during the research team's first visit.

> I took us about 45 minutes to reach Baybay from the university. The road to Baybay is asphalted with the sea on the left and tracts of rice field on the right. The entrance into the *barangay* is signaled by a welcome sign embossed on a cemented slab erected across the bridge that separates Baybay from an adjacent *barangay.* On our way, I saw big houses along the road, mostly made of concrete materials. On my left, the terrain was mostly flat; I saw some swamps and ponds teeming with water hyacinth and *kangkung (*swamp cabbage/water spinach). The *nipa* palm, which residents sometimes used as roof thatched, grows profusely at the edge of the swamp. I also observed roads signs pointing to two beach resorts near the shore. I saw from the distance coconut trees aligning on the shore. On my right, the terrain was somewhat flat, however, it gently slopes into a hill at the far distance. At the foot of the hills are houses and rice paddies where one can see remnants of freshly threshed rice stalks. Some rice paddies are planted with mongo. I found later in my interview that mongo is used as intercrop in between rice harvest. (Personal Journal, 12/04/06)

During our first visit in Baybay, we had the impression that this *barangay* had a better economic standing when compared with the average Filipino rural *barangay*. We found that most of the big houses along the highway were owned by residents whose family

members work abroad, e.g. seamen, nurses, overseas contract workers, etc. As we moved around the *barangay,* we were surprised by the big economic disparity between the rich and the poor. This social inequality in the community was captured in the lead researchers' journal after a focus group discussion centering on social justice issues in the community:

Figure 3.6. Picture of Baybay as a fishing village.

Figure 3.7. Picture of Baybay as an agricultural village.

> *We found Baybay as a community of paradox. As we moved around the barangay today, we were surprised by the gross economic difference in the community as evidenced in physical structures that divide the residents. We observed that houses along the highway were big, distanced, and made of concrete materials in contrast to very close, dilapidated, and mostly made of nipa and bamboo houses near the coastal area. We were told that residents living near the coast do not*

own the lot where their houses stand. They called themselves as "squatters" because anytime soon, they might be evicted from the area. Most of all, we were surprised to see a tall, long wall that separated the "squatters area" from the posh subdivision owned by rich residents of the community. We found this economic disparity very glaring in Baybay. (Personal journal, 12/13/06)

Procedures of the Study

Community Immersion Protocol

Procedures of the study were closely related to the three phases of community immersion, namely (a) preparation phase, (b) community stay, and (c) integration and summative assessment phase.

In phase one of the study, the research team focused on (1) understanding the "community", (2) exploring community immersion and understanding the different models of service learning paradigms focusing on communitarian, project-based, and social justice approaches, (3) understanding the research process (methodology and framework) and data sources (e.g. portfolios, journals, exhibits, lesson plans, etc.), (4) negotiating with the team the research activities, (5) preparing the team for data gathering procedures and analysis, (6) visiting the community, (7) conducting a community survey, (8) conducting preliminary individual and focus group interviews with community people, (9) developing an action plan, (10) negotiating and fine tuning the plan with the community people, and (11) developing assessment tools.

Phase two of the study focused on the actual community stay. Community immersion participants lived with the community people for one week. In this phase, they were involved in (1) implementing the action plan, (2) on-going data collection, (3)

making sense of community activities and research process through formative assessment, (4) negotiating and revising the action plan on the basis of continuous feedback and formative assessment, (5) interpreting the data and continuous sense making of the community immersion experience and the research process, (6) collecting portfolio artifacts, and (7) organizing ideas for the memory banks and lesson plans.

Phase three of the study was the integration and summative assessment phase. In this phase, the research team was involved in (1) assembling and organizing portfolios, (2) conducting focus-group debriefing, (3) on-going data analysis and interpretation, (4) developing a community immersion exhibit, (5) developing cultural memory banks, (6) developing and fine tuning culturally relevant science lesson plans, (7) conducting demonstration teaching, and (7) conducting summative assessment.

Specific research procedures of the study

Table 1 shows the summary of research activities under each phase and stage of the entire research process.

Table 3.1

Specific Procedures of the Study Showing Research Activities Under Each Phase and Stage of the Action Research

Phase/Stage	Specific Procedure/Activities	Data
Research Preliminaries	• Secured approval from the university and local officials to conduct the research. • Negotiated with the teacher educator on class schedules, role expectations, and preparations in co-teaching the community immersion course. • Conducted the first research team meeting; secured consent to participate in the research; discussed the overview of the research process.	Researcher journal 1 Research journal 2 Minutes of the meeting # 1
Phase 1: Preparation Phase		
Stage 1: Understanding the "community"	• Conducted focus-group discussion (FGD) probing the team members' initial understanding of "community." The research team members were asked to draw their understanding of community on a paper and explained their drawings. • Students in the large cohort presented posters depicting their ideas about community	Focus Group #1 Minutes of meeting 2

	• The lead researcher distributed the chart depicting different notions of community for the take home reading. • Members of the research team analyzed their notions of community based on the transcripts in FGD # 1. The lead researcher's framework on the different notions of community framed the analysis; it also served as a centerpiece of the dialogue.	Focus Group #2 Minutes of meeting 3
Stage 2: Exploring community immersion and understanding the different models of service learning focusing on communitarian, project-based, and social justice paradigms	• A focus-group discussion probed the participants' beliefs on the purposes, goals, and values of community immersion. • The idea of service learning was introduced to the team. Readings on the different service learning paradigms was distributed to the members of the team for discussion. • The team brainstormed ideas on how to best integrate the communitarian, the social justice approach, and the project-based service learning paradigm into the community immersion experience.	Focus Group #3
Stage 3: Understanding the research	• A focus- group discussion was conducted focusing on the: - research objectives and question;	Focus Group # 4

process (methodology, framework, and data sources)	- the action research and ethnography as research methodologies; - possible data sources the research outputs (portfolios, journals, exhibits, lesson plans, etc. • Action plan for the research was developed.	
Stage 4: Negotiating with the research team the research activities	• The research team conducted a focus-group discussion and brainstorming on/of activities to be included in the research plan.	Focus Group #5
Stage 5: Preparing the team for data gathering procedures and analysis	• Focus-group discussion was conducted on the use of ethnographic research tools (e.g., qualitative interviewing, field observation, and journaling) and the practice of qualitative data analysis (e.g. narrative analysis, grounded theory, and phenomenology) • Students conducted interviews with faculty members on their beliefs about the purposes, goals, and values of community immersion. • Students conducted interviews with at least 10 students (who had prior community immersion	Minutes of the meeting; Faculty Interviews #1- #5; Student Interviews

	experience) on their beliefs on the purposes, goals, and values of community immersion.	#1- #10
Stage 6: Visiting the community	• The group visited the *barangay* for geographical familiarity and for initial discussions with the *barangay* officials regarding the conduct of community immersion. • Students conducted initial field observations focusing on social justice issues in the community. • Research team conducted a focus group discussion focusing on social justice issues in the community and the service learning project appropriate in the community.	Focus Group #7 Field Observation # 1; Student journal 1-8; Focus group # 8
Stage 7: Conducting a community survey	• The research team conducted a rapid community appraisal. • Focus group discussion focused on what was learned from the survey and the initial field observation and how these influenced our research.	RCA Focus Group # 9
Stage 8: Conducting the	• Interviews and focus-group discussion were conducted with approximately 7 community people	Focus Group # 10

preliminary individual and focus group interviews with the community people	probing - their notions of community - strengths of the community - social justice issues/problems in the community	Community people interviews #1-#5
Stage 9: Developing an action plan	• A focus-group discussion was conducted to brainstorm results of focus group discussions and interviews with the community people. • The team members brainstormed activities to be included in the action plan for a week community stay based on initial results from interviews, focus-groups, and the survey.	Focus group # 11 Action Plan
Stage 10: Negotiating and fine tuning the plan with the community people	• The research team presented the action plan to the *barangay* officials for their suggestions/comments/ approval.	Minutes of meeting
Stage 11:	• The research team members negotiated and discussed the criteria and format for portfolio development and	Focus group # 12

Developing of assessment tools	assessment. • They developed rubrics for portfolio assessment and for community project.	Preliminary rubric
Phase 2: Community Stay		
Stage 1: Arrival, opening program, settling down (Day 1)	• Students supervising faculty, *barangay* officials, and some village people gathered together for an opening program. • Student groups were billeted at host families. The research team was housed in a Daycare Center of the *barangay*. • Some students did some preliminary tour around the *barangay* to familiarize themselves of the different parts of the community and to develop acquaintances with the village people. • The research team conducted a focus group discussion to thresh out initial problems met in the community and to discuss preliminary learning experiences.	Opening program Student journals Focus group 13
Stage 2: Mapping the village,	• Students conducted a qualitative observation focusing on village activities in the costal area. • Students explored the entire village for community	Journal entries (11)

identification of informants, and preliminary interviews. (Day 2)	mapping, identification of cultural practices relevant to science teaching, and interaction with possible informants. • Preliminary interviews were conducted on their choice of cultural practices (e.g. *ginamos* making, *palupad, tuba* making, *pangihas*, mongo as an intercrop) • A focus group discussion was conducted with members of the research team focusing on the learning experiences of the day.	Interviews with village people #6- #8 Focus group # 14
Stage 3: Intensive data collection (Day 3	• Interviews were conducted by the research team and other members of the class on cultural practices, social justice issues, historical landmarks, oral history, and arts and crafts of the community. • The research team conducted a focus group discussion to share learning experiences and preliminary themes from their data.	Interviews with village people #9-19 Focus group #15
Stage 4: Continuation of data collection and discussion	• Members of the research team and the entire class continued to collect data through interviews and participation in community activities relevant to their assignments.	Interviews with village people # 20-29

of the service learning project (Day 4)	• A focus group discussion was conducted with selected members of the class specializing on the study of social justice issues in the community. Brainstorming of service learning projects for the community took place. • The research team conducted a focus group discussion to synthesize significant learning experiences for the day.	Focus group discussion # 16 Focus group discussion # 17
Stage 5 Synthesis of significant learning experiences and closing program (Day 5)	• The research team conducted a focus group discussion with members of the class who specialized in the study of historical landmarks and oral history of the community. • The research team conducted a focus group discussion with selected members of the class who specialized in studying the arts and crafts of the community. • The research team conducted a focus group discussion on cultural practices in the community relevant to science teaching and learning. They also shared their meaningful learning experiences for the five-day community stay in *Barangay* Baybay.	Focus group discussion # 18. Focus group discussion # 19 Focus group discussion # 20

Phase 3: Integration and summative assessment phase		
Stage 1: Make sense of collected data from the community through cultural memory banking	• The research team participated in a seminar workshop on cultural memory banking. Initial memory banks were conceptualized. • Some members of the research team returned back to the community to collect more data for the cultural memory banks. Six more interviews were conducted with village people focusing on *ginamos* making, tuba making, mongo planting, indigenous fish catching methods, and fish preservation technique.	Minutes of the seminar Interview with community people # 30-33..
Stage 2: Investigate parallel community immersion experiences of students and faculty in different communities.	• The research team conducted focus group discussions with other third year students who participated in community immersion in different communities. A total of 27 students representing 21 majors and specializations participated in one of the five FGDs conducted by the research team. • Research team conducted four more interviews with faculty members who supervised students in other communities.	Focus group #21- 25 Faculty interviews # 6-9.
Stage 3. Assemble and	• Student groups continue to develop their portfolios.	

organize portfolios	• A focus-group discussion was conducted for the purpose of critiquing the on-going portfolio construction.	Focus group # 26
Stage 4: Prepare for a conduct of the service learning in the community	• The research team develops culturally relevant lesson plans. A focus group discussion was conducted to critique the lesson plans. • Students assemble, organize, and transform their artifacts and interview data into displays for their community-based mini-museum.	Focus group # 27
Stage 5: Implementation of service learning project	• The research team conducted a demonstration teaching of culturally relevant science lesson plans in the community. High School students in the community participated in the demonstration. Some village people attended the demonstration teaching while women served s resource persons on culturally relevant practices in the community. • Community people attended the opening of community museum. Students explained their displays to village people.	Journal notes; video tapes of demonstration teaching and opening of the community museum.
Stage 6; Synthesis of the entire	• A focus group discussion was conducted in all student groups who participated in the community immersion focusing on lessons learned and	Focus group # 28-31

community immersion experience	suggestions/comments for improvement of the practice. • All students submitted their journals to the principal investigator. Students groups submitted their portfolios to the principal investigator. • In addition, student members of the research team submitted 10 cultural memory banks and 10 culturally relevant lesson plans.	35 out of 41 students submitted their journal Lesson plan # 1-10; Memory bank # 1-10
Stage 7: Conduct of summative assessment	• A de-briefing session and summative reflection was conducted with the research team.	Focus-group # 32

Sources of Data

The primary sources of research data included the transcripts of interviews, transcripts of focus-group discussions, principal investigator's field notes, student journals, minutes of meetings, portfolios, cultural memory banks, and culturally relevant science lesson plans. The secondary sources of data included archival data, photographs, video clips, and artifacts. Table 1 shows a matrix of data sources in relation to research questions.

Table 3.2

Matrix of Data Sources Vis-à-vis Research Questions

Data Sources	RQ 1	RQ 2	RQ 3	RQ 4
Interviews	X	X	X	X
Focus-Group Discussions	X	X	X	X
Field Notes		X	X	X
Journals		X	X	X
Cultural Memory banks		X		X
Minutes of Meeting	X	X	X	X
Culturally relevant lesson plans		X	X	X
Portfolios	X	X	X	X
Archival Information	X	X	X	X
Video Clips				X
Artifacts		X	X	X
Pictures	X	X	X	X

In general, the entire collaborative action ethnography was able to generate a total of 52 individual interviews, 32 focus group discussions (18 of which were conducted with members of the research team), 32 principal investigator's field notes, 35 student

journals, 10 cultural memory banks, 10 culturally relevant lesson plans, 18 minutes of meetings, 4 portfolios, over a hundred archival documents, 4.5 hours of video clips, and over 500 pictures.

Data Analysis

There is a growing belief that little attention has been paid to teachers' voices in studying their thoughts, perceptions, beliefs, and experiences. Cortazzi (1993) argued that the use of narrative approaches in data analysis provides an appropriate medium for expressing research participants' voice and for understanding their culture from the inside.

The use of narrative approaches in data analysis has a long history in qualitative research with its theoretical and methodological framework grounded in interdisciplinary literature. For example, Cortazzi (1993) traced the historical background of narrative research in linguistics. Other applications of narrative analysis across diverse disciplines include the fields of psychotherapy (Labov & Fanshel, 1977); history, literature, psychology, and philosophy (Polkinghorne, 1988); education, psychology, and anthropology (Brewer, 1985); and literary and sociolinguistics (Toolan, 1988).

Narrative analysis as an analytic approach utilizes narrative reasoning in the construction of a plot drawn from descriptions of actions, events, and happenings in the data (Polkinghorne, 1995). The outcome is a story in which data elements are linked together in order to create a coherent whole. As a storied outcome, narrative analysis may take the form of a "historical account, a case study, a life history, or a storied episode of a person's life" (p. 15). Analysis of narratives as an analytic approach utilizes paradigmic reasoning and/or inductively derived concepts from common elements of stories. Results

of this analytic approach are descriptions of themes that hold across stories or of taxonomies of stories, characters, or settings. Due to the theory-driven nature of the study, the analysis of narratives utilizes the dialectic of paradigmic reasoning and inductive analytic procedures of grounded theory to generate themes for the findings.

Narrative analysis

Cortazzi (1993) argued that the use of narrative analysis as an analytic approach provides a specific window through which one can examine the teller's representations and explanations of experience. It is an analytic procedure through which scattered data elements are organized and synthesized into a coherent developmental account (Polkinghorne, 1995). Emplotment and narrative configuration is the primary analytic tool. Through narrative configuration, data are drawn together into thematically organized narrative texts in order to create a story. This story is a special kind of discourse production in which events and actions are drawn together into an organized whole by means of a plot—a narrative structure through which "people understand and describe the relationship among the events and choices of their lives" (p. 7). In narrative analysis, stories, often called narratives, are considered a "kind of knowledge that uniquely describes human experience in which actions and happenings contribute positively or negatively to attaining and fulfilling purposes" (p. 8). According to Clandinin and Connelly (2000), narratives are the best way of representing and understanding experience. They create contexts central to understanding thinking, culture, and behavior (Cortazzi, 1993).

In the construction of stories in narrative analysis, information is drawn from multiple sources (e.g. interviews, journals, public and personal documents, and

observations). Clandinin and Connelly (2000) refer to these various data sources as narrative texts. These narrative texts are organized into a unified whole in which elements are connected to the central purpose of the action (Polkinghorne, 1995). The story is a product of narrative integration because it allows for the incorporation of the notions of human agency as well as chance happenings, dispositions, and environmental factors. According to Polkinghorne, the analytic procedure in the configuration of stories requires a recursive movement from the data to an emerging thematic plot in order to create a story that fits together data elements and their relationships. The analytic process in narrative analysis employs the synthesis of the data in order to discover or develop a plot "that displays the linkage among the data elements as parts of an unfolding temporal development culminating in the denouement" (p. 15). Contrary to the separation of parts, narrative analysis aims at synthesis of elements in data sets in order to construct a whole new understanding of the object of the study. The process of organizing elements into a coherent developmental account may reveal the unique quality of an individual case or a bounded system and provide understanding of its idiosyncrasy and particular complexity.

In writing the stories, the analysis was informed by Spence's (1986, as cited by Polikinghorne, 1995) notion of narrative smoothing: "Not all data elements will be needed for the telling of the story. Elements which do not contradict the plot, but which are not pertinent to its development, do not become part of the research result, the storied narrative….The final story must fit the data while at the same time bringing an order and meaningfulness that is not apparent in the data themselves" (p. 16). Dollard (1935), also cited by Polkinghorne (1995), provided guidelines in developing narratives. According to Dollard, a good narrative must include descriptions showing (1) the cultural context in

which the story took place; (2) the embodied nature of the protagonist, (3) the role of significant others affecting the actions and goals of the protagonist, (4) decisions and actions that the protagonist take to accomplish his/her goals; (5) the historical continuity of characters; (6) the temporal nature of the story showing the importance of beginning, climax, and denouement of the story; and (7) the generation of a plausible and understandable research occurrence.

In writing the story, elements in the data were linked together. An outline was made to accommodate a better fit with the data. In terms of the process of writing the story, there were missing links or gaps in the data that were inferred by the principal investigator and referred back to the research participants for clarification in order to produce a full and explanatory story. Citing Brunner (1986), Polkinghorne contends that "the narrative structure…. are not secondary narratives about the data but primary narratives that establish what is to count as data" (p. 18).

Cortazzi (1993) identified three criteria in writing a good narrative: temporality, causation, and human interest. In literature, these three comprise the minimum structure of a plot. Temporality refers to the sequence of events in time, which is characterized by states of equilibrium, causation, and tension resolution. Causation is the link between the beginning and the final state, which is finished off in a resolution of tension. Human interest, a very subjective component of the story, determines whether the events and causes fit together (Cortazzi, 1993). In this study, narrative analysis was represented by vignettes, individual case-based narratives, and group narratives.

Procedures for the development of vignettes. Vignettes are specific narratives focusing on short but meaningful episodes found in primary data sources (e.g., transcripts

of interviews and focus group discussions, journal entries, field notes, cultural memory banks, portfolios, minutes of meeting). In the identification of a segment for the vignette, the principal investigator was guided by its relevance to the research questions and the presence of elements of narrative structure in the data, namely: abstract, orientation, complication, evaluation, result, and coda (Labov, 1972, 1982; Cortazzi, 1993, p. 45). The beginning and ending of the segment was tentatively marked in the data. The following questions guided the principal investigator in appraising the merit of a segment as a potential vignette:

1. Is the segment relevant to the research question?
2. Does it show evidence of a personal meaningful construction of an experience, reality, event, etc.?
3. Are basic elements of narrative structure—abstract and coda are optional—present in the segment?

Once a segment was identified, marked, and assessed, it was then subjected to narrative smoothing (Spence, 1986) and creative analytic process (Richardson & St. Pierre, 2005) resulting in the generation of a vignette that was faithful to the data yet laced with aesthetic merits. In order to be faithful to the data, the principal investigator, as a general rule, used the "words" of the research participants. In cases of texts written in dialect, the principal investigator took the liberty of translating them into English. Mindful of the possibility of losing the meaning in the process of translation and reconfiguration of the texts, the vignettes were e-mailed to the research participants for comments, affirmations, or suggestions.

Procedures for the development of individual case-based narratives. The individual case-based narrative is an in-depth, personalized account of the research participant's community immersion experience vis-à-vis research questions. The narratives of three members of the research team were selected for representation in this study using the following criteria for examining the individual case data: (1) relevance to the research question; (2) unique contribution to theoretical framework of the study (e.g., deeper understanding of notions of community by focusing on tensions experienced by research participants); (3) balance and representation of gender, family background, education, and rural and urban community experiences; and (4) level of participation in the research.

The individual case-based narrative is a "big story" about a research participant's experience of community immersion. The "big narrative" is drawn from multiple data sources such as interviews, focus group discussions, journals, portfolios, cultural memory banks, lesson plans, etc. Vignettes, an abstraction from the primary data sources, additionally informs the generation of individual case narratives.

The principal investigator utilized multiple guidelines in the emplotment of an individual case narrative. For example, Dollard (1993), Spence (1986), and Polkinghorne (1995) argue that a good narrative must attend to the (a) cultural context in which the storied case takes place; (b) embodied nature of the protagonist; (c) significant others affecting the actions and goals of the protagonist; (d) decision of the protagonist to accomplish his/her goals; (e) historical continuity of the character; (f) elements of the narrative structure, e.g., importance of the beginning, climax, and dénouement in the

story; (g) plausibility and understandability in the generation of the researched occurrence.

In the development of the individual case-based narrative, the principal investigator was also guided by Clandinin and Connelly's (2000) notion of three-dimensional narrative inquiry space: sliding back in the temporal dimensions of the past, flipping forward into the temporality of the present, and moving in and out of the experience by focusing on internal feelings and interpretations and outward manifestations of events. This technique is used in the emplotment of individual case narratives requiring complex description of events and experience. Spence's (1986) notion of narrative smoothing still applies in the development of case-based narratives.

Procedures in the development of group narratives. The narrative analysis produced two kinds of multi-layered group narratives for the study: (1) the negotiated shared narratives and (2) the community or collective group narratives. The development of a negotiated shared narrative involved the following process: (a) narrative production developed by two or more persons; (b) narrative knowledge drawn from multiple data sources; (c) narrative process of negotiation through co-generative dialogue and focus group discussion; and (d) narrative understanding that was eventually shared by all stakeholders involved in its development. In this study, the development of the cultural memory bank was adapted to the principal investigator's notion of shared narrative. The cultural memory bank was used as a meaning negotiation tool: members of the research team were involved in its development through the negotiation of meanings, thereby resulting in shared understandings of cultural practices relevant to science teaching.

In addition to the negotiated shared narrative, the study also generated the "community" narrative—a holistic, "grand" story capturing the broad community immersion experience of all community immersion participants. In an ideal narrative analysis, all experiences of the members of the research team should be captured in the group narrative. However, there are limitations in the gathering of data and in procedures for analysis—they cannot capture every individual experience in the grand narrative. This conception is consistent with the theoretical framework of the study—some of the individual meaning constructions are not part of the group meaning construction. In the same manner, all group meaning constructions do not capture all individual meaning construction. Hence, the group narrative is an attempt at capturing every possible collective experience relevant to the research while admitting to the fact that not every individual meaning is reflected in it.

The group narrative was configured as a "grand" story capturing the collective experience of all members of the research team. Stories in the group narrative have schematic elements because they revolved around certain themes. Wertsch (2003) refers to these stories as schematic narratives—they have generalized functions and represent a collective memory of all stakeholders involved in their development. All the schematic narratives were further weaved into a grand story—usually in a chronological order—capturing the entire community immersion experience of research participants. The selection of stories for inclusion in the schematic group narrative was informed by the following criteria: (1) relevance to the research question, (2) unique contribution to the theoretical framework of the study, (3) congruence to chronological order of events, and (4) preference to shared experiences as expressed and discussed in the focus group

discussion. The development of the group narrative was co-informed by a dialectic process of analysis of narratives. The procedures for the analysis of narratives are discussed in the succeeding section.

Analysis of narratives

Narrative analysis was co-informed by a dialectic process of theme generation from the analysis of narratives. The outcomes of narrative analysis were specific individual and schematic group narratives. These narratives were further subjected to another layer of analysis for the purpose of generating themes that cut across stories. Due to the theory-driven nature of the study, the purpose of the analysis of narratives was to generate as many ideas and concepts as possible from the narrative data and connect them to theoretical ideas found in literature. This was the reason why the principal investigator utilized a combination of paradigmic reasoning and the inductive analytic procedures of grounded theory.

Paradigmic reasoning. Analysis of narratives considers the story as data. Its outcome produces paradigmic typologies or categories (Polkinghorne, 1995). Analysis of narratives utilizes "paradigmic analysis in order to identify particulars as instances of general notions or concepts" (Polkinghorne, 1995, p. 13). Themes, categories, or typologies as an outcome are constructed through the use of paradigmic reasoning and/or inductive analytic procedures. In paradigmic reasoning, "concepts are derived from previous theories or logical possibilities and are applied to the data to determine whether instances of these concepts are found." (p. 13). The process involves the categorization of storied data into instances of logically plot typology. The primary aim of paradigmic

analysis is not only to identify categories but also to describe relationships among categories.

Inductive analytic procedures of grounded theory. The inductive analytic procedures of grounded theory were utilized in the generation of themes from narrative data. The origin of the grounded theory methodology can be traced from seminal works of Glaser and Straus (1967), who emphasized the salient role of constant comparison as an iteration process of moving back and forth among the data that leads to the development of a theory. In particular, theme generation in this study was informed by Charmaz's (2002) notion of a constructivist grounded theory, which "places priority on the phenomena...and sees both data and analysis as created from the shared experiences of [the] researcher and participants and the researchers' relationships with participants" (p. 667).

The analysis of narratives for the study was informed by core analytic strategies in the generation of substantive theory using the grounded theory approach. Pidgeon and Henwood (2004, p. 629) outlined the seven major steps in data analysis, namely: (1) development of open-coding schemes to capture the detail, variation, and complexity of observations and other materials obtained; (2) sampling of data and cases on theoretical grounds, and as analysis progresses, to extend the emergent theory; (3) constant comparison of data, instances cases and categories for conceptual similarities and differences; (4) writing of theoretical memoranda to explore emerging concepts and links to existing theory; (5) continuous use of comparisons and theoretical sampling until saturation is reached; (6) focused coding of selected core categories, and (7) use of tactics to move from descriptive to more theoretical levels.

In addition to Pidgeon and Henwood's (2004) core analytic strategies, the principal investigator was specifically guided by Straus and Corbin's (1990) notion of open coding, categories naming and developing through properties and dimensions, and memo writing schemes (Straus & Corbin, 1990). Charmaz (2004) and Harry, Sturges, and Klinger (2005) also provided the principal investigator a very practical and easy to follow exemplar on how to proceed from levels of open codes through substantive theory. In other words, Charmaz; Harry, Sturges, and Klinger; Pidgeon and Henwood; and Straus and Corbin informed the principal investigator's inductive analytic procedures in the generation of themes and substantives theories from the narratives.

As applied in the study, the specific individual and schematic group narratives were the "primary data" for the analysis. However, there were cases when the principal investigator had to go back to original data sources (e.g., transcripts of interviews and focus group discussions; journals; observation notes) for comparison and for further support of emerging themes. This was his adaptation of the theoretical sampling due to his distance from his research participants during data analysis. Then, the principal investigator subjected the narratives to open coding strategies (Charmaz, 2004; Straus & Corbin, 1990). Specifically, he made use of the line-by-line open coding scheme. He grouped his initial open codes using the research questions as a guide. Then, he started making initial categories, many of them came in vivo (Charmaz, 2002). He started the initial memo writing (Corbin and Strauss, 1990) during the grouping of codes into categories. The categories were then refined through the constant comparison of data and categories (Pidgeon & Henwood, 2004). In particular, the principal investigator utilized axial coding techniques to refine categories (Charmaz, 2002), which was supplemented

by constant comparison strategy. The process of code refinement through constant comparison generated themes, which were further enhanced by memo writing. The final step in the analysis of narratives was the generation of substantive theories through reflection, memo writing, and paradigmic reasoning.

Chapter 4

FINDINGS PART ONE: INDIVIDUAL CASE NARRATIVES

Introduction

> *As meaning makers we are also meaning-seeking creatures…..who consistently write about experience from a sensual perspective—centering, decoding, reframing, discovering, and discoursing the clutter of the Made World, literally as "embodied participants" and observers, full of touch, smell, taste, hearing, and vision, open to the buzz and the joy and the sweat and the tears…of daily life, hoping to reveal the world for what it is as it is experienced reflexively and self-consciously...*(Brady, 2004, p. 628)

Consistent with Brady's (2004) notion of embodied participants, members of the research team—ten prospective science teachers, a teacher educator, and an advance level science education doctoral student—were meaning makers as they consciously and reflexively examined their community immersion experience through their participation in collaborative action ethnography: What have they brought into the experience? What have they learned through the experience? How do they make sense of their experience? What do their experiences offer into the altar of science teacher education scholarship? Like a multi-beaded rosary, these overarching questions strung together the multiple layers of narratives generated from the community immersion experience of the research participants.

The purpose of this chapter is to examine the community immersion experience of three prospective chemistry teachers whose narratives served as a focal point in understanding their (a) notions and experience of community; (b) beliefs about the purposes, values, and goals of community immersion; (c) learning experiences; and (d) the transformation of these learning experiences into useful practices in preservice science teacher education. The three individual case narratives in this chapter provide an in-depth portrait of research participants and their individual experience of community immersion and collaborative action ethnography. This chapter contends that as meaning makers, participants of the research draw from their personal, social, and cultural capitals to make sense of their community immersion experience. Case participants' prior knowledge and their home, school, and community cultures are capitals to inform the meaning making process and to draw upon in a collaborative negotiation of meanings.

This chapter is divided into three major sections. Each section highlights the story of community immersion case participants—Tomas de la Cruz, Trixie Anne Gonzales, and Vincent Ben Zaragoza. The case participants were chosen because of their unique personal circumstances and contributions to the research. Tom is a male participant who comes from a large family and has lived most of his life in a rural agricultural village. Trixie, female and an only child, was born and raised in the city with limited or no rural community experience. An "achiever" coming from a family of two siblings, Ben tends to "trouble" the dynamics of the group by bringing unique perspectives and dissenting opinions in the sense making process. A self-confessed product of a broken family, Ben holds a "transient" notion of community as a result of his exposures to different communities associated with temporary living arrangements with one relative or another.

The individual narratives of case participants are generally written as a single story of a person. This story, written in a continuous manner, is divided by segments represented by Roman numerals, i.e., I, II, III. A segment indicates a shift in either a setting, topic, or genre of writing in the narrative. The narratives generally start with a life history of case participants showing how their personal, family, school, and community backgrounds cast a shadow of influence into their immersion experience. As a caveat, all names of persons and places in the succeeding narratives are fictitious. They are assigned a pseudonym to hide the identity of research participants. Resemblance to actual names of persons and places is purely unintentional.

Individual Narrative 1: The Case of Tomas de la Cruz

I.

My name is Tomas "Tom" de la Cruz. I am 19 years old, a third year chemistry major in a secondary teacher education program in the University of Central Philippines. Currently I live in a rented house with my father, a chemical analyst in a government agency in the city. Every weekend, we go home to our barangay [or village] in a neighboring province.

Our barangay is a rural agricultural community surrounded by towering mountains. In front of our house is a vast rice field; at the back is a big river. To go into our barangay, you need to take a bus, about a three and a half hour ride from the city. The road that leads to our barangay from the national highway is uncemented, narrow, and rough. It is very slippery during the rainy season. As an alternative route, some people in our barangay use supong, a small river boat, to go to the town to buy groceries.

People in our community engage in the farming of rice and corn as basic sources of income. Sometimes they go fishing; the river is an alternative source of food. In addition, people raise livestock such as pigs, chickens, goats, cows, and water buffaloes. Vegetables and tubers such as kamote [sweet potato] and balinghoy [cassava] are also planted as seasonal crops to provide additional source of income in summer. The extra crops are sold in the town on Tuesdays or Thursdays, our market days. During those days, people also buy their supplies of groceries for the whole week.

A typical day in our barangay starts at a very early hour in the morning. Before dawn, farmers are already at the back of their carabaos [water buffaloes] to go to their farm for work. They go home at about 8:00 in the morning to eat and then go back to the field and work until 10:30 a.m. After lunch, they return to the field at about 1:00 p.m. and continue to work until sunset. Despite their hard work, most of the people in our barangay are still poor. There are cases when they eat only root crops such as kamote and balinghoy during drought. Without much education, people in our barangay are generally poor because they do not own their farms. Most often, rich landowners get a lion share of their crops.

In addition to poverty as a problem, many of the people in our barangay do not value education. Others would just settle for a high school or elementary diploma. I feel that they are already content with their work in the farm, satisfied to man the bao-bao [a turtle-shaped soil tiller that floats on a muddy rice field]. Many of my classmates from elementary school are now working as maids in Manila. Others are still in high school while some got married at an early age. There are some who are out of school and do nothing. Most often, you see people do tsismis [gossip] to kill the time. I also notice that

we are experiencing problems related to morality in our barangay. Votes can be bought during elections. There are also cases of adultery and teenage pregnancy in our community.

Despite these problems, there are community activities that bind barangay people together. For example, we celebrate fiestas, All Saints and Souls Days, Flores de Mayo, Semana Santa (Holy Week), birthdays in the family, New Year, and Christmas holidays. In our barangay, there is also a binayle [community dancing] and communal assemblies. We practice pagdamayan, a cultural practice of helping each other in the farm or in building a house on a voluntary basis.

My father works as an analyst in a government agency. My mother is a plain housewife. We are eight in the family. None of us are married yet. We are quite conservative. We are always encouraged by our parents to study hard and value our education, an inheritance, we are often reminded, that cannot be taken away from us. Tatay [an endeared name for a father] always reminds us that his responsibility to support us ends when a son or a daughter gets married. I am happy that my older brothers and sisters help augment our family income. One of my older siblings works abroad and still continues to financially help my parents.

When I was young, I remember my father told me a story, one-on-one. It was orasyon, about 6 o'clock in the evening right after sunset. He told me that the de la Cruz family used to have a large tract of land. However, my grandfather was a gambler. Most often, he used as his bet a piece of land in his gambling. Influenced by the Spanish culture, he was very strict and did not hesitate to use a lubid [rope used in tying a carabao unto the tree] to punish his children. Early in the morning, he and his siblings

woke up at about 4 o'clock to feed the carabaos. At about 5 a.m., they put a yoke to the carabao and started plowing the field.

My father made a promise to himself to work very hard to finish his education because he did not want his children to experience the same difficulty that he went through on the farm. My father was blessed. Despite his trials and frustrations in life, he really worked hard in order to get a college degree. He was able to get a good job in the customs office and finally landed a position as an analyst in a government agency. This is a lesson that Tatay shared – we should value our education. I don't want to put to waste the legacy that my father has started. That's why I study very hard.

This is my first time to share this with you, classmates. Despite our long stay in the barangay, we, as a family, also experience some kind of alienation and cruelty from the community. There was an incident in the past that changed the dynamics of our relationships with the community people, most especially with our relatives. We used to have a close relationship with our relatives. However, everything changed when my uncle impregnated my older sister, Inday. My uncle used to live near our house. When his wife died, my sister was often asked to accompany his eight children, most especially at night. My cousins often requested my sister to stay with them most especially when one of their siblings got sick. To cut the story short, my uncle raped my sister. That's why we hate him. We could not imagine that he can do that to his niece.

We only knew about the incident after four months when her pregnancy was very apparent. My mother observed something and confronted my sister of her suspicion. My sister was only 17, menor de edad [a minor]. According to the law, the crime was heinous and punishable by the death penalty. My parents found out about it on Sunday

night. The following day, they went to a police station to formally file the complaint. At that very moment, my uncle was arrested. We were glad that he was put into prison because my brother, who was abroad, upon knowing the situation, immediately went home with the intention of killing my uncle. I am glad he did not succeed and everything was placed under the hand of the law. That incident, however, created a huge tension and gap between us and our cousins and relatives who mostly live on our barangay.

We are actually seven in the family. The eighth child is Biboy. He is now in grade 3. Biboy does not know that our sister is his mother. My parents decided that we will tell him the truth when he is of a right age. We love Biboy so much. My siblings and I treat him in a very special way. Despite this secret, we notice how lukso ng dugo [gut feeling brought about by blood relationship] works. Biboy is very close to Inday, my sister who is his mother. He sleeps with her and is close with our cousins, his siblings. "Blood instincts," my mother often said. Although the gap is there, we try to be good with our cousins because my parents would say, "The sin of the father is not the sin of his children."

Sometimes, we are angry with our neighbors, most especially with those who often said to Biboy, "Your Tatay [father] and Nanay [mother] are not your real parents. Your true father is locked in a prison cell." One time, Biboy asked my mother regarding this comment of our neighbor. And my mother would always respond, "Your father is in the city. He is working in the city."

Inday stays in the house with my mother. She used to study in a computer school in the city. One time, I saw my father crying while looking at my sister's uniform and school materials. Her belongings are still with us, in our rented house. We hope

someday, Inday could go back to school. She is now 26 years old. I am grateful to her. Every time I go home, she takes care of me. She does housework for me like cleaning my clothes and preparing things I need when I go back to the city. She makes things easy for me.

As for my uncle, he is now in prison. The case was filed in 1997 and the decision came out in 2004. He is facing a death or life sentence. That's why people in our community speak against us. They would say, "My uncle should be forgiven because he is my brother's father." But my father does not agree with them. I admire my father for his principles. He believes that a crime committed against his daughter, whether done by a relative or not, should deserve a full measure of the law. That is probably the reason why our relatives, including my other uncles and aunts, are against us. That's why I said that our society is sometimes very cruel.

As to our family tradition in the community, we used to practice paentero. It is a tradition in which we pass from house to house a wooden sculpture of a saint and say the novena [some kind of a Catholic prayer]. In a year, we try to sponsor a paentero. We accommodate community people in our house and serve food for them. In addition, I remember my grandmother used to say prayers before a rice harvest. She used to practice panurong-surong, a tradition of preparing food, usually made of sticky rice, as peace offerings to unseen spirits to protect our crops or as a way of thanking the spirits for a bountiful harvest.

In our community, there are still some superstitious beliefs that continue to exist. For example, some farmers are still planting flowers in the middle of their rice fields. There are those who time the planting of root crops during full moon to make the tubers

big and full. There are some barangay people who plant corn without wearing a shirt. They call this practice dal-ag. In planting the corn, one should wear either a thin shirt or no shirt at all. They believe that the corn will produce big kernels and thin sheets as coverings. They also invite a fat-legged person in the community to help them plant the corn. In between planting, they hold his/her leg and say, "Mangunawa ka nga magdaku sang amo ni kadaku nga mais" [May the corn grow as big as this leg.] I think this is funny but there are still some people who practice dal-ag in our community.

In spite of some problems we encounter in our barangay, I still feel that I belong to the community. During election, I still exercise my right to vote. Last summer, I was invited by our Sangguniang Kabataan [also known as SK, a youth organization] chairman to represent our barangay in a forum in the capital of the province. Even though I was not able to attend, I felt that they gave me some kind of importance. They trust that I could be a very good representative of our barangay.

In December, every Christmas, we have a party in the barangay. Every year, our barangay officials also invite us for the annual discussion of community projects. In this community forum, barangay officials often present their completed projects and their plans for the next school year. They also invite us to critique their work. They also value our ideas. They give importance to our ideas. Sometimes I feel that I do not belong in the barangay but there are also times that I feel a sense of community.

II

Through this poster, I would like to express my views about community. I put pictures of different faces of people who come from different walks of life. For me, a community consists of a group of people occupying a certain territory. People interact with each

other and share common beliefs, traditions, and customs. They have some common sources of livelihood. I have placed different kinds of pictures representing the different types of community. This represents a coastal village, where the common source of livelihood is fishing. People in this area might also engage in salt making. This picture represents the farmers whose common means of livelihood is growing crops and raising animals for food. I have also placed pictures of children here belonging to poor, middle, and rich families. In the community, people have varied economic status— upper class, middle class, and lower class.

Institutions also exist in the community. In here, I placed pictures of a church, a plaza, and a factory. I also pasted a picture of money. I read in the internet that a community cannot exist without a source of capital. So I thought money is a good representation for that. Money plays a very important role in all aspects of community life. I have pictures of different places in the community that may serve as tourists spot— waterfalls, mountains, caves, rivers, etc. This is how I view community as represented through this poster.

III

For me a community is a certain territory where a group of people live together in harmonious ways. A community must have physical structures such as buildings, schools, church, etc. There should be some kind of farms or rice fields. I believe that there should be some sources of living or means of livelihood in the community. For example, fishing could be a source of living for people along coastal areas as farming is common in rural agricultural communities.

In my drawing, I put in here a weighing scale. I consider this as a symbol of justice. The color here is yellow; its bright light symbolizes social justice. I also draw an imbalanced weighing scale to show that social vices and injustices take place in the community. This jar in my drawing symbolizes the legacy that forefathers bequeath to their grandchildren. These also represent community traditions, beliefs, and customs. In this picture of a community, I drew a microphone to symbolize a tool for communication. This represents the local dialect, our common means of communication with each other in the barangay. I have also included here the sun to represent God. Belief in God is very important in the community.

IV

As early as four in the morning, I was already wide awake, excited about what the day had to offer. I saw Nanay, my mom, ironing my clothes and preparing the things I needed for the community stay. Tatay, Nanay, Biboy, my youngest brother, and I ate our breakfast together while the rest of my siblings were still sleeping. At seven, my father and I were already waiting for the bus that would bring us to the city. When we stepped into the bus, it was crowded with people. I was forced to stand until someone moved out and vacated a seat. I immediately grabbed a seat and dozed off. I only woke up from the hustle and bustle of jeepneys. I realized we were in the city and the time was thirty minutes after eleven.

That day marked the beginning of our community stay. Excited and frantic that I might be late, I skipped my lunch and immediately proceeded to the school. When I arrived, I saw some of my classmates sitting inside a rented jeepney. I thought I was late, only to find that there were still some members of our group who were not around. We

left the university at about 2:30 p.m. and arrived at about 3:20 p.m. in Barangay Baybay, our immersion site. After settling down in the Day Care Center, our home for the rest of the week, we started our opening program, which was attended by other members of the class, barangay officials, some village people, and our supervising faculty. We ended our day with an open forum and focus group discussion among members of the research team. We discussed our preparation for the community stay, problems encountered, preliminary learning experiences, and plans for the next day.

My week stay in Barangay Baybay was very challenging and exhausting. However, I learned a lot from that experience. Most of these learning experiences took place during my interviews, observations, and interactions with the village people—from whom I drew significant information on cultural practices relevant to science teaching. During my community stay, I focused on learning cultural practices such as palupad and ginamos making, which became part of my contribution to the research outputs—the development of cultural memory banks and culturally relevant science lesson plans.

V

On my second day in Baybay, I first heard the term palupad from a fisherman carrying a crateful of shrimp fry, instead of fish, as catch for the day. It was very early in the morning. And our task was to write a qualitative observation of the life along the shore of the village. The shore is one of the busiest spots in the barangay—one can see the arriving fishermen after a night of fishing or others leaving to fish in broad daylight.

Palupad was the first cultural practice that stuck me as curious in Barangay Baybay. Having lived in a farming village, I did not have any personal idea or knowledge about palupad. There were many strange images that conjured in my mind when I first

heard the term from a village fisherman. Lupad, the root word for palupad, is an equivalent to a local dialect for fly or flying. So, I asked myself, "Does it fly? Is it like a kite?"

My curiosity brought me to Lolo Tasyo, one of the oldest fishermen in the village. He told me that palupad is a seasonal fishing and shrimping technique in the village utilizing the flow of water currents brought about by the low tide and the high tide. Palupad is a stationary device, located at a far distance from the shore. It got its name from a description of the net in the palupad that looks like a funnel being "flown away" by a current of sea water. The fishermen also call it palupad in reference to one's attitude accompanying such practice of fishing. Lolo Tasyo told me, "Palupad means 'que sera sera,' whatever will be will be. Since palupad is stationary and dependent on the current of water, no one really knows if the catch is good or bad. One has to trust in 'fate' that the current of water will bring many fish and shrimps into the net."

From my interviews, I learned that the palupad is constructed offshore, a location far beyond the intertidal zone. This means that a palupad will not be totally exposed or dried up by the lowest low tide. The use of palupad is seasonal, usually from the month of December to March. Typhoons, the main cause of a palupad's destruction, seldom occur during these months. Besides, shrimp fry and krill, the target catch of palupad, are also abundant during these months.

The construction of palupad is very interesting. The net is attached between two coconut posts pegged under the water. To make the posts stand stronger, each post is supported by a banting, a support made of three thick strings, placed 30^{o} angle apart. Each string is attached to a wooden post pegged under the water. A bridge-like structure

is constructed above the water connecting the two coconut posts. The bridge serves a dual purpose: (1) to make the palupad stronger and (2) to provide a resting and temporary storage during the "harvesting" of fish and shrimp.

The net for the palupad comes in various "hole" sizes or diameters. The fishermen call these holes "mata" or eyes. The holes are bigger near the two posts; they become smaller towards the center of a funnel-shaped net. The center of the net is called "puyo," a long, slender pouch serving as a repository basket for the catch. The net of a puyo is very fine. It collects almost everything ranging from small shrimp and fish fry to large sharks. Once the fish get inside the puyo, they cannot leave due to the strong current of water that pushes them in.

The collection of the catch in a puyo occurs twice a day— immediately after the high tide and the low tide. Fishermen get the tide information from a calendar, although Manong Rodolfo, my second informant, observed that based on his experience, some information on the calendar is incorrect.

Fishermen ride in a motorized boat to get into the palupad. The fish and shrimp collection occurs when the water current is no longer strong—that is, before it changes in an opposite direction. They use tonton [a sinker made of stone tied to a string], which serves as an indicator of the strength and direction of the water current. When the current of the water registers about a 45 degree angle or less, it is an indication for fishermen to start collecting the fish and shrimps from the puyo. If they are delayed in the collection, the contents of the puyo will be washed away because of the changing water direction. That's why, according to Mang Rodolfo, "Timing is very important in the collection of fish and shrimp in a palupad." The contents of the puyo are then emptied

into the boat and brought in the shore. Shrimp fry are separated from the rest of the catch using a bakag, a basket made of bamboo strips. Shrimp are the basic ingredients of ginamos or shrimp paste, a famous delicacy in the village.

Using the palupad as a topic for the cultural memory banking, I learned from my interviews how this practice is located at the intersection of community life. For example, I realized that the palupad plays a significant role in the economy of the community. It has been a major source of income for the village people—from the operator or owner of palupads to fishermen, laborers, fish vendors, and ginamos makers. The practice provides a fresh source of food for people in the village most especially those who are directly working in it. Residents of the village also get an affordable source of fish and shrimp as viands from the catch.

I also realized the impact of palupad as a fishing practice on the environment. The fine nets in palupad capture almost everything, including the fish and shrimp fry. I am afraid this practice will deplete the fish and shrimp resources of the community. The good thing, though, is that palupad is seasonal. This means that fish and shrimp are given the chance to grow bigger. However, I am still against the idea of catching small fry. In the first place, how can they grow bigger when they are caught while young? I suggest that the use of fine nets in palupad should be banned or prohibited.

I also learned from my interviews that the operation of palupad is governed by some religious or superstitious beliefs. For example, the materials used in the palupad are often subjected to the ritual of pagtu-ob. In this ritual, all materials needed in the construction and operation of palupad are passed through smoke generated from burned ramos, dried coconut leaves blessed by a priest on Palm Sunday; amorsiko, a kind of

grass with seeds having Velcro-like properties; tanglad, a local grass known for its sweet aroma; and kamangyan, a local incense. From my interview with Lolo Tasyo, I learned that he hired a pregnant woman to sew the puyo of his palupad. "For good luck," he said. There may be reasons why some fishermen still hold on to some of these superstitious beliefs. I don't know the scientific basis of these beliefs—probably the sweet aroma of tanglad attracts fishes. However, I respect the village people for the things that they believe.

As a future science teacher, I see the potential of using the idea of palupad in science teaching and learning. Using the palupad as the center of a lesson, I can teach integrated science concepts such as water movement due to high and low tides, differential filtration due to the different sizes of fish net holes, and force and equilibrium in the construction of palupad.

In addition to palupad, I was also involved in the development of a memory bank related to the practice of ginamos making, a preservation technique in the village. Due to the large volume of shrimp fry caught in the palupad, ginamos making is a very popular shrimp preservation practice in the community. It improves the shelf life because it can be used during the non-palupad season. Furthermore, it adds value to shrimp caught in palupad.

I helped facilitate the interviews and focus group discussion with village people on the nature and process of ginamos making. I learned how shrimp fry are caught in the palupad; sorted from fish using simple, locally available technologies such as bakag [basket made from bamboo strips]; cooked as delicacies; processed into ginamos; and marketed to consumers. I was an active participant in the development of our group

memory bank focusing on ginamos, which eventually became the topic of our demonstration teaching to school children in the village.

VI

My community stay in Baybay was also spiced with some difficulties and misunderstandings. One memorable experience that I can not forget took place on the fourth day. It was 9:00 o'clock in the morning. After our breakfast, Chenny, Mario, Leslie, and I [all members of the research team] went to the coastal area to take pictures of fishermen loading and unloading their boats with fishing equipment and fish, respectively. We wanted to use the pictures for our portfolio. However, we were met with negative attitudes from some fishermen. There was a group of fishermen who got angry when we took pictures of them unloading their boat. We said, "Sorry." We also showed them how we erased the pictures we took from our digital camera. I also realized that these were the same fishermen who did not want to be interviewed. To me that experience was very embarrassing. I felt slighted. However, these fishermen have the right not to be interviewed. Saddened and heavy hearted, we just went back to the Day Care Center and planned for our interviews in the afternoon.

During the course of our community stay, we were able to find out why some fishermen had such an attitude. A fisherman told us a story of student-researchers who went into the village and participated in their fishing activities. They were very accommodating and helpful to them. He told us that these students took pictures of every fish they caught and asked many questions about their fishing activities. After some time, they were surprised to receive an ordinance prohibiting them from catching certain kinds of fish and limiting their use of some fishing practices.

Fishermen told us that they did not trust researchers anymore. Their help and cooperation were reciprocated with nothing but laws and ordinances limiting them in their source of livelihood. A fisherman told us that if the government intends to promote environment-friendly fishing practices, why go after small time fishermen? He said, "Why don't they go after 'big time' fishermen in huge boats who use sophisticated instruments and large nets that can catch almost all the fish in the ocean?"

VII

I am writing on the basis of your request to share my beliefs regarding the purposes, goals, and values of community immersion. I remember you asked a similar question at several points in our research. Now that community immersion is almost over, you again asked the same question. I believe that now is the perfect time for me to show the evolution of my beliefs regarding the purposes, values, and goals of community immersion.

At the early stage of our course and research, I remember telling our research team that the purpose of community immersion, in my opinion, was to let me experience a community life other than the rural agricultural village that I grew up in. I admit, in the beginning of the course, I had little knowledge about the significance of community immersion in science teacher education. However, as days went by, I began to slowly understand the value and purpose of community immersion based on my participation in the class and in our research. For example, in the course orientation, the notion of community immersion as a "dialogue of life" struck me. I developed an idea of community immersion as something that goes beyond the superficial going into the community, living with the community people for a week, and then going back into the

university. I thought then that a "dialogue of life" goes beyond knowing. It must involve an active participation in community life and an element of reflective thinking, which may result in change of perspective or orientation.

Still wrestling with my idea on the purposes, goals, and values of community immersion, our research procedures required us to conduct an interview with a teacher educator and a pre-service science teacher who had prior community immersion experience. This brought me to Prof. Amelia Losanta [a pseudonym], a special education teacher educator who taught and supervised students for four years in their community immersion. Ma'am Amelia has been a teacher in the university for 25 years. She started as a kindergarten teacher (at the laboratory school) and later moved into the college handling special education courses in the teacher education program. She defined community as "a group of people with similar ideals, norm, and standard of living. It is also a place where a group of people live together." She considered community immersion as an "avenue for students to see, feel, and experience the actual situation in the community, particularly on how people carry on with their daily activities." To Ma'am Emilita, community immersion is relevant in the preparation of future special education teachers because the community becomes a laboratory "for students to observe how community people behave." The experience gives students an idea on "how to deal with students who have behavior problems and with people in communities they will be assigned to teach someday." The purpose of community immersion is "to ground students on the reality of life. They will have an opportunity to apply whatever theories they learn in the classroom. They will have firsthand experience in how to behave in a rural community and compare his/her community with that of an immersion site."

Through community immersion, "students will see their role as teachers in a community. They will also have the experience of becoming teachers as they usually volunteer to teach in kindergarten classes."

I also learned from Ma'am Amelia about her preparations prior to the actual community stay. For example, she visited the barangay and conferred with its officials to see if they were willing to host her students. Then, she facilitated the signing of a memorandum of agreement between the municipality and the university. This task brought her to the town mayor for a face-to-face conference. She also accompanied her students in their preliminary visit, which aided them in the preparation of their action plans. Alongside, she had to theoretically prepare her students on cultural, sociological, and political considerations for a successful community stay.

During the actual community stay, Ma'am Amelia visited her students for conferences and listened to their stories, learning experiences, and problems they encountered. She also mentioned the different community projects that her students conducted in the community. For example, her student-cohort conducted community beautification projects (e.g., planting of flowers, painting and aligning of stones along the road), prepared instructional materials for kindergarten students, presented a cultural show, and conducted demonstration teaching to pre-school children. In the past, they also facilitated seminar workshops on parenting, handicraft making, and bangus (milkfish) deboning.

To Ma'am Amelia, the core values of community immersion are cooperation, sharing, and the capacity to adjust with other people—their classmates and rural dwellers. Students must learn to adapt their behavior to the situation. For example,

students might leave the comfort of their homes and stay in a community devoid of city life's amenities. They must learn to sleep on the floor, use minimum kitchen utensils, and cook with firewood. As prospective teachers, they must learn how to negotiate and adapt to conditions without complaining. After the community stay, students return to the university to further make sense of their experience, take a midterm examination, put up an exhibit showcasing their experience in the community, and submit a portfolio documenting their learning experience.

According to Ma'am Amelia, community immersion has been an avenue for students to nurture relationships with community people. Most often, students are invited by their host families on important occasions such as fiestas or birthdays. She believes that community immersion has enriched her experience as a teacher educator. "There are difficulties along the way but the learning experiences and the growth I saw in my students through community immersion would suffice the sacrifices."

I also interviewed a student who had a prior community immersion experience. I want to hide her identity in the name of Roselle Magbanua. Roselle is a biology major in the teacher education program of the university. She completed her community immersion a year ago. She defined community immersion as an experience that brought her to a rural agricultural community, which was quite different from the urban city where she lives. To her, community immersion is very relevant to science teacher preparation because it has prepared her for the possibility of teaching science in similar places in the future.

She also considers community immersion as an avenue to serve a community. For example, her cohort was involved in feeding school children, painting stones along the

road, putting labels on herbal plants, and teaching some lessons in science. They also put up magic shows in a local school using the knowledge they learned in science. They also trained students for a cultural show.

Roselle was surprised by the accommodation they received in the community. She was prepared for a rough life in the immersion site. She brought her banig, a mat made of palm leaves; slippers; and kitchen utensils. In the immersion site, she was surprised that their host family lived in a big house. Nevertheless, she experienced taking a bath in puso, a public well, and walked on rice paddies at night. She also experienced the generosity of the people in the community as "they always gave us vegetables for our dinner. Youth in the community were very helpful as they fetched water for us and offered us help in washing our clothes at a public well."

According to Roselle, "The core values of community immersion are unity and cooperation. We helped each other and completed the tasks assigned to us." Through community immersion, Roselle came to know and understand her classmates better. "Each person is different. That's why we must study and understand each other in order to live a harmonious life."

Through community immersion, Roselle realized the need to save money, and not spend it on worthless things. "Most of us in the group grew up in the city. Most often we go to malls and spend 100 pesos in just one meal. In the immersion site, students have only 5 pesos a day. We realized that our snack is worth a day's meal for three children. Some school children even walk far distances on slippers in order to go to school. We have changed our attitudes after the community immersion."

My interviews with Ma'am Amelia and Roselle have helped shape my beliefs regarding the purposes and values of community immersion. After going through the entire community experience, I have come to realize that community immersion is very important in the preparation of prospective science teachers.

Through community immersion, I was able to identify social inequalities and social justice issues in the community. For example, Barangay Baybay, is a place of paradox. Along the highway, you see big houses on the left and on the right side of the road. I had an impression that the community is well off only to be surprised by the kind of life experienced by people living in the "squatters' area" near the shore.

My second visit to the community highlighted the gross economic disparity in the village. The road that leads to the "squatters' area" is narrow and uncemented. Houses are very close, mostly made of nipa and bamboo. They are called "squatters" because they do not own the land where their houses stand. They are always insecure— anytime and for whatever reason they might be evicted either by the government or rich land owners. In addition, most of their sources of income are dependent on their share of the catch. Boats and palupads (fishing tools) are usually controlled by rich families or politicians. I also observed, near the squatters' area is a large posh subdivision. A long, high wall separates the squatter's area from the big houses in the subdivision. From the physical structure alone, I can see the large economic disparity in the community. Through community immersion, I was able to look at social justice issues in the community, which I believe is very important for prospective teachers. Social justice is always a worthy goal.

I also believe that through community immersion, I developed a more well-grounded perspective as a prospective chemistry teacher. I learned many cultural practices that are relevant to science/chemistry teaching. For example, the practice of ginamos making is a rich context for teaching chemistry concepts such as chemical kinetics, food preservation, separation of solid mixtures, and the classification of compounds. The science behind palupad is amazing. Its construction requires extensive knowledge in physics. This surprised me because the palupad was constructed by fishermen who hardly finished elementary or high school. These people must be really close to the sea as they know fish behavior and tide movements to catch fish and shrimp.

In summary, through community immersion, we became a community of learners trying to make sense of our experience. I believe that community immersion is important for science teachers because through the experience I was able to work closely with my classmates. Through community immersion, I became a good team player. I became conscious of the social justice issues in the community. I became an active participant in the generation of knowledge. My interviews and focus group discussions enriched my understanding of community life and cultural practices. Through the memory banking, I was able to understand deeper the practice of ginamos making and palupad at the intersection of community life. I realized that the community provides a rich context and resource for chemistry teaching. I was able to integrate my learning experiences in the community through a lesson I developed on ginamos making. After the demonstration teaching, I felt like I was a real teacher. I believe community immersion is an experience that every prospective teacher must undergo.

Individual Narrative 2: The Case of Trixie Ann Suarez

I

I am Trixie Ann Suarez. You may call me Trixie. I was born, grew up, and have been living in the northern outskirt of the city. I'm an only child of my parents. I used to have a good life—yes, a comfortable life. As an only child, I used to get many of the things I wanted. We were not rich but my parents made my life easy and very comfortable. I was not obliged to do household chores at home. After school, I used to watch television, eat, open my notebooks to study, and sleep. All I needed to do was focus— and my only focus was my studies. I did not worry much about money. My parents gave me money when I asked it from them.

My problems started when Mama got sick. It was the beginning of my hardships and difficulties in life. I had to attend her needs. I was not used to it. It was very difficult for me. I was about to graduate from high school then. After her death, I began selling my personal belongings. I sold my cell phone. I borrowed money from others. I never did that in the past. I was too ashamed. Before, my classmates were the ones borrowing money from me. Now, it's the opposite. I lost face. I have many unpaid debts. Shame on me! I have no choice. We are buried in debts, which grew when my mother got hospitalized. My father's salary is not enough to pay our debts. That's why, at first, I was hesitant to join the research team because I was planning to work as a tutor. My cousins told me that they needed a tutor. Since I made my commitment to the research team, I abided by my decision to participate in our activities and forego my plan to work part-time this semester.

At this point in my life, I have learned a lot. It's very difficult to be alone. Since my mother died, many changes have taken place. I have had many adjustments to make. I have come to experience many things that I never did in the past. Now, I do household chores and take care of my father, most especially his needs before he goes to work.

My Papa works as a chef in a famous bar and restaurant in the city. He works on a night shift. Most often, I sleep all alone in the house. You might have noticed that I am quiet and aloof. Actually I am not. I am just used to being alone. But I can be very noisy sometimes. I admit I was very quiet as a child. But now, I have changed a lot. My friends taught me to become noisy.

Back in high school, I graduated in a public school in the city. I was a consistent honor student from elementary up to high school. I graduated valedictorian in my elementary school. I was a consistent honor student in high school. However, when my mother got sick, all my grades went down. I only graduated as third honorable mention in high school, although I could have done better. Things changed very fast. I lost focus in school. I admit I did not concentrate much in my studies, most especially in my fourth year.

It was my fault that I ended up that way. But I also blamed my teachers. There were two teachers who really treated me unjustly. They gave me very low grades in my two subjects. For example, my grade in one subject was 85, far below the 96 he gave to my other classmates. I did not see any reason to deserve 85 as a grade. He did nothing in the class but talk about irrelevant things. He really wanted to put me down.

That unfair treatment led me to take for granted my studies, an attitude that I carried over in college. It seems like I did not care for my studies. Did you notice, in my

first year, I went to school whenever I wanted? I had absences in class for no reason. Often times, my classmates told me to focus. Probably, they see my potential. What should I do? I made a wrong start in college. I didn't know how to handle problems. It is better now because I don't drink alcoholic beverages anymore. Yes, I used to drink but I didn't smoke. That is me, a drifter. I am fond of a night out. It seems like I don't care.

Despite some negative experiences in high school, I also felt the support and camaraderie of my classmates, most especially my friends. I used to represent my school in district, division, and regional level quiz bees in Philippine History. At first my classmates did not know that I represented the school. They often asked me why I was absent. Usually I answered, "Secret." I used to be uncomfortable with my classmates. I did not know how to socialize. I felt awkward in their presence. I had few friends. I only got along with those I was comfortable with. I did not associate much with anybody. I was so onion-skinned, afraid to be teased. I was also afraid that they might talk behind my back.

Actually my thoughts were wrong. When I started winning the quiz bee, I noticed that my classmates were happy for my achievements. I began to see my classmates' support. We had a class that morning and I did not inform them, except my best friend, that I would represent the school in a contest. I was so afraid to disappoint them. What if I could not answer the questions? What if I would not win? I didn't want people close to me to be around during the contest. I was surprised when there were a lot of people clapping every time I got the correct answer. When I looked back, I saw many of my classmates in the audience. I was wondering, "How come they know? I did not tell

them." Every time I gave the right answer, I heard a big applause. It was very flattering. From then on I did not doubt their support.

When they elected me as class president, it dawned on me that, "Hey, your classmates trust you." That was the beginning of how I built my self- confidence. My exposure to leadership roles further improved my self-esteem. My classmates built me up and encouraged me to run for higher positions. For example, I was elected president of the Sophomore Student Council. That was a great honor for me considering that there were 22 sections in the second year. I was happy. I felt and experienced their support.

I also began to confront my insecurities. I was so insecure of my body because I am…you know. [Trixie is overweight.] Of course, each person has insecurities. So when I was in my third year high school, I began to come out of my shell. I began to trust myself knowing that I am not alone at all. I could count on the support of my friends. I began joining in many school organizations. I ran for treasurer of the entire Student Council. They helped me distribute vote cards. They made streamers for me. They campaigned for me. They carried placards saying, "Vote Trixie Ann Suarez for Treasurer." They helped me distribute book marks. I saw their all out support.

I also tested their friendship when my mother died. I was so helpless. I did not know what to do. I felt like I was groping in the dark, adjusting to a new world without a mother on my side. My classmates' comforting words, presence, and sympathy helped me go through that most difficult stage of my life.

I am always sad every time I remember my mother. She died without her knowing how much I love her. I was not vocal in expressing my appreciation for all she did for me. Now that she is gone, I miss her and remember all the pain that I brought her. I feel bad

because I cannot do anything about it. I cannot bring her back to life. If only she were alive, I would tell her how much I love and miss her.

II

Here is my idea of a community. [Trixie showed a drawing depicting her notion of community]. In my drawing, you can see a lot of human beings. They comprise a family, which in turn comprises a community. For me, a community is composed of families, houses, and establishments. I have schools here, churches, markets, a municipal/city hall, hospitals, and so forth. Of course, the community people must have sources of income. There are people who work in the office. Some members of the community engage in business. For those near the sea, people may engage in fishing. People in a rural community may engage in farming and raising livestock for a living.

A community is always faced with problems. For example, a community may face the problem of waste disposal. There are communities that are over populated. There are communities that experience the prevalence of crimes. We cannot deny the fact that there are problems of social justice in the community. For example, justice is not fair between the rich and the poor. The rich most often can do many illegal things without being caught. However, if the poor person commits a mistake, he gets the full measure of the law.

III

I consider myself a member of the community. I live in an urban community with a highly dense population. In our barangay, houses are very close to each other. That's why our community is very noisy. Our barangay is close to a commercial complex, plaza, church, town hall, supermarket, and schools. We also have a big talipapa in the community. A

talipapa is made up of open stores where people can buy their food. Fish and vegetables are commonly sold in a talipapa. Most often, a talipapa operates only early in the morning or late in the afternoon. This is the time of the day, most especially after a day's work, when people buy fresh food for their supper or breakfast

People in our barangay are engaged in different occupations. We have different sources of income. There are those who work in the city as government employees. Some work in private companies. Our community is adjacent to the river. This river divides the city into half. Near the river bank, you can see a lot of punongans or fishponds. Although we are in the city, there are still people in our community who engage in fishing

About 40% of the people in the barangay are my relatives. Of course, that is rare in the city. This is probably the reason why I find no difficulty in dealing or getting along with the people in the barangay. Everybody knows me. Every time I pass by, people greet me.

We have many problems in the barangay. The barangay captain, I think, is one of the problems. As head of the barangay, he should be fair in dealing with people. However, he favors his relatives and those close to him. There are zones in the barangay that get a large share of the community projects while other zones have no improvement whatsoever.

There are legal cases in the barangay that he doesn't know how to handle. Sometimes he is biased in his decisions. There are also a lot of unresolved misunderstandings in the barangay. One time I saw a fistfight in front of our house. I did not know the cause of the problem. I heard there was a quarrel between two families.

Other people were dragged into the fight. It disturbed the peace and order of the community. Until now, the Barangay Captain has not done anything about it.

What else? What more can I say about our problems in the barangay? Ah, our barangay has so many tsismosa [gossipers]. Of course I am a tsismosa too. Ha ha ha ha. When people see you walking with a guy, a male friend for example, they begin to gossip. They gossip more if they see this guy visiting a lady's house. They tell stories like this, like that—that the guy is your boyfriend. Then that news spreads like a wild fire in the community as if it were true.

Another major problem in our barangay is over population, especially in Zone 6. In that area, you can see many young children, born one after another. As you know, people in Zone 6 live near the fishpond and the river. And you know, how does it feel living near the fish pond? It is very cold there, most especially at night. With that condition, what do you expect to happen? [Everybody laughs]. I also noticed after a typhoon, in a month or two, lots of women become pregnant. [Everybody laughs again.] I think overpopulation is a problem that must be addressed in our community.

Despite our community problems, I can also say that I am happy with the place where I live. At least, I live near my relatives. I also have a good relationship with our Sangguniang Kabataan (SK) chairman and his officers. Sometimes they approach me when they have problems. If I have something to offer, I do not hesitate to extend my help. I can also say that I am an active member of our barangay. I participate in community activities. For example, we have a summer tutorial class for school children in our barangay. For the past three years, I offered myself as a volunteer teacher for elementary

and high school students. I only stopped when my schedule became hectic, most especially that I carry 27 units this semester.

Generally our barangay is good. I think one is safe in moving around, even at night. I have not heard stories of killings or stealing. We don't have those problems because we have barangay tanods, village residents who patrol the place at night. We are somewhat safe. Besides, the people in our barangay are very cooperative. Although we have many religions in the community, people still make a point to hear the mass, most especially those held in the barangay hall. We have a chapel that is always filled with people every time there is a mass. Even if you will not invite them, they will come freely, on their own.

In our barangay, there are people who belong to the upper, middle, and lower economic classes. But most of the people in our community are poor. However, I like the way people treat each other in our community. In December for example, the poor ones go into the rich neighborhoods for caroling. The rich often give them free food and money. However, I've lately heard stories that upset me. There is a plan to convert our place into a first class subdivision. You know, the land in our place is not owned by the residents. This worries me because we do not own the lot where our house stands. We are just paying the rent for the land every year. In other words, we are just squatters. I am afraid; we might be forced to leave someday. I hope it will not happen because I love our place. I have been living in the barangay for all of my life and I don't know where to go if ever we will be evicted from our house.

IV

My participation in community immersion, most especially in the research, was like a journey. Sometimes I was confused and did not know what to do. There were times I felt the tasks were difficult. I mean not really difficult. My problem was I had little time. With 27 units this semester, my research tasks added to my burden. At first, I was hesitant to join the research team because I was planning to work as a part-time tutor. I need to work to help support myself. However, most of my friends were already in the team so I decided to join as well.

Our first research agenda explored our notions and experience of community. I shared about the community where I came from—an urban barangay in the northern part of the city. I realized that we have similarities and differences in our ideas of community. For example, we share a common perception that a community must be composed of a group of people. Many of us agreed that a community must be confined to a territory. In fact, all of us described our respective barangay to represent our community. However, we have some differences too, in our notions of community.

I believe that a community should share common goals. However, Ben, also a member of the research team, disagreed. For him, a community must allow differences in aspirations and goals. A good community, according to Ben, must also cater to those who don't feel like sharing the goals of the group. I was surprised when he showed us an empty drawing representing his notion of community. I found it strange when a person says, "I am a community." Yes, a person can live alone but I doubt if he or she really feels the fullness of life without a community of people around him or her.

V

Based on our first and second visits in the immersion site, I had a positive impression of Barangay Baybay. It seemed like the place was peaceful and the people were nice. The barangay hall was clean and spacious. I met the barangay captain and officials for the first time. They were very accommodating. I could not help but compare it with my barangay. Our barangay is not as organized as Baybay. After listening to our interview with the Barangay Captain, I came to admire him for the efforts he has done to improve Baybay. Imagine, they have a water system project. They have also a housing project for the squatters living in the coastal area. He took the effort to write the government officials to provide a permanent settlement area in the village for the squatters.

The judicial system of Baybay is more established than ours. I heard the Barangay Captain's story of how he settles problems at the local level. In other words, people in Baybay have avenues to resolve their conflicts. This means that their justice system is good. That's why, during our focus discussion, I shared that, it seems, Baybay does not have social justice problems. I might be wrong. Who knows? Anyway, that was just my first impression. A preliminary visit, I understand, is not enough to conclude that there is no social justice problem in the community.

During our first visit in Baybay, we also toured around the barangay and visited the houses where we will stay for the duration of our community stay. We drew lots. We found that our group will be placed in the Health Center [but later changed to the Day Care Center] while other groups will live with host families. There was one place that everybody wanted to stay—the cottage near the beach. That was taken by the other group. Since the process in assigning accommodations was fair, I had no choice but to

accept the fact that the Health Center will be our "home" during the community immersion.

On our second visit in Baybay, we focused on the identification of social justice issues in the community that might help us in planning our service learning project. Honestly, I found it uncomfortable to talk about social justice and inequality issues, most especially in relation to a community I hardly knew. If I were to believe the barangay officials during our preliminary interviews and consultation, everything is fair and just in Barangay Baybay. If ever there are social justice issues in the community, they are nothing compared with the problems I know in our or other barangays.

Our interviews with three village people during the second visit—one was an SK chairman—corroborated the impression I had developed about the community from the Barangay Captain. Manang Linda, a mother of ten children, praised the Barangay Captain for his good governance and fair play in dealing with issues in the community. She said that the current barangay captain "has done so many projects and improvement in the community than any other elected barangay officials in the past." She also enumerated the projects the barangay captain had implemented in his term. The information simply confirmed the data we previously gathered from the barangay captain. However, Manang Linda admitted that the lot, where their house stands, is owned by a rich land owner. She expressed her fear that they might be displaced someday. She heard a rumor that the coastal area will be converted into a beach resort. "If that will happen," she said, "we have no choice but to move somewhere else."

After our interviews with some village people, we toured the coastal area. As we moved around, I could not help but notice a very glaring difference between the houses of

the rich and the poor in the community. A concrete fence separates the squatter's area from a nearby subdivision in the barangay. Of course, social inequity is always inevitable. However, during our focus discussions, we initially could not cite many social justice issues in the community. Except for the physical manifestation of social inequality such as the contrast between concrete houses from bamboo houses, we could not generate any specific issue of social justice in our second visit. Ben might be right in saying that our positive impressions of the barangay—based from our initial interviews with the barangay officials—might have clouded our perception of the social justice issues in the community. I think this is problematic. As newcomers in the barangay, we are dependent on the barangay officials for help and support. As leaders of the barangay [a position of power and privilege], it's just awkward to study social justice issues in the community without dragging the barangay officials into the discussion. It's weird. We cannot separate social justice issues with personalities. And we cannot talk about problems without troubling those people in power.

VI

In the evening of our first community stay in Baybay, we had an open forum to thresh out our differences among members of the group. Ben facilitated the open forum. He turned off the light and passed around a lighted candle. Each one of us took turn in pouring out our heartaches and misunderstandings. I was happy to hear from Carla, who said that she considers me like a sister. Honestly, I felt flattered because, like her, I also need a very close friend.

From our activity, I learned that each of us has different personalities, attitudes, and ways of responding to situations. I learned also to be open to what others say about

me without getting irritated. I hope that our relationship as a group will grow deeper and stronger knowing that we learned to open up and share what's inside our hearts.

We started our second day in the barangay by conducting a qualitative observation of life in the coastal area. Our professor called it "time-activity log." These were my observations of the early morning life on the shore in the village:

(6:35) When I arrive at the shore, the sea is peaceful and quiet. I can only hear the sound of the waves and feel the breeze of the cold air on my skin. It is still dark. Not many people are around. Near the shore, I see some fishermen catching fish using the net. I see a woman waiting for the coming boat—probably to buy fish. I also see my other classmates standing on the shore. .

(6:41) A small boat arrives. I see a few people walking on the shore. The rays of the sun slowly appear on the horizon. My classmates slowly move toward the boats. After the fishermen pulled the boat into the shore, my classmates slowly come and encircle the boat. They look at the contents of crates being unloaded out of the boat.

(6:45) I see three physics majors wading in the sea water. I also see a middle-aged guy from the distance. He's carrying a balde or pail. It seems like he's picking something from the ground. I don't know. From the distance, I see another boat arriving. I see an old man sitting on a drift wood facing the shore. Maybe he's thinking about something.

(6:48) I see six dogs barking. I see Sir Handa approach the man picking something up from the shore. They are talking. The intertidal shore is exposed. It is hunas or low tide. The water near the shore is not high. I see four physics

majors, all girls, wading through the sea water. I see Sir Handa still talking to the man who is picking something up from the shore. Now they are walking a little bit, then, pick something up again from the ground. They are still talking.

(6:53) The sun has fully come up on the horizon. I still hear a very pleasing sound of water coming from the sea. The dogs come closer to Tomas. They wag their tails. My other classmates and co-researchers are also busy writing in their journals. I see a guy carrying his child while walking on the shore. I see one guy carrying his bugsay [boat paddle]. Then, two men are talking with him. They are preparing their boats. They might be going out to fish this early morning. I see my two male classmates wading into the water. They might be swimming because I see them submerge under the water.

(6:57) I see one pump boat approaching. I see two other boats at a far distance from the shore. Now I see my two classmates swimming at a far distance. A dog also wades into the sea water and starts swimming. Sir Handa is still interviewing the man picking things up from the ground. Now I see. The man is picking stones from the shore and putting them into his balde. Sir Handa is helping him while they talk. They are now getting closer to where I stand.

(7:05) The sun shines brilliantly. I see many people now standing on the shore, both children and adult. I see children running on the shore. The dogs are also increasing in number on the shore. I see Ben moving towards the water, alone. It seems like he doesn't want to be disturbed while writing.

(7:10) Another boat has arrived. There's another one coming. There are two new boats on the shore. I hear from the guy picking white and colored stones

that he's selling them for profit. I heard him telling Sir Handa that the cost of one lata (big can) is 40 pesos. These stones, he said, are used in landscaping a garden. I realized that even stones in the barangay can be sold as an additional source of income. As fishermen arrive on the shore, the residents come closer to see their catch. Probably they are waiting to buy fish from fishermen.

(7:22). There's one fisherman coming towards the shore. He's carrying wooden crates. As I come closer to investigate, I see fish such as liwit, barera, tangigue, duwaw. We take pictures of the fish. Ben shows us a fish and a starfish he picked up on the shore.

(7:27) I also see the approaching fishermen. We come closer to investigate. Their catch was hipons (shrimp fry). All of a sudden, the hipons are gone. We are told, they are not for sale. They bring home all the hipons. What are they going to do with them?

VII

After our qualitative observation activity, we decided to move around the barangay. In particular, we visited the agricultural area located at the elevated portion of Baybay. It was a long tiresome walk. It seemed like we reached the periphery of the barangay. We walked through rice paddies and crossed a stream. Our intention was to find farmers to interview for our memory bank. I was interested in finding how farmers grow rice, an interesting topic for me since I have lived most of my life in the city. I was also interested in collecting insects for our museum project and gathering stories about them. I was planning to preserve these insects to complement the stories I might draw from the farmers.

While walking on the rice paddies, I found something strange. I saw mongo growing on the rice field. "Why are they growing mongo instead of rice," I asked myself. My curiosity led me to the development of a cultural memory bank focusing on the role of mongo as an intercrop in rice production.

My interviews with rice farmers provided me with a wide range of knowledge on cultural practices associated with rice production. Baybay is a melting pot of different beliefs and cultural practices—they influence the planting, cultivation, and harvest of rice. Some of these practices are modern; others are very traditional. There are also farming practices that combine both traditional and modern knowledge and technologies. Drawing from village farmers their knowledge of traditional and modern farming practices gave me a lot of insights and understandings of life stories of the people in the village.

VIII

Let me tell you a story of Lolo Juan, a farmer whose life history has inspired me—it always pays to be industrious, hard working, and a good steward of whatever blessings we receive in life. Lolo Juan is a case of rags to riches story, combining the elements of luck and hard work as his passport to success.

When we first visited Lolo Juan, we did not know that he used to be an ordinary rice farmer. He lives in a big mansion, a picture of affluence and contrast to the bamboo and nipa houses commonly found in the coastal area. He is old but his mind is still sharp. He told us that he started farming at a very young age. During that time, very few went to school because people did not consider education that important. One simply needed to work in the farm in order to live. Life then was simple. It was as simple as the process

of growing, harvesting, and eating of rice. He confessed that he doesn't know how to read and write. In short, he is illiterate.

"During the Japanese period [1941-1945]," Lolo Juan recalled, "we were not allowed to cultivate rice. The Japanese soldiers prohibited farmers to grow rice when they had big casualties in war. For example, "if we heard that the Japanese soldiers were killed in an ambush, we started running away for fear of our lives, because for sure, the same number of civilians would be killed. Whenever we planted rice on the field, we did it at night. Sometimes we dug soil to store our harvests for fear that the Japanese might burn them. Every time we worked in the farm, one served as a look out or watcher to signal if the Japanese soldiers were coming." According to Lolo Juan, they had to endure the "hide-and-seek" rice farming until the Philippines was liberated from the Japanese Imperial forces through the help of the United States of America.

Lolo Juan believes that every person is always given the chance to do good in life. One must be very vigilant when his luck comes. In his case, the chance came when he found a five peso bill. During that time five pesos was a large sum of money. When his step- brother learned that he found the money, he became interested in trying to get it. His brother beat him but he did not budge. As a result, he was forced to leave the house. He decided to live on his own.

His decision to live alone was a blessing in disguise. He became close to his step-sister. They decided to buy a carabao and a small piece of land. Since both of them were unmarried, they agreed to help each other on the farm and equally share the harvest and profit from their crops. Both hardworking and thrifty, they were able to save more money and buy more land, which they equally divided when each of them got married. To cut the

story short, Lolo Juan was able to acquire more properties. He got married and sent all his children to school. He told me that trust is very important in every relationship. He said he was lucky to cultivate this trust with his sister who guided him until he got married at the age of 45. All eight of his children, he said, are successful. In fact, almost half of them are working abroad as seamen and nurses. Lolo Juan is one of the richest members of the community because he pushed his luck further through hard work and prudent living.

From my interviews with Lolo Juan and other rice farmers, I was able to learn the various cultural practices associated with the cultivation of rice. For example, the modern practice of planting rice called sab-og involves a direct broadcasting of rice seeds unto the soil. This practice is in contrast with the traditional way of planting rice called dapog.

The dapog system requires the seed to be germinated on a plot of soil until they grow about 6 to 10 inches tall. These plantlets or seedlings are individually pulled from the soil and are bound together using the leaves of tigbaw, a grass species. Planting is more tedious using the dapog system. Most often, the planting of rice from dapog is done by a group of people. Two persons hold a string at opposite sides of the rice paddies. This string serves as a marker to guide the alignment of seedlings during planting. "Planting rice is never fun," as the song says, because "one neither sits nor stands." And so, according to past practice, one had to play a guitar to entertain the workers while planting the rice.

Due to the emergence of new technologies, the dapog system has been slowly replaced by the sab-og system—the direct broadcasting of seeds on soil. Since pulling of

weeds is difficult when rice is planted through sab-og—the distance between plantlets are close and irregular—modern rice farmers resort to the use of pesticides such as herbicides, insecticides, and molluscides to control weeds, insects, and mollusks, respectively. Since it shortens the germination period, the production cycles become faster. Some farmers produce rice two or three times a year. This practice, however, easily depletes the nutrients from the soil, thus farmers resort to buying commercial fertilizer to increase their yield.

Manong Lito informed me of the "modern" method of cultivating rice. Before the broadcasting of seeds, he sprays the soil with molluscide to kill kuhols [a kind of snail] that loves to eat the leaves of the growing rice. Fifteen days after planting, the rice plants are then sprayed with herbicides to control the weeds. A week after that, he sprays insecticides on rice plants to kill the tamasok. Tamasoks, according to Manong Lito, are moths with white-to-gray colors. "Tamasoks must be immediately controlled, because if left unattended, they will produce more eggs. They eventually grow into worms. These worms eat the leaves thereby killing the growing rice plants."

In addition to the pesticides, Mang Lito applies fertilizers when the plants grow about five to seven inches tall. Most often, he uses the ratio of four bags of fertilizer to one hectare of rice land. A month and a half later, he applies another round of fertilizer to the plants. Mang Lito calls this second application "dressing." Once the rice starts to grow seeds, he again sprays another kind of insecticide to control capsidbugs. This is locally known as tiangaw. The tiangaw attacks the fruiting rice. If left unattended, it lowers the volume of rice production.

In the traditional dapog system, rice production is very slow, usually once a year. Most of the work is done manually. Carabaos or water buffalos are the farmer's best help in tilling the soil. They seldom use mechanized technologies. Pesticides are not used in the traditional method of rice growing. Also synthetic fertilizers are seldom applied to the soil. The soil is given the chance to "rest." The decomposing rice stalks serve as fertilizer.

A farmer recalled that in the past, the rice fields used to be abundant with fish. During the planting season, when rice paddies were opened, farmers could harvest fish from their rice fields. Sad to say, due to the excessive use of chemicals, there are no more fish in rice fields.

The traditional dapog system also involves a lot of help from members of the community. Rice farming used to be communal work. Members of the community used to volunteer their services to help fellow farmers in tasks of farming. This volunteer work was locally known as dagyaw. In dagyaw, a person helps without expecting a salary. Since dagyaw is voluntary, it is based on trust and reciprocation. It further promotes close relationships among people in the community. According to Manong Doming, our other informant, the system of dapog and dagyaw are vanishing practices in the community. Everybody wants the new technologies because they provide quick income. However, he laments that the current practice of rice farming is expensive. Farmers are always in debt because they buy almost everything to grow rice—from seeds to fertilizers, insecticides, herbicides, and so forth.

From our interviews with old village farmers, we were able to gather stories showing remnants of old superstitious beliefs associated with rice farming. For example,

Manong Narding used to practice pangbunggad—the planting of other plant species along with rice in the rice field. Examples of these plants are cosmos, a plant with pungent smelling flower and tanglad, a grass with sweet smelling aroma. When asked what was the basis of pangbunggad, Manong Narding could not give us a good reason except, "I learned this from my elders. There's no harm in following them." It made me think that probably the smell coming from bunggad plants might be effective in driving insects away from the rice plants.

I also heard another interesting story from Manong Narding. I found it strange and somewhat funny. Manong Narding told us about the practice called panudlak, which he learned from his elders. He used panudlak to predict which crop cycle would be more favorable in a year. Panudlak, he said, is done at midnight before a new year starts. Three growing banana plants, of equal height and size, representing the first, second, and third crops for the year, are cut at the middle of the stalk. After three days, the growth of a new shoot is measured. The bud with the highest growth represents the crop with the most abundant harvest. For example, if the second banana plant registers the highest shoot growth, this means that there will be abundant harvest in the second crop cycle. This practice, according to Manong Narding, guides him in his choice of seeds and his plan whether to pursue or not a second or third cropping. This is a case of farming practice that I cannot explain using science concepts I learned from the university.

From my interviews and observations of farming practices in Baybay, I came to realize that the traditional rice farming practices have been replaced by new "modern" practices. Although remnants of old beliefs still influence some rice farmers' practices in growing their crops—something they could not explain sometimes—the modern way of

farming rice is the dominant practice in Baybay. Instead of the lowly carabao, the young generation of farmers prefers tractors to cultivate the soil. Various pesticides have replaced the traditional way of controlling pests.

I am not against the use of new technologies in rice farming. It increases rice production. But knowing from my environmental chemistry class the harmful effects of agricultural chemicals on humans and the environment, it makes me question the benefit gained from the wanton use of fertilizers and pesticides in farming. Despite larger crop production, farmers are still poor and in debt because their production cost is expensive. My question is, who then gains from the modern practice of rice farming?

The fusion of modern and traditional farming practices is another interesting case to explore in Baybay. Inspired by my curiosity of mongo, a leguminous plant, growing in a rice field, I took the lead in the development of a cultural memory bank focusing on the role of mongo as an intercrop in rice production. From my interviews, I was able to understand several science concepts involved in the process of growing mongo. In particular, I was able to tie the practice of growing mongo with relevant biology and chemistry concepts such as the nitrogen cycle, the role of denitrifying bacteria in fixing atmospheric nitrogen into usable forms in the soil, and the economic and health benefits of mongo production to human beings. As an output, I developed a culturally relevant science lesson and used it for my demonstration teaching to school children in the village.

As I look back, after going through community immersion, I could say that the course has helped me prepare to become a chemistry teacher. It honed my social skills most especially in dealing with different personalities, not only with the community

people but also with members of my group. My community immersion experience was generally good, but I think, it was also a test of my patience because I had to endure many uncomfortable living conditions and uncooperative informants. Having lived most of my life in the city, this exposure has given me the opportunity to live, even for a short while, in a rural area. Who knows, I might be able to teach in a similar situation someday.

Individual Narrative 3: The Case of Vincent Zaragoza

I.

My name is Vincent Ben Zaragoza. Just call me Ben. I am a third year chemistry major. Like Trixie, I was also hesitant to join the research team because I am helping my aunt and uncle in their business. They are the ones sending my sister and me to school. Although I was born in a rural area, most of my life I have been transient, living with one relative after another.

It is sad to admit but I come from a broken family. My mother is not married to my father. I have a sister who is graduating this year, also in a teacher education course. In our legal documents, my grandparents are our parents and my mother is just our sister. I was told that my mother got pregnant during her third year in college. She used to study in a private university in the city. I was also told that my father left us before I was born. For whatever reason, I do not know.

At first, I didn't want to become a teacher. I wanted to join a religious congregation and become a monk or a priest. I tried to apply to a seminary. However, I was not accepted because I am a product of a broken family. The seminary only accepts students coming from an intact family. It's a church law...or was it a seminary policy? If

ever I get accepted to study in a seminary, I still need to wait for the Pope's approval for my ordination. I understand—

my mother committed a big sin. I was born outside the sacrament of marriage. But I cannot understand why I cannot be a priest. I don't think it's fair for me to suffer the consequences of my parents' mistake. That's why I settled for an education course. But still, I dream that someday I will become a priest.

Honestly, I don't believe that there is a perfect, just world on earth. I have been through many unjust circumstances in the past. It's alright even if sometimes I was and am still unjustly treated. I believe that in due time, I will get my reward. The world goes around anyway. At this point, I should make the most of the opportunities given to me.

Modesty aside, my sister and I are achievers. I am glad that both of us use the academe to vent out our frustrations in life. At least, we are not like others who rebel and have gone to the point of destroying their lives. We are still in the right path, I suppose. Our academic track records still vouch for our focus and passion for education. My sister graduated salutatorian in high school while I graduated valedictorian both in my elementary and high school.

Let me tell you this story. When I started in the first year of high school, the school environment was not good to me. I came from a barangay elementary school. Most of our classmates came from the central school. And you know the stigma associated with barangay schools—poor academic preparation. Yes, I was poor and am still poor. My classmates also knew about our family circumstances. Sometimes, they teased me, "How come your mother is very old? She is not your real mother. Why do you call your real mother, Yaya?" They were right. The one we called Tatay was our

grandfather and Nanay, our grandmother. In a Filipino culture, it is not proper to address your mother Yaya. There were times I felt like nobody respected us. I don't think it's fair. Even until now, I still long for the love of a real father.

My life story is even worse than yours, classmates. I recall during our elementary days, there were times we could not go to school. Our mother would not allow us to leave the house, especially when she suffered a nervous breakdown. I understand, she carried so many problems. I could not forget that time. I was supposed to take a periodic exam the following morning. I could not study some nights before examinations because she had breakdowns. I had to attend her because I was afraid she might go out of the house naked.

You cannot relate to me unless you have experienced living with a mother who has nervous breakdowns. We could not leave the house as often as we wanted. We could not participate in activities outside the school. We were scared that her breakdown would reoccur. Sometimes she would run without her clothes on. She would walk back and forth without knowing where to go. Those were the trials in my life. I did not know what to do. Will I feed her? Should I lay her down to sleep? Will I accompany her to wherever she wants to go? I did not know. Probably, she wanted to escape from her past. But she also could not go and leave us. She knows that both of us, her children, have potential. My sister and I are both honor students.

The worst part happened when our grandparents had a big fight. We were made to leave their house. We lived on our own, with our real mother. We experienced economic hardships. We had nothing to eat. We had no money. We were forced to live in a small hut. There were times I studied under the moonlight. I also felt all alone and

insecure. We always entertained the idea that somebody might bolt open our door and do us harm. Sometimes we went to our grandmother's house. We stayed for a while and then left again. We did not have a house of our own. Despite those problems, I still maintained my positive outlook. I kept on praying. God answers prayers, you know.

As I mentioned earlier, the environment was not good during my first year in high school. But still, I made it to the honor list. I ranked number 9. In my second year, I made a promise to myself that whatever will happen, I will study harder. I embraced education as my only way out. I told myself to get high grades. Despite our problems, sometimes no supper, no light—I used a flashlight to study—I focused on my academics. I ranked third at the end of the school year. In my fourth year, would you believe? I graduated valedictorian.

You know, we have a long history of a broken family—from my grandfather up to my mother. I might also have a broken family someday. That's why I don't want to get married. I don't want my children to experience the same problem I went through. I understand that children are the ones suffering in a broken family. I don't want that to happen.

I need to live my life. I must go through this stage in order to be successful. I must understand. I always tell myself not to have any grudge against somebody. I always try not to harbor any ill feelings most especially now that we are just staying at our relatives' house. There were cases when my relatives turned off the light while I was studying. Sometimes I slept outside the room, on a sofa. There were times I wanted to eat something but I could not because I didn't have money. What will I do? The place where we stay is not our own. I am only living at our uncle's house.

As to my grandfather, he suffered a stroke a few months after we left his house. In a year, he died. If I harbored ill feeling against him, I have sinned. I don't want to harbor any grudge. I don't want to become my enemy. I try to understand things. I consider this experience as part of a growing process. This is part of becoming human. As a human being, I need to survive and see the meaning of my life.

I don't want to be a hypocrite. I used to have a grudge against my father. Actually, I still have this little pinch in my heart. He should have stood as a good father to us—face his responsibilities. However, as I grow older, I come to understand him. Probably, he is much needed by his family now.

Our mother never told us about our father. We are also afraid to confront her or ask questions. She might break down again. Based on my classmates' stories, I have other siblings. I heard they are eight. They must be more important to him than us. I also heard they are poor. I still hope that someday, when I am done with college, I can pay him a visit. I will tell him, "Tay [Father], I am your son, the one you left a long time ago. Here I am. I have a degree." Then I will tell him, "When I get work, you don't have to worry for your epitaph. I'll buy you one when you die."

I will open myself to my father. If ever he will visit me one day, my initial reaction would be anger. I don't want to be a hypocrite. I will be angry. But it will pass soon. I heard from my sister that she is also willing to forgive him. She even told me that she is willing to spare a part of her salary for him. Even though we are children out of wedlock, we are glad that we did not rebel. We still walk in a right direction. We value our education.

Now we are living at our uncle's house. They are rich. His wife is a pure Chinese. They own a big business in the city. They are the ones financing our studies. Every time we ask from them, they always give. Most of the time, they leave us on our own. We have the freedom to do what we want. It's strange because I long for somebody to tell me that this is the right thing to do.

II

I represent my notion of community with a blank sheet. [Ben showed an empty sheet of paper. Everybody, it seems, looked surprised.] I believe that a community should have no physical or territorial boundary that separates one person from another. I do not look at the community as a whole—a collection of people, so to speak. I would rather look at the individual comprising the community. I do believe that a community is dependent on the individual comprising it. A community is dependent on what we bring into the community.

I also look at the community not as a group of people with common interests. I would rather focus on differences. Community is made up of people with different personalities, livelihood, culture, and tradition. I put more value on individual differences than shared identities.

I noticed we have different ideas of community in our drawings. Flip it back. Now our drawings are the same. They are empty sheets.

What makes a successful community? I contend that cooperation is the key in making a good and peaceful community. Whether you live in a rural or an urban area, the community is dependent on people living in it. It is not that a rural community is peaceful. It is not that an urban area is noisy. It depends upon the people living in it.

A community is not territorial. I don't like territorial boundaries. My ideal community doesn't need a constitution. My community is made up of one big family of people whose main purpose is to love and help one another. In my ideal community, everybody is equal. Rich or poor alike are equal. As long as we cooperate, regardless of our differences, we are a community. Nobody is harmed. We are a big harmonious community. I am more idealistic.

I think I am still a member of our community, but not an active one. I am just a transient member. I do not know them [the people in the community] and probably they do not know me. I don't move around in the neighborhood. The truth is, I don't know our barangay officials. I don't know my neighbors' name. I am confined in a four-wall building, a house I share with my relatives and some of their workers.

I am still a member of the community because I have a heart to help. However, I am not given the chance. I mean, I don't have the chance because I am busy with my studies and work.

The community where I belong is an urban community. In this community, people in the neighborhood do not have time to socialize. They are busy with their personal or business affairs. I could describe this community as rich but poor in terms of developing the members of the community. We just don't mind each other. Our relationship is not intimate. The neighbors do not cooperate with one another. Even relatives, it seems, do not know each other. We mind our own business.

This community with a rich neighborhood is adjacent to a squatters' area. So I see the gross difference between the rich and the poor. There is a huge gap. The rich do not socialize with the poor. Those people living in the squatters' area are also hesitant to

go or approach the rich. They are afraid to come closer because the rich might suspect them as thieves. The two groups, the rich and the poor, do not trust each other. In the community where I currently live, I can see obvious differences. I see varied religions. I see varied faces. There are Chinese, Indians, and others I could not decipher which part of the planet they came from.

If given the chance to become an active member of the community, I will suggest socialization or a forum between all members of the community. Or there should be an avenue for interaction. This will allow every member of the community to know each other better. I hope we can do something to enrich one another.

In the past, I felt I belonged to a community. We know each other. I moved around the neighborhood, slept at my relatives' houses, or ate with them without worrying who they really are. When I walk the street, people greeted me because we know each other.

I have no choice. I am just a transient member of a community. Eventually I will move again. After college, I do not know where my fate will lead me. After some time, I will leave my urban community.

Can a person exist without a community? Yes, he can and why not? The question must rather be: What kind of life he or she lives if he or she is alone, with no socialization? He or she might feel like an alien in that community. He or she might feel not secure. He or she might lose the essence of being human. The most precious thing in life is to feel being loved and to love. There should be love in a community. What would life be without love? Love makes a community pleasant to live in. Without it, life is meaningless.

When you are all alone, life is bland, tasteless. There is no inspiration. There is no reason to strive. Even if one is poor, as long as he or she is in the company of his/her loved ones, he or she will strive for them. If you are all alone, you don't care. A person without a community is like an elephant in a pack of tigers. Even if you are big, they will help each other in killing that elephant. Yes, you might exist, but what kind of existence? It is good to have a community in order to have a peaceful co-existence.

III

This is our poster. You can see here different pictures. If we flip this poster, this becomes nothing but a blank sheet of cartolina. The future of the community depends on us. We view our community different from others. A community is composed of different people with different beliefs, different personalities, trades, cultures, and livelihood. We have different ways of living, different houses.

How do we represent different classes in the community? There are poor. There are rich and middle classes. However, cooperation makes this community exist. There is harmony in community because everyone cooperates.

In our group, we view the world as one community. There is no actual boundary. There is no territory. There is no need for a bounded habitat. We only need a house. Our ideal community can exist despite variations within. We celebrate our differences. We respect each other's differences. As long as we have cooperation, we can live a harmonious life.

It is but natural for chaos or conflict to exist in a community. Because of our love for each other, we could always have the heart to resolve our conflicts. Even in time of war, there is still a community. After all, you are a community—as long as you have love

and a sense of cooperation. Even in times of conflict, as long as in your heart you love other people, you are a community. You are a person. You are a community. One more…there is no such thing as requirements for the number of people comprising a community. Population should not be a factor in labeling a community. You are a community. You alone are a community. However, you can be a part of other communities.

IV

After our Biochemistry teacher left the room, somebody came inside. I thought he was a salesman carrying different products because of his large backpack. It was Sir Handa, who introduced himself as a doctoral student and a faculty member of our college. Without delay, he oriented us as to his research and invited us to join the research team. At the very beginning, I was hesitant to join the team because I might not be able to give my 100% focus on my subjects. In addition, I help my aunt in her store on weekends. Eventually, I decided to join because of the prodding of my classmates.

From the focus group discussions on our notion and experience of community, I learned how my classmates described the place where they came from or live. Trixie described the urban community where she lives while Tomas shared his experience growing up in a rural agricultural community. However, this statement from a classmate struck me: "The kind of community we live in influences the way we relate in school." It seems like, I agree. It is difficult for me to separate my experience and my personality. They co-influence each other particularly on the way I react and relate with other people. Another classmate also emphasized the role of capital in the community. I think he is right in saying that capital is important for a community to survive.

In our discussion, I always emphasized the importance of individual differences in the community in contrast to the notion of "common beliefs, tradition, and culture," a belief that most of my classmates hold.

One time I shared to my virtual friends our plans for community immersion. They were glad that I have the chance to live with the people in a rural community. I told them that community immersion will give me the chance to learn in a natural way because the setting will be outside the university. However, after a month of sharing our views about community, community immersion, and qualitative research, I still do not understand many of the things that our professor was telling us. I just can't understand his idea of memory banking, narrative analysis, collaborative ethnography, etc. Actually I was planning to give up my participation in the research, however, I already made my commitment at the start of the study.

Sometimes I do not enjoy what we do in the research. I find them useless. I don't' think we need to study the community because we are already familiar with it. The community is always around us. I don't think we need to study them. All we need is common sense. Unlike the cultural practices in the community, the lessons in chemistry are well-structured and the concepts are well-organized. I don't appreciate the research because it is unnecessary. I don't think we need to show our practices, like ginamos making, because the Americans might find them filthy.

During our first community visit, I was in a bad mood because two of my classmates failed to submit our letter of request to conduct a field trip for our other class. I did not greet my classmates before we left the school. When we arrived in Baybay, the Barangay Captain welcomed us. As I stepped into the pavement leading to the Barangay

Hall, I noticed the stagnant water in the canal. I like the Barangay Captain. I sensed that he is a good person. However, I noticed the plastic characteristics of other barangay officials. I also sensed that the people in the barangay looked at us with suspicions.

V

I was amazed to see several tape recorders and boxes of tapes. We were oriented on how to use them because each of us will be interviewing a faculty member and a student who had prior experience in community immersion. The first interview was conducted by two members of the research team. After their interviews, we critiqued their work. And so, when my chance came, I was well-prepared. I interviewed Dr. Ramos.

Dr. Ramos has been a teacher in the university for forty years. He usually teaches educational foundations courses. He has been teaching community immersion for the past five years and supervised students in their community stay. For Dr. Ramos, "community immersion is very important because it provides a lived experience for students of a community outside their own. This experience helps them to adjust with as many people as possible, most especially outside the school—the community where students live. It is important to know and experience the kind of life that students live outside the school." Through community immersion, "prospective teachers have the opportunity to participate in community life and share the community people's joys, problems, and struggles."

Dr. Ramos believes that the community is a very rich source of scientific information and materials for science teaching and learning. For example, he said that students may use the herbal plants in the village to teach science concepts....You don't

need a book to teach science because a science teacher who knows his concepts can make use of the local resources of the community to teach a lesson.

According to Dr. Ramos, "The core values of community immersion are cooperation, team spirit, humility, and patience. It teaches students to become creative and to learn to adjust to people from different walks of life. That's why, it is very important for students who go for community immersion to be patient, friendly, and accommodating. They should be very clear and persuasive about their intentions in the community. In return, the community people teach us the values of generosity and hospitality—to be accommodating to visitors."

Aside from Dr. Ramos, I also interviewed Manang Rina, a fourth year science education student who had her immersion in the previous year. I visited her in a nearby school where she conducts her student teaching. When asked her definition of community, she said, "Community is a group of people interacting together. There is sharing of some values. Members of the community help each other. There is a friendly co-existence. A good community is bound with certain relationships between individuals, between individuals and the school, between families, and between individuals and the environment. The community is successful and happy if good relationships are maintained." The narrative that follows tells my reconstruction of Manang Rina's beliefs about and experience of community immersion:

> *Community immersion is relevant because a prospective teacher learns how to deal the different kinds of attitudes and behaviors in the community. One can learn from his classmates and also from people in the community....As a science*

teacher, our concern is not only the molecules, ions, or matter. Of course we deal with people most especially with students.

Community immersion makes you aware of many things like concern for the environment. The community environment could be utilized to help you teach a lesson. Students can understand better if the topic taught is seen, observed, or experienced in reality in their community. It's not all science concepts— like the drawing of molecules. We need to connect these concepts to reality. For example, in a fishing village, you can teach the concept of dissolved oxygen. The large surface area of the sea allows more oxygen to be dissolved in water. This dissolved oxygen allows the fish to live underwater.

Through community immersion, students will be able to realize their responsibility towards their fellowmen, environment, and community. They can serve as a bridge to connect the university and the community. That is, to promote better interaction between the people in the university and the community. It also provides an opportunity for students to serve the community through the projects and activities that they conduct in the community.

As future teachers, we are not only teachers per se. We also serve as advisers. We are like mothers to school children. We must know the needs of our students. Most of these needs are not limited to education. These students also have a life outside the school. We may not be able to address all these needs but it is important to be aware of them. Community immersion provides us the opportunities to learn the kind of life that our students live. Community immersion

helps mold our person—teachers who can understand not only the students but the people in the community as well.

Through community immersion, I learned to become responsible not only to myself but also to members of our group. I learned to stand on my decisions and be responsible for my decisions. I learned the value of cooperation since we work as a group. I learned to value the contribution of every member of the group, praising and appreciating the little things that they contributed to the group. I also learned how to deal with people, how to appreciate the little things they give or help for our successful stay in the village. Indeed, no man is an island. We need each other's help, most especially in the community immersion setting.

From my interviews with Manang Rina, I learned insights on how to go through community immersion in Baybay. I also became aware of what is expected of me through my participation in group and community activities.

VI

In our second visit in Barangay Baybay, we explored the social justice issues in the community. We first interviewed the Barangay Captain. From our interview I realized that he is a good politician. We also interviewed the Sangguniang Kabataan (SK) chairman. After that, he gave us a tour around the barangay. We passed by a house near the shore and interviewed a mother and her son. They said that they are treated equally in the barangay and there is no boundary between the rich and the poor. Actually I don't believe that there are no social justice issues or inequalities in the community. And so, I suggested that if we really wanted to learn about social justice issues in the community,

we must do away from working with the people in power in the barangay. The SK chairman was with us during those interviews. Besides, we first interviewed the Barangay Captain. Our understanding of the social justice issues might have been clouded by the things we heard from those people in the upper strata of power in the community. During our focus discussion at the hilly portion of the barangay, after our tour, I felt a discomfort in sharing my ideas because of the presence of the SK chairman. I had to filter my comments so that he would not feel offended.

Before we went home to the city, we took pictures of ourselves under the Lomboy tree. An old woman approached us and said that the tree is mariit [inhabited by unseen spirits]. She said that the tree used to be a landing place of bulalakaw [a mythological bird believed to have powers to make one sick].

We said our tabi-tabi [little prayer for protection] before we left and rode in the jeepney, about an hour drive to the city. On our way, Tomas and Mario were all in praise of the community. They said, "The barangay is really nice." And I said, "I don't think so." I don't' think we can fully comprehend the problems in our first visit.

VII

After the opening program, we were surprised to learn that we were billeted in the Day Care Center instead of the Barangay Medical Center, the original plan to stay for the duration of the community stay. I sensed the discomfort of my classmates because we were told that the day care class is held in that building every morning. We had no choice but to obey.

I think community immersion is memorable because that was our first time to be with each other for the whole week. We started our supper at about 8:22 p.m. We had so

much food because each of us brought something from our New Year leftovers. After the dinner, I started an open forum to clear things out.

There were many misunderstandings in the past and so I initiated the passing of the candle to pave the way for each of us to say what we would like to say to members of our group. Many of my classmates opened up. In fact they told me of many things in my behavior that offended them. That activity also paved the way for one of my classmates to confront me with her heartaches. I learned to accept my fault and I hope I can change some of my attitudes. At least, I am now on speaking terms with her.

During my community stay, I immersed myself in understanding the healing practices in the community. The following day, after our observation on the shore, we started looking for our interview prospects. We were able to reach the boundary of the barangay in order for us to find our informants.

I interviewed Lolo Gorio, a well-known manoghilot [a person who does therapeutic massage] in the barangay. I also interviewed Lola Toyang and Lola Binyang, two famous albularyos [community healers who use herbal plants to treat ailments] in the barangay. From my interviews, I was able to develop this narrative in my memory bank:

> *It was late in the afternoon. The sun was about to set. Ynes and I went to the house of Lolo Gorio, a well-known manoghilot in the barangay. We saw five men and two women and many children, ages ranging from two to seven. Tay Gorio was having a social drinking session with his neighbors after a day's work in the farm. Upon seeing us approaching, he immediately smiled and started to separate from his group.*

Our task that afternoon was to uncover the community knowledge about panghilot. Panghilot is a traditional form of massage for medication and relaxation purposes. It is an ancient form of healing using chiropractic manipulation or massage of ligaments, muscles, and bones. According to Lolo Gorio, "Every barrio has a manoghilot. Without a manoghilot, the barangay is not complete."

From our interview, I learned that panghilot goes through different stages. It starts with an interview by manoghilot with his patient. He or she then takes the pulse (also called pamulso) of the patient. This is done by toughing different parts of the patient's body. The purpose of pamulso is to identify which part of the patient's body has sickness. A therapeutic massage then follows. In this step, the manoghilot may accept or reject his patient. If he thinks that it is within his capacity to cure the sickness, he will continue. If the patient requires medical attention, he then refers him/her to the doctor. If there is saw-id [sickness caused by unseen spirits], he may refer him to a babaylan [village shaman]. The albularyo then performs a ritual to appease the spirit that caused the sickness.

Should the manoghilot feel that it is within his capacity to heal the patient, he then gives him/her an intense massage. The purpose of the massage is to release the gas confined in the patient's body or to bring back the joints or veins to their normal position. After an intense hilot or massage, pangbanyos follows. In pangbanyos, extracts from herbal plants and coconut oil are being rubbed on the patient's body. "To prevent air to get into the patients skin," Lolo Gorio said.

Then, it is followed by the resita. In this stage, the manoghilot advises a patient on what herbal plants to take or rub on his/her body.

Panghilot is concluded by a payment. The payment should not be directly received by the manoghilot. The patient must place his payment on the table and not on the hand of manoghilot. A direct transfer of money from the patient to the manoghilot is a taboo. Once it is done, it is believed that the sickness is transferred from the patient to the albularyo.

From my readings, I learned that panghilot is a traditional practice in rural communities in the Philippines. This practice has been existing even centuries ago. It is ingrained in the beliefs and traditions of a rural village. Village people usually follow it out of respect, hope, and faith in the manoghilot. I decided to use panghilot as a topic for my memory bank because the practice might have potentials for science teaching and learning. Using the memory bank as a tool, I identified the impact of panghilot in the community's environment, health, economics, religious, political, and cultural dimensions of community life:

Environment:

- *It promotes the preservation of indigenous herbal plants used by the manoghilot to treat the disease.*
- *It encourages residents to grow coconuts because the oil is a very important ingredient in making local herbal plant extracts.*

Health:

- *Panghilot can heal different kinds of diseases such as headache, diarrhea, and minor fractures or joint dislocations.*

- *Massage or panghilot can accelerate the healing process in the body.*
- *Balanyos from coconut oil—herbal plant extracts are believed to have therapeutic effects.*
- *The heat of the body is being transferred to the leaf during the panghampol. (Fresh leaf bud is plastered on the forehead of the patient with high fever.)*
- *The linahob [heated leaves of plants, most often banana] can absorb heat from the patient suffering from colds.*
- *The perspiration after the hilot is a good indicator that the body is responding to the hilot. The patient feels good after perspiring.*
- *The pulse rate is used to diagnose the patient's sickness.*
- *Consulting the manoghilots should be treated with caution because they do not have any medical background.*

Economics

- *Panghilot is a means of living for the manoghilot.*
- *It also generates income for those making balanyos out of coconut-herbal plant extracts.*
- *It saves money for poor rural villagers who do not have money to avail of expensive medical services in hospitals.*
- *Residents can also save money for medicines because a manoghilot often uses herbal plants in their prescription.*
- *No fixed amount is required as payment. Patients are given the freedom to pay whatever they can afford.*

Religious

- *Sickness with saw-id (disease caused by unseen spirits) cannot be healed by modern medicine, according to manoghilot.*
- *Manoghilot practices religious rituals and offerings to appease the disturbed spirit.*
- *The patient is required to pay nonmonetary offering, usually food, to appease the spirits.*
- *The process of making coconut-herbal plant extracts is also governed by rituals and beliefs. For example, some manoghilot gather their herbal ingredients during Holy Fridays only.*

Political

- *A manoghilot is considered a public servant. He/She can be called anytime of the day, even at the middle of the night, to serve residents of the village.*
- *A manoghilot is revered as he/she symbolizes power and wisdom in the community. He/She is respected in the village.*
- *A manoghilot also serves as a consultant in some major decisions in the community, e.g., where to construct a community building.*

Socio-cultural

- *The practice of panghilot is believed to be inherited from dead forefathers who had similar gifts in the past.*
- *Ancient prayers, songs, and dances, etc. are preserved through this practice.*
- *Panghilot is viewed as a sacred duty and a manoghilot should not turn back from opportunities to serve the people.*

- *Rituals associated to the healing of people with saw-id are also a form of social activity for the people in the village.*

After studying and reflecting on the data I collected for my memory bank, I identified some science concepts to explain or ground the practice of panghilot. These concepts are listed in my lesson plan, which are as follows:

Science behind Panghilot

Panghilot is an ancient Filipino art of healing. This is commonly found in rural communities in the Philippines. The practice employs chiropractic manipulation and massage for the diagnosis and treatment of musculoligamentous and musculoskeletal ailments. It is also used to reset dislocated and sprained joints such as the knee, ankle, fingers, and metacarpal bones. Manoghilots tend to be chiropractors while arbularyos tend to be herbalists.

The process of panghimulso or touch diagnoses—taking the pulse and touching the different parts of the body—helps the manoghilot in identifying the different areas of the heat-cold imbalance in the body. Panghilot involves energy manipulation in the body. Thermodynamics is the science that studies heat transfer—usually from warm to cold area of the body. The proper way of panghilot produces a biochemical reaction that brings energy balance in the body. In addition, the use of harampol such as banana leaves facilitate heat transfer from the hot body to the cold leaves. When the leaves are placed on the skin, the interaction promotes energy transfer thereby bringing back the energy balance in the body.

Like body massage, panghilot improves circulation of the blood in the body. It facilitates blood flow thereby bringing fresh oxygen into the different tissues and organs of the body. The process consequently improves the elimination of body wastes products. It speeds up the healing process of the injured parts of the body resulting in a fast recovery of the body from sickness. Finally, the balanyos used by manoghilot such as the coconut oil, essential oils, and herbal plants are believed to have anti-fungal, anti-viral, and antiseptic properties. Looking back, I can say that I learned a lot from my community immersion experience. I have realized that the community is a rich resource for teaching science. For example, the practice of panghilot has been around for a long time but it is never taught in schools. Through the lesson plan I developed on panghiot, I hope that the practice will be preserved and many students will realize that science is always all around us. Through community immersion, I am thankful that I see panghilot in a new perspective.

Summary

This chapter examines the community immersion experience of three case students—Tomas, Trixie, and Ben. The narrative analysis of case participants revealed a complex interplay of personal life history, family background, *barangay* experience, formal education , and group interaction—all woven together, casting a shadow of influence on how an individual made sense of his/her community immersion experience.

The narrative analysis also revealed sometimes complementary and sometimes conflicting notions and experience of community. Case participants shared a common perception of community as a place, most often associated with the *barangay* where they grew up; as a group of people, which may refer to their family, friends, cohorts,

classmates, co-villagers, etc. They also perceived the community as having an intangible collective sense of unity—possibly a culture—bound together by shared beliefs, hopes, and aspirations; the sense of kinship, memory, and belonging that only a heart can tell where it belongs, thereby transcending space and time. In some cases, students' experiences of community were not situated in place, people, or shared belief. Rather, they focused on activities and actions, so short lived that after the interaction, one moves again, leaving behind a tiny mark of oneself in other people's lives.

The narrative analysis also revealed multiple beliefs about the purposes, values and goals of community immersion. Case participants demonstrated a progression in beliefs at different points of their community immersion experience, ranging from naïve to mature perceptions on the importance of the course. It is apparent that their beliefs were influenced by their knowledge about the course, their interaction with students and faculty who had prior community immersion experience, and their actual short-lived experience in the rural fishing village.

Through community immersion, case participants exhibited multiple dimensions of learning ranging from the understanding of the socio-cultural milieu of the teaching profession and knowledge of cultural practices relevant to science teaching and learning. In addition, the community immersion experience facilitated among students the identification and crystallization of content knowledge as embedded in the rural villagers' ways of life and the transformation of personal, school, and *barangay* capitals into useful practices in science teacher education. Students also developed managerial, administrative, and social skills for communal and community living and affirmed values such as cooperation, trust, unity, and concern for fellowmen.

In spite of the numerous benefits of community immersion, examination of stories of case participants revealed tensions associated with peer adjustments and relationships, differences in personalities and motives, inadequacy of time and resources, and socio-cultural and political factors and structures in the immersion site.

Chapter 5

FINDINGS PART TWO: GROUP NARRATIVES

Introduction

Dubbed as a story of our collective community immersion experience, the narratives in this chapter are grouped into three major parts—Book I, Book II, and Book III. Book I is preceded by an epilogue describing the research locale, contexts, and events prior to the formation of the research team.

In order to give a detailed account of the research team's collaborative experience prior to the community stay, Book I is entitled, "Our Early Beginnings." The book is divided into narrative segments focusing on the early beginning of the research; the formation of the research team; the storied lives of its individual members; participants' notions/experiences of community and their beliefs about the purposes, values, and goals of community immersion; and initial learning experiences brought about by preliminary community visits, participation in community immersion seminars, and other activities.

Book II is entitled, "Baybay, Here We Come." In this section, members of the research team describe their experience living in a rural coastal fishing village in the central Philippine archipelago. The book is divided into several narrative segments focusing on the learning experiences of community immersion participants as they explored and learned Baybay's cultural practices relevant to science teaching and learning, rich historical legacies, and social justice and inequity issues. Specifically, the first narrative segment is centered on cultural practices in Baybay, a collection of stories

told by members of the research as they learned science contextualized in the lived experience of the people in the village. The second narrative segment focuses on the history of Baybay. It is a collection of stories documenting the community funds of knowledge associated with the historical landmarks of the village such as a memorial for casualties in the first ambush against the Japanese soldiers in the region during World War II and ruins of an old bantayan, a pre-Spanish watchtower believed to be constructed to warn villagers of invading pirates. The third narrative segment is a collection of stories describing the marginalization experience of people living in the periphery of power, opportunities, and privileges in Baybay.

Also titled, "We Shall Return," Book III contains post-community stay narratives. For the most part, the book tells how the research team transforms their interview data into useful tools and products in science education. For example, the early part of the book narrates how memory banking is used both as an analytic tool and as a reference point in the development of culturally relevant science lesson plans. One narrative segment also tells stories of how community immersion participants returned back the village people's funds of knowledge through the implementation of their service learning projects—the putting up of a community-based mini-museum and the teaching of village school children culturally relevant science lessons. Another narrative segment is also devoted on stories focusing on how a portfolio is used in assessing students' learning. This dissertation chapter is culminated by the researcher's reflection on his research experience at the intersection of the different—and most often conflicting—notion of community.

As a caveat, except for the principal investigator, the names of persons and places in this chapter are fictitious and are given pseudonyms. Resemblance to specific persons and places is purely unintentional.

Prologue

The Old Gothic Building (OGB) was the most imposing central structure of the University of Central Philippines. From the university's main gates, I traversed the three short intersecting roads leading towards OGB—go straight, turn left, then right. The two-lane, narrow road leading towards OGB were filled with few slow moving cars while the sidewalks were crowded with walking, talking, and sometimes laughing students. Some students walked leisurely while others walked fast, probably in a hurry to catch their afternoon's class.

On my way, I remembered this all too familiar place. The old cemented road, side walks, and buildings did not change much after my nearly three years of absence from the university. The only difference I felt was the sense of alienation to the crowd. I elbowed my way among a group of students and scaled the spiral staircase that led towards the second floor of the building. Despite the dimly lit hallway, I did not find difficulty in locating the room where my prospective research participants held their class.

It was the first week of November, an official first day of classes for the second semester at the University in Central Philippines. At about 2:30 in the afternoon, right after their Biochemistry class, I hurriedly entered the classroom. "I mistook him as a salesman peddling different stuffs because of his large backpack," Ben recalled of our

first encounter. I introduced myself as "a faculty member of the college." Ready to leave, with some already at the door, students returned back to their seats.

I further introduced myself as a science education doctoral student in one of the universities in the southeastern part of the United States. I oriented students to my doctoral research entitled, "Bridging communities and preservice science teacher education through community immersion: A collaborative action ethnography." After which, I invited students to join with me as co-researchers and co-participants in exploring the experience of community immersion, a course that students would take that semester.

The students, at first, seemed interested and excited. The prospect of doing a qualitative research study was new to them. However, a few students expressed apprehensions that they might not be able to devote their time to the research because of their heavy load—27 credit hours. They also feared their lack of prior knowledge and experience in doing qualitative research. Except for a few students, almost everybody raised their hands when I asked, "Who wants to join as a research participant and member of the research team?" Mario expressed hesitation. He told the class that he could not tarry for long in school, particularly in the late afternoon. He reasoned that he "commutes everyday from school to home and vice versa." Ben was apprehensive too. In addition to his part-time work at his aunt's store, he was concerned that the research might prevent him from focusing on his studies.

"As members of the research team, you will devote extra time, in addition to your regular Community Immersion class, for focus group discussions, meetings, and other research activities," I reminded my prospective research participants as I distributed

copies of the consent form. I also informed students of the benefits that they might draw from the experience and their rights as research participants. After explaining the content of the form, I further instructed students to read and study the consent form at home. The orientation ended with my reminder, "If you are interested to join the team, affix your signature in the consent form and return the principal investigator's copy at the next meeting."

After the research orientation, the students and I walked out of the room and headed towards the Worn Out Building (WOB), where Community Immersion class was supposed to take place. WOB, an old shabby building, was about 100 meters away from OGB. On their way, students asked questions about my life and experience in the United States, the places I visited, the university where I studied, and how I was able to study in America. We were about to settle in several benches in front of ORB when a teacher informed us that the 4:00 o'clock Community Immersion class for that day was postponed. Students and faculty members of the College were advised to attend a Catholic mass in memory of a former associate dean's first death anniversary. After we said our goodbyes, some students went home while I tarried for a while to attend the mass and socialize with my colleagues in the college.

Book I

Our Early Beginnings

The Worn Out Building was a two-story shabby looking edifice in the university. Located at the periphery of the university's property, the classrooms were sometimes noisy and dusty. The noise came from running jeepneys at the nearby street, which was separated by the tall university walls adorned with murals paintings and graffiti.

Our community immersion class was held in one of the rooms on WOB's ground floor. The spacious room was lined with gray and black steel chairs to accommodate at least 50 college students. The chairs in the room were aligned in two groups, one at the left and another at the right side. The spacious aisle at the center led towards a teacher's table facing the students. Marian, our research collaborator handling the course, was standing in front of the table. She presented the class syllabus. She discussed the course descriptions, objectives, and requirements. She also shared her personal experience in teaching community immersion.

The formation of our research team did not necessarily begin during our first encounter as a group. About six months before the community immersion class, Vicente exchanged e-mails with Marian, asking her to collaborate with him in his dissertation research and in teaching the community immersion class. Despite their being colleagues at the university, Vicente looked to Marian as a respected mentor—she used to be his professor in an undergraduate psychology class. Being a good-hearted mentor, it was easy for Vicente to convince Marian to help him in his research.

Upon arrival in the university, Vicente made arrangement for the class schedules. He was surprised that the schedule was perfect. Marian's name was reflected as the course instructor in the official schedule of classes. There was also an hour and a half free-time—between 2:30-4:00 p.m.—prior to the community immersion class. "Everything was perfect," Vicente told himself as he intended to use this free time for research meetings and focus group discussions.

When Vicente and Marian met, the latter expressed some hints of hesitation about joining the research team for an obvious reason. She had been appointed as the new

director of a very busy, high profile administrative position in the university. Vicente literally begged Marian to teach the course and promised to help her in the instruction and supervision of students.

The class was a cohort of prospective science teachers—17 chemistry and 24 physics majors—in an undergraduate science teacher education program of the University in Central Philippines. Since that was the second class meeting, almost all of the students were present. After the course orientation, Marian officially introduced Vicente to the class. Right there and then Vicente made his second round of orientation about his research and reiterated his invitation for students to participate. Before the class ended, Vicente requested the chemistry majors to stay behind. He introduced a detailed plan for his research. Of the 17 chemistry majors, 11 students handed in their consent forms. On that day, the research team had 11 official student members—four males and seven females.

It was already dark when the meeting was dismissed. Everybody was in a hurry to go home, most especially Mario and Vicente who lived in distant towns. On the way out of the room, Aldrin expressed his strong intention to remain on the team. He was afraid that he might be eliminated since the research plan required only 10 student-members. I assured Aldrin that he was counted in as a group member and that it was alright to exceed 10.

Unknown to Vicente, there were existing social groupings among students in the class. The physics and chemistry majors were the two major groups. Within these groups were barkadas or cliques. Vicente later discovered that most of the members of his research team were part of a clique formed long before the research began. In that

informal group, Aldrin and Vicente were basically "outsiders". Their only difference—Vicente wielded power and authority while Aldrin did not.

At the beginning of the study, Vicente observed that Aldrin did not get along well with Ben, one of the most influential members of the group. As the research process progressed, the enmity between Aldrin and Ben became glaring as evidenced by body language, side comments, and verbal disagreements on some issues. At one point, Ben threatened to leave the team. This alarmed Vicente as it might create a domino effect among the rest of the members of the research team.

Aldrin, who expressed the feeling of "not being part of the group," approached Vicente and expressed his intention to leave the team. Vicente brought this sentiment to the rest of the group. About three weeks after the initial meeting, the team eventually allowed Aldrin to leave. Aldrin decided to join another group. The decision sealed the research team's final composition—ten prospective chemistry teachers, three males and seven females; Marian, a teacher educator and "official" course handler; and Vicente, a science education doctoral student.

Our Storied Lives

The Teachers Enclave Building (TEB) was one of the newest structures in the university. The second floor housed the offices of the College of Education faculty. The conference room and administrative offices of the college were stationed on the ground floor. We, members of the research team, were all seated around an oval-shaped mahogany table in the conference room. The centerpiece of our first focus group discussion revolved around the sharing of our life history and experience of community. We talked. We also listened.

We glimpsed a part of our co-researchers' lives as reflected in the excerpts of our individual stories below:

> *I am Dianne, a fifth child out of eight siblings. I described my community as rural agricultural. I lost my father when I was eight. He got sick. He was an alcoholic. During my elementary years, I helped my mother wash clothes and clean yards for our rich relatives. During high school, a well-to-do relative brought me to the city to help in their household. In exchange, they supported and are still supporting me in my school and living expenses.... Back home, I consider my birthplace as my community. It is a rural farming village, about 3 hours ride from the city. It takes a 30-minute drive to reach our barangay from the town proper. The road that leads to our barangay is narrow—dusty in summer and sticky-wet during the rainy season. We have a small chapel in our barangay. Our house is surrounded by a rice field. To go into our house, one must cross a river using a make-shift wooden bridge. People in our village get fish from the river as viand. Most of the villagers raise farm animals to help them in their work. For example, we use carabao to plow the field. Some farmers use tractors but only very few can afford to buy them. That's it. We are very agricultural.*
>
> *I am Ben. I grew up in an agricultural community in one of the central towns of the province. However, I experienced moving from one relative to another. As you know, I am a product of a broken family. My parents were not married. My father left us before I was born. I grew up thinking that my grandfather and grandmother were my parents and my real mother, an older sister. We are two in the family. Despite our personal and family circumstances,*

my sister and I were able to make some achievements in school. That's why we work hard. Actually, I am also afraid to get married someday because I don't want my future children to become products of a broken family. You know it runs in the family. I don't want to add more. At first, I wanted to become a priest or monk but was denied admission in a seminary because of my family background.

Just call me Carla. I came from the northern town of the province. My father works as a bookkeeper while my mother attends our small sari-sari store. I have a younger brother. However, my parents "adopted a big brother." He stays in our house. My parents shoulder his school expenses. I am a Sanguniang Kabataan (SK) kagawad, a youth representative in our barangay. Sometimes, our barangay captain accuses our youth group as corrupt. Actually, he is the one who is corrupt because he tries to claim the projects that we put up in the barangay.

My name is Trixie. I am my parents' only child. I grew up and studied all my life in the city. I live in one of the barangays in the northern outskirt of the city. My community is noisy and crowded. We have a problem of overpopulation. After the rainy season, I noticed many pregnant wives, most especially those living near the river. Many of the people in our barangay are my relatives. This is strange because we live in the city. I used to live a comfortable life. My parents provided me well. They gave me things I wanted. However, everything changed when my mother died. I was in fourth year high school. Since then, I have learned to fend for myself and endure the loneliness of being alone. My father works at night as a chef in a local bar and restaurant. Most often, I stay alone in our house. It's quite lonely.

I am Candy. I am the eldest among three children. My father is a government employee. He is very religious. In fact, he is a member of the Knights of Columbus in our parish. My mother is a plain housewife. We live as part of an extended family. It includes my two other spinster aunts. They live with us. One works as a maid in Hong Kong. She helps in our needs. She even helps finance my education. My other aunt is strict. She does not allow me to go out with my friends. That's why, when I am in the city, I enjoy my life to the max. At home, I feel like a spinster too. I live in a community where everyone helps each other. I recall an incident when our storage barn was razed by fire. If it were not for the help of our neighbors, we could have lost our house. They took turns in putting out the fire.

Please call me Mario. I describe my community as rural and agricultural. My father is a truck driver. His work is seasonal. When he is not driving, he attends our small farm. I have three other younger siblings, all boys. My grandmother stays with us because my mother works in a distant town as a high school teacher. She goes home every weekend. That's why, at an early age, I learned to be responsible. When I am free from school, I go home right away and attend the needs of my younger brothers. I fetch water and gather firewood. I commute everyday from home to school, about 50 minutes away from the city. The barangay I live in has an interesting story. This is how it got its name. During the Spanish time, our barangay had no official name. The seat of governance was not in its current location. In 1758, the Spaniards penetrated the hinterland using the river as the main thoroughfare. They expanded westward until they reached our barangay. During that time, the barangay was headed by a woman chieftain. The

Spaniards asked the people of the name of the place. The villagers thought they were asking for the name of their leader. And so, the barangay was named after that lady chieftain. I am proud of our community. It has produced distinguished sons and daughters such as the civil service regional director, chief clerk of court, lawyers, politicians, and doctors."

I am Leslie. I came from a different province, which is about four hours drive from the city. I currently live with my older sister, an only sibling, in a boarding house. We go home once a month to get our allowance. My mother is a school principal while my father is a janitor. In our barangay, the people have varied sources of income. Those who live near the coastal area are experts in fishing. Those who live near the mountains raise crops and farm animals for a living. Our village is famous in making "pawod," a hand-woven roof thatch made from leaves of the nipa palm. People from different towns and nearby provinces come and buy pawods in our barangay. A hundred pieces of pawod costs 650 pesos.

Like Leslie, I also came from a different province. By the way, my name is Tomas. My hometown is about three and a half hours drive from the city. I described our barangay as rural agricultural. It is surrounded by towering mountains. A river splits our barangay into half. Our barangay is divided into five sitios or sections. Each sitio is named after a famous place landmark in that area. For example, the sitio where I live is named after a famous mountain on our side of the barangay.

Call me Ynes. I came from a family of seven children. I originally came from a fishing village in the northern part of the province. At the age of ten, I was adopted by my grandmother. When she died, my childless aunt and uncle brought me to the city. Honestly, I feel bad being given away just because of economic reasons. Sometimes, when I eat good food and enjoy the luxuries of life in the city, I could not help but think of my younger brothers and sisters. Are they eating three square meals a day? Are they properly clothed? In summer or during holidays, my aunt and uncle sometimes allow me to go home and spend a vacation with my real family. However, I always have this strange feeling at home. I felt the tension of wanting to be close to my mama and papa but could not feel the closeness that I wanted. I also noticed their effort to get closer to me but I could not understand why I am aloof. One time I saw my parents crying because of my attitude. How I wish I could be close to them but I couldn't. I don't know why. It seems like there is a gap. Despite the economic abundance that my adopted family has showered upon me, I also experience the same feeling of not being very close to them. I know they love me but I could not feel the warmth that I want. Our home is very quiet. We eat together, watch TV, and then sleep. On weekends, I attend our small grocery store because my aunt plays mahjong. Despite what I have gone through, I am still thankful for the many blessings I receive in life. My experience has also taught me to be strong and independent at an early age.

I am Chennie. I come from a big family of eight siblings, four boys and four girls. My father is a farmer and my mother, a housewife. As the eldest, I must

finish my education so that I can help my parents in sending my younger siblings to school. I receive government aid to support my college education. It is something like study-now-and pay-later. I stay in a boarding house, which is quite noisy. I always look forward to going home every weekend. The community where I grew up is very peaceful. The people are very helpful. For example, when somebody dies in the community, the barangay officials move around and collect money to help the grieving family. In our barangay, a typical family is about five or six children. However, we have a peaceful community. When I go home, I notice that people are already in bed at about six or seven in the evening. The lights are already out in our neighbors' houses. Sometimes, I watch TV at night because the stillness of the evening is sometimes scary. In the city, the houses are very close most especially in the squatter's area. That's not the case in our barangay. Our nearest neighbor is about a hundred meters away from us.

From the sharing of our life stories, we came to understand each other better. For example, Mario realized that, "Each one of us has different experiences, some inspiring while others are touching. Some of my classmates' stories almost made me cry. I have learned that in life, we face some challenges and obstacles. That makes life colorful. Nevertheless, whatever happens, life must go on." From our discussion, we realized that each of us has a strong attachment to our respective families. We were in agreement that our experience of family shapes our perception of community. For example, we learned from Chennie that despite her poor economic situation, she still considers herself lucky because she "has a family to support her."

After listening to each other's stories, Ben said, "We are like brothers and sisters to our classmates." Tomas wrote in his journal, "I enjoyed listening to the stories and experiences of my classmates. We became emotional as we listen with empathy to our classmates' life story. I realized that life is full of pains and joys, failures and success, obstacles and opportunities. I further realized how blessed I am with a family that is always around—whatever, whenever, wherever."

Our Notions of Community

The blackboard where we held classes in WOB was filled with 6 cartolina-size posters. We started the class with an orientation from Marian on the dynamics of the poster presentation. The poster was a group assignment from the previous meeting. Looking at the posters, we could see a collage of pictures and drawings depicting students' collective understanding of community. Six student groups took turns in explaining the poster. Most often, the members of each group stood in front while their leader took the lead in explaining their posters. It was interesting to note that two of the lead presenters were members of our research team. We were amazed about how we diverged and converged in our understanding of the term "community" as evidenced in the poster presentation excerpts:

> *"This is how we picture a community. [Rosario, a female leader of the group, pointed to the poster with her right hand.] We have here pictures depicting a rural community. If you notice, we have here a group of people talking, working, and helping each other. People in this picture are busy in the farm. Look, we have here farmers working on the tractors. This one is a fishing village. So you see....the fishermen are catching fish. I like fish. They taste good. Look at the*

urban community. Everybody is busy—buildings over here, jeepneys, etc. On this side, we have a group of people working together in building a house. Have you seen a group of people pooling their resources in constructing a house or a school? We call them contractors. There is a community in them because they share resources in order to make a living. In general, our idea of a community is this: It is composed of a family. A group of families form a community. They share a culture. They help each other in making a living and in maintaining peace and order in the community."

"Good afternoon. In this poster, we have different kinds of community. The first community is a coastal village. The second community depicts people engaging in vices such as drinking, gambling, and illegal card games. The third one is a religious community. You see, we symbolize the community with a church. We have a priest in here and his staff. We have here a singing community too. The family is involved in playing the rondalyas. [These are stringed instruments.] We have here the school community. We have also an agricultural community. For us, a community is composed of people interacting together and sharing the same environment. For example, in the coastal area they share common resources from the sea. Even in the gambling area, people share vices too. In a religious community, people attend the church and participate in a Flores de Mayo. Of course, the students and the teachers comprise a community in school."

"In this picture we show different faces of people coming from different walks of life. For us, a community consists of a group of people occupying a certain territory, a certain area where they can interact. Most often, they share

common beliefs, values, or traditions. Sometimes they have the same means of livelihood. For instance, in the coastal area, the common livelihood of the people is fishing or salt making. We also agree that not all people in the community are the same. There are also some variations. For example, we have a picture of a poor family in here. In a community, there are those who belong to the upper, middle, and lower economic status. Other institutions may also exist in the community. For example, we have here the church, the family, the factory, etc. People in the community need to work in order to live. This is very important to us. In here, we pasted a picture of money to show the importance of capital for the community's improvement. I read in the internet that a community cannot exist without a capital and so we thought that money is a good representation for that. We also pasted in here different places in the community that we consider as tourist attractions. We have here falls, mountains, rivers, etc."

"Good afternoon. Can you see the different pictures in here? What if we flip this poster? You will see nothing but a sheet of cartolina. Our view of community is somewhat different from others. We often view the community as something composed of different people with different beliefs, trades, occupations, livelihood, etc. We also often represent a community with different classes—poor, rich, middle. However, our idea of community is not limited to this local representation. We view the world as one big community, one without a territory, without boundaries, where everyone exists in harmony and cooperation. So you might ask, how could our idealized community exist? As long as there is

cooperation and love between and among people, a community exists. So, where is the community? You are a community...We are the community."

"No man is an island but wait.... The man in an island belongs to a community of islands. Whoever you are—robber, prostitute, gay, ugly, pretty—you are still part of a community. It's alright if you belong to the tribe of Badjao [sea faring indigenous groups] or Igorots [tribal group in the mountains of Luzon]. You are still part of a community. Even the gossipers in Divisoria [a famous open field public market in the Philippines] are part of a community. Sad to say, not all communities are good. A community may also have bad elements. There are vices, oppression, and injustices in the community. Not everybody is equal. In fact there are some who are left out. A community also experiences some tragedies and trials. I remember a high school classmate raped by a member of our community. But life in the community must go on despite the trials. Through trials and difficulties, one can appreciate the meaning of life. One has to go through the trials first before he/she can appreciate how happy and lucky he/she is....I believe that a man can live without a community but a community cannot exist without people. A person can live with the basics—food, clothing, and shelter. However, we need a community to experience the fullness and meaning in life."

"Good afternoon. A community is composed of families. A community is a social organization because people in it share some activities, facilities, and natural resources. In this poster, we have a clinic. We have here the barangay health workers (BHW) who do their part in maintaining the well-being of the

people in the community. We also show here a carabao festival where people enjoy social gatherings. We also have a Pagoda festival in here and serenade in the sea. All of these social and cultural activities attract tourists and bind the people together. The natural resources of the community—the beauty spots—can generate income for the community."

"We put the family at the center of the community. A community is made up of a formal group such as the family. But there are also informal groupings in the community such as barkadas [cliques]. In our poster, we have pictures of a community in a fishing village and a community in the mountain. So you see, they have different kinds of houses. A community is also visited by calamities. We have here a typhoon-ravaged village. A community is a place. It has a leader who helps manage and organize the community."

From the poster presentations, we learned that some different perceptions of community such as a place is closely associated with a territory, where one lives or grows up; a group of people such as family, co-workers, or friends; a culture composed of collective shared beliefs, traditions, or ways of living; a process, one that focuses on a collaborative undertaking that binds relationships together. From the poster presentations, we encountered two contrasting attributions of a community—one focusing on shared undertakings, values, and beliefs and another centering on differences among community members living in a territory. We also realized that we have contrasting perceptions of urban and rural communities—the crowdedness of the city and the rustic, spacious ambiance of rural farms. We learned that we have prior knowledge about the

difference between formal groups such as family and church and informal groups such as cliques and friends.

Exploring Our Initial Understanding of Community Immersion

The stillness of the conference room was broken by clicking sounds coming from the loading and unloading of our tape recorder. In a short while, we listened to the audio of the interviews we conducted with students and faculty members who had a prior community immersion experience. These audio recordings served as springboards of focus group discussions centering on our collective beliefs regarding the purposes, values, and goals of community.

Community immersion was not strange to all of us. Vicente used to teach the course for three years before he left the university for his further education in the United States. Marian had two years of research and teaching experience, particularly in the supervision of a cohort of students during their community stay. At the outset, the student members of the research team were also aware of the community immersion course. Their excitement about the course was fueled by stories they had heard from fourth year students who had prior community immersion experience.

To further inform ourselves about the nature, scope, and purpose of community immersion, we conducted a series of interviews with previous community immersion participants. Each one of us was encouraged to interview at least one faculty and one student who had previously experienced community immersion. In our interviews, we focused on the students' and faculty members' understanding of the nature and scope of community immersion; their notion and experience of community immersion; their beliefs about the purposes, values, and goals of community immersion; and the lessons they

learned through community immersion. Our team was able to interview 9 faculty members and 7 students. We were able to generate 178 pages of interview transcripts. Findings from these interviews were presented to members of the research team. The narratives below represent Ben's learning experience after interviewing a faculty member of the college.

> *I am Ben and I interviewed Dr. Manuel Ledesma for his experience of community immersion. He is a teacher of social studies and foundations of education subjects in the college. He has been a teacher for 36 years. In addition, he is also a talented musician and local newspaper writer. He used to work as an ethno-musical researcher. He documented and arranged the indigenous songs of hinterland people in the island. His teaching and supervision experience of community immersion spans for five years. He supervised over 200 college students for their community immersion in over ten barangays and two municipalities in the province.*
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> *Dr. Ledesma defined community as a group of people living together in a particular area. These people, he said, may share common values, beliefs, or sources of living. A community may also refer to a place where one grows up and feels the sense of attachment and belongingness. He believes that community immersion is an important course for college students who want to become teachers. It serves as training for students to actively participate in community life. Through community immersion, students may learn to adjust to different situations, places, and people of all walks of life.*

From my interview, I learned Dr. Ledesma's beliefs about community immersion. For him, community immersion is an avenue for prospective teachers to understand the community where their students live—their families, living conditions, etc. "Prospective teachers," he said, "must understand that students have life of their own outside the school. Whether we like it or not, their family and community influences the way they learn and behave in school." Dr. Ledesma contended, "The experience of community immersion provides prospective teachers the opportunity to gain insights about schooling, community life, and family relationships. These insights are most often learned through experience and not so much in listening to lectures or reading books in the university."

From my interview I also learned the value of community immersion in science teacher education. For example, Dr. Ledesma believed that the community is a rich source of scientific information and materials that could be utilized for teaching. "Science concepts" he said, "are most often grounded in practical life such as local health and sanitation practices, traditional cooking and food preservation techniques, exploration and use of water resources, and so forth." For example, Dr. Ledesma mentioned a cohort of prospective elementary teachers in his class who collected and identified the uses—from leaves to roots—of indigenous medicinal plant varieties found in the community. "Through community immersion, prospective science teachers are encouraged to use locally available materials in science instruction." He cited the case of Dr. Jose Rizal [a Filipino national hero] who used the local and natural resources in Dapitan, his place of exile, to teach students in the village about science, math, and sports.

"Community immersion is also an opportunity for students to experience the generosity of the people in the barangay." Dr. Ledesma recalled many cases of generosity that barangay people extended to his students. In one community immersion site for example, the students stayed in a crowded barangay hall. A well-to-do family of the community offered their house as a place for students to live. In other words, they became a host family to a cohort of 12 to 15 students. The owner of the house further gave students fish everyday. These fish came from their family-owned troll and fishing boats. From that gesture, the students were able to save a lot of money for their food. In addition, there were also cases when students wake up in the morning with a bunch of bananas on their doorsteps. Some village people also gave them basketfuls of freshly harvested sweet potatoes. "So you see," Dr. Ledesma quipped, "those acts of kindness meant a lot to students. They felt accepted and appreciated in the community."

It is very important to build a good relationship among teachers, barangay officials, and village people. About three weeks before the community stay, Dr. Ledesma said that he and his students visited their host barangay and negotiated with officials for their community immersion activities. Students usually present their action plans for approval. "In the past, my students were involved in volunteer teaching in schools, in the cleaning and beautification of the barangay plaza, in putting up flower and vegetable gardens, and in raising money for the barangay through Christmas caroling. During the course of their community stay, my students interviewed village people and collected data and artifacts for their portfolios and exhibits. I taught students to be courteous and

respectful to the village people. I told them to be courteous in entering a house. Students must listen to the elders before they talk. They should not forget the courteous expressions such as "thank you." Community immersion is basically a practice in dealing with people from all walks of life in the barangay.

The core values of community immersion, according to Dr. Ledesma, are cooperation, team spirit, humility, gregariousness, and temperance. Through community immersion, students, he said, are taught to stoop down at the level of the lowest member of the community. They are also taught to be become persuasive yet respectful in negotiating their needs with the barangay officials. "The practice of community immersion," he said, "capitalizes on the accommodating nature of Filipinos. People in the barangay will treat you as visitors and will not hesitate to extend their help when you ask them.'

From Ben's interview with Dr. Ledesma, we learned the preparations to be made prior to community immersion. We also learned from Dr. Ledesma his beliefs about the purposes, values, and goals of community immersion. In particular, we learned about the connection between science education and community immersion—he suggested the use of local resources and practices in the teaching of science. He advised us on proper decorum during the actual community stay and informed us of the benefits that we might get through the experience.

In addition to the faculty members, we also interviewed several fourth year students regarding their experience of community immersion. As an illustrative case, we examined the community immersion experience of Marissa, a senior student in special

education, who readily shared her community immersion story. Marissa's story was drawn from an interview conducted by Ynes, a member of the research team.

I am Marissa Cuenca. I am twenty years old and a special education major. I am currently on student teaching handling Grades IV, V, and VI. I temporarily live very close to the university, at the back of that stadium. I originally came from a different province, about four hours drive from here. I took the community immersion course last year. We were assigned in Barangay Bukidnon in the northern town of the province. As the name of the place implied, Bukidnon was mountainous and far from the national road.

We experienced several difficulties during our community immersion. First of all, the Barangay Captain lived far from the community hall, thus, we had difficulty in coordinating our daily activities with him. Second, we faced the problem of water shortage in the barangay. The deep communal well where we fetched water was very far from the place where we stayed. We used the karosa, a carabao-drawn cart, to bring water to our quarters. We were glad our host family provided us an assistant to help in the fetching of water.

We usually started fetching water very early in the morning. We set our alarm clock to remind us when to wake up. Then our assistant got the carabao from the turil, [something like a barn]. The karosa was then attached to the carabao using the yoke placed on its shoulder. Then we got our large plastic containers and slid them into the cart. You know, what was funny? We also rode at the back of the karosa; it was my first time. The distance was very far and sometimes we're tired of walking. We went up and down the hill and crossed a

rice field in order to reach the well. After we filled the containers, we returned back to our quarters. We fetched water several times because we used a lot of water in cooking, washing dishes, taking a bath, and cleaning our clothes. Oh my, it was really difficult. But I enjoyed the experience.

The people in the community were very hospitable. There was a barangay kagawad, member of the barangay governing council, who was very kind to us. Every time she went down to the town, she always asked us if there was anything that we would like her to buy for us. There were some things we forgot when we went up the barangay and so Manang bought them for us. Sometimes she also brought us to her house. She cooked for us tinolang manok, [a chicken- vegetable dish]. She also toured us around, up in the higher altitude of the barangay. She also gave us young coconuts which we made into a punch.

For me, community immersion is an opportunity for us students to mingle with the people in the barangay most especially in unfamiliar places such as Bukidnon. It was a training for us on how to adjust with different kinds of people, not only with the villagers but also with our classmates. It was also an opportunity for us to do service. We conducted seminars on parenting and beautification activities in the barangay plaza. We organized day care classes. At first, the barangay had no functional day care center. After we left, the day care center really looked like a day care center. We painted it and decorated the room with the visuals we made. We taught pre-school children and prepared for them. I think we contributed something to the barangay. That's why, before we left, the

barangay officials gathered together and expressed their appreciation. They also expressed willingness to host again next year's community stay..

I learned so many things from the community immersion course. First of all, it was a training for us in planning and managing our little resources. Prior to our community stay, we needed to visit the place so that we can organize our schedules. Also, it was our first time to make a week's budget for a group of 11 students. We planned every thing we needed to bring, most especially our food, because the town was very far and we cannot go back anymore for marketing. We really sat down and planned our menu. It took a lot of time in negotiating the menu because we had varied food preferences. We ate together, and so, the food must be acceptable for all of us. At first, there were some of us who did not like the menu. Eventually we made some accommodations after talking it out.

After we finalized our plans—food, transportation, community activities, budget etc.—we presented them to our adviser. Then, we secured consent from our parents and a medical certificate from a doctor. You know, you cannot just go there without a doctor's approval. Remember the walk was long. If you have asthma or whatever, God forbid, how could you manage to carry firewood on your shoulder up the mountain? We presented all the necessary documentation to the Office of Student Services, which officially approved our request to stay in Barangay Bukidnon.

We were always busy during our community stay. We had little sleep, about three hours a day, because we have so many things to do. Upon arrival, we immediately cleaned and decorated the day care center and the barangay hall.

We spent like 200 pesos for our project in the community to buy paint and all that we needed in teaching the pre-school children. We held class everyday. At night, we practiced what to teach, mostly story telling. In addition, we fed the children who came into our class.

The parents really liked what we did. As you may know, the nearest elementary school was far from our immersion site. It was on the other side of the mountain. Because of this problem, we catered to the educational needs of pre-school children who cannot afford the long walk. We did that for seven days. We were so busy. We slept at about two or three in the morning to prepare for the things we needed for the day. Then we fetched water before dawn and cooked our food and the children's food. It was really a labor of love. We were glad there were tanods— residents volunteering as patrols— and some community people who help us in our activities.

After our community immersion, I brought so many experiences that I cannot forget until now. I realized the importance of conserving water; not everybody has an abundant supply of water. I could not forget all the difficulties that we went through in fetching the water. Also, I realized that teaching was not an easy job. Every day we struggled on how to present our lessons. Our students had no prior experience of schooling. That's why we did our best to give them the positive experience. And then, we had another problem, a language barrier so to speak. Our accent was different from our students. Sometimes, we had problems in understanding each other.

I also realized the big difference between life in the rural area and in the city. Here, the houses are very close. The houses in Bukidnon were far apart. In our immersion we had only one close neighbor, still far in terms of the city's standard. Our next closest neighbors were far down the mountain. To live there, one must be very industrious. Just imagine the effort we exerted just to get water. I observed our host family. They woke up early in the morning and worked in their farm.

I think the goal of community immersion is for us to experience life in remote areas. Through community immersion, we experienced the kind of life people in the mountains live. We witnessed and shared their kind of life—their problems, struggles, and simple joys.

We also realized the value of education that we sometimes take for granted. For example, elementary school students in Bukidnon had to walk a long distance every school day just to get an education. You could really see how serious they were in getting an education. We also realized that community immersion was an opportunity for us to contribute to the development of the barangay. Through our service learning projects, we believed we contributed something in enriching the lives of the people in Bukidnon.

The community immersion was also an opportunity for us to learn science. In Bukidnon, every house had a herbal garden. That might be due to the absence of a doctor in the community and the distance that they needed to travel to see one. The condition probably forced them to prepare for ordinary ailments, something that could be treated by herbal plants. In addition, the village people were experts

in plant propagation. We learned from them the technique of marcoting and grafting to propagate plants and trees. I was surprised to see a grafted Indian mango. It was something like a different plant grows on another stem. It was amazing. There was so much science in it.

From our interviews and focus group discussions, we shared stories focusing on the community immersion experience of students and faculty members. These stories helped us prepare for the actual community stay. For example, Marrisa's story was very informative. She helped us prepare for the worst eventualities that might confront us in our immersion site.

Our Preparation and Learning Before the Community Stay

We had about seven weeks to prepare prior to the actual community stay. For our community immersion class, we met two times a week, an hour and a half for each session. Most often, before the class started, members of our research team attended research meetings and/or focus group discussions. In our focus group discussions, we participated in planning our research activities, shared our notions and experience of community, explored our beliefs about the purposes and values of community immersion based on our interviews, discussed our research plans and challenges, brainstormed solutions to our problems; and shared learning insights all throughout the collaborative process.

Two weeks before we took our Christmas break, we were busy preparing for our community stay, which was scheduled to take place right after the holidays. In that two-week span, we needed to cramp our class and research schedules to include activities such as preliminary community visits and community immersion student seminar.

Preliminary Community Visits

Except for a few students who live in adjacent towns and barangays, all of us community immersion participants—41students and two faculty members—were complete strangers in Barangay Baybay, our immersion site. Our link to Baybay was Manang Susing, Marian's friend and a spiritual adviser to the municipal mayor. Both Marian and Manang Susing live in an adjacent town and are active members of their parish council.

Through Manang Susing's help, Marian was able to connect with the town mayor and sought permission to conduct community immersion in Baybay. Without much ado, the lady mayor introduced Marian to the town's administrative officer, Tatay Juan, who previously served as a barangay captain in Baybay. After further arrangements, Marian met the incumbent Barangay Captain Rodolfo Tanaleon who expressed willingness to host students for their community stay in Baybay.

For our first visit, we assembled in the university and went in mass to the paradahan, a jeepney terminal, to get our ride for Baybay. We split into groups because the jeepney could not accommodate all of us. The road to Baybay was asphalted. Along the way, we saw houses close to each other and then slowly they became more distant as we came neared the barangay. The entrance to Baybay was marked with a big sign "Welcome to Baybay" embossed on a cemented marker. As we entered the road leading to Baybay, we saw on our left vast rice fields and hills sparsely planted with mango trees. On our left were swamps, the beach, and yonder the blue sea.

Upon arrival, the barangay people looked at us with surprise. Probably, it was their first time to see a crowd of college students storming into their barangay. We were

ushered into the Barangay Hall, which became crowded because of our presence. Manang Susing, our contact person, was there too. She then happily introduced us to Barangay Captain Rodolfo Tanaleon. Tatay Rodolfo in turn introduced us to his barangay officials. They took turns in orienting us to Baybay. We also communicated the purpose of our stay. The barangay officials expressed support for our plans.

After gathering important information about the barangay, we moved around the coastal area where most of the houses were located. Manang Jesusa and Manang Rowena, two lady Kagawads of the barangay, served as our tour guides. They introduced us to the host families and brought us to their barangay livelihood project, a garment shop, operated mostly by unemployed housewives in the community. Along the way, we meet a lot of people. Many of them were very accommodating while others looked at us with suspicion.

A week after the first visit, our research team came back to Baybay with more focused intentions. After our focus group and brainstorming sessions on different service learning paradigms, our second visit centered on identifying the social justice issues in the community. We first approached Barangay Captain Rodolfo Tanaleon who readily agreed to participate in the interview.

Tatay Rodolfo is not a native of the Baybay. He grew up in a different town in the province. He finished a degree in chemical engineering and worked in a soda bottling company for about seven years in the capital city. Then, he was re-assigned to his home province and opted to live in Baybay, his wife's birthplace. After his retirement, he was elected in 2002 as the Punong Barangay of Baybay.

From our interview, we learned that Tatay Rodolfo had facilitated a lot of improvements in Baybay—a claim corroborated from interviews we conducted with residents of the barangay. He showed us records of his community development projects. During his term, he implemented development projects amounting to two million pesos. For example, he facilitated the transfer of ownership—from the national government to the local barangay—of the abandoned, old, nonfunctional national road. Dubbed as Sitio Sinikway, the area served as a relocation and resettlement site for the displaced 52 squatter families in the coastal area. From nongovernmental organizations, he also secured funding for the construction of low cost housing for indigent families. In addition, he facilitated the construction of the community water tank, with pipes bringing water into the homes of the barangay people. Through his leadership, he institutionalized a functional garbage disposal and management system for the community.

When asked about his idea of social justice in the community, Tatay Rodolfo showed us records of complaints filed in his office—vandalism, slight injury, malicious mischief, oral defamation, public scandal, etc. As a barangay captain, he chaired the lupong tagapamayapa, a council serving as local arbiters of conflicts in the barangay. This council also served as an avenue for residents to express issues on justice and inequity. He further informed us that most of the complaints filed at his office were amicably resolved, thus saving both the complainant and the accused from going through the hassle of waging legal battles in the municipal trial court. As we examined the barangay records, we could not help but admire Tatay Rodolfo's ability in organizing the legal and administrative documents of the barangay. To maintain peace and order in the community, the Tatay Rodolfo also informed us that the barangay had deputized tanods

[local residents serving as patrols] who watch over the village day and night. He assured us that he will provide tanods to keep us safe for our community stay.

Aside from Tatay Rodolfo, we also interviewed two barangay Kagawads, Manang Jesusa and Eduardo. Like Tatay Rodolfo, they shared the ways that they had contributed to the improvement of the barangay. For example, Manang Jesusa said that she chairs the women's group in the community. Through the help of the social welfare office and nongovernment organizations, their women's group, mostly unemployed wives, was able to secure training, equipment, and capital for their garment making and t-shirt printing project in the community. Manang Jesusa said, "This is our way of addressing social inequalities in the barangay by providing gainful employment to jobless housewives."

Our other informant was Eduardo, a Sangguniang Kabataan chairman. As a youth representative, he shared the activities he conducted in the barangay, mostly in summer since many of the youth are in school. Everyone, he said, was busy with their school work durin school days. In fact he mentioned his busy schedule as a nursing student, which sometimes prevented him from carrying out his obligations in the barangay. "In summer, though, we organize community activities such as basketball tournaments and beauty pageants, two of the most often requested youth activities in the barangay."

After our interviews with Manang Jesusa and Eduardo, we explored further the social justice and inequality issues in the community through the eyes of indigent families in the Barangay. We interviewed Manang Rosita and her 24-year old son. They said that "in a community relationship, the poor is not equal with the rich in terms of the food they eat, the clothes they wear, and the houses they live." However, when we asked them

about their personal experience of injustice or inequality in the community, they could not tell us anything. They instead looked at us with suspicion. Instead of answering our questions, Manang Jesusa narrated how pleased she was with the way the barangay is managed. She said that in her more that 40 years in the barangay "no other barangay captain has contributed so much for the improvement of the community except Rodolfo."

After lunch, we proceeded to the hill overlooking Sitio Sinikway, now a resettlement site for squatters displaced in the coastal area.. We sat, in a circular manner, on the grass facing each other. From the distance, we saw two sides of the barangay—the coastal area we had explored earlier and the plateau on the other side where farmers grow their crops. From our vantage point, we could not help but see the glaring difference between houses of well-to-do families along the national road and the poor families in the resettlement area. Against these backdrops, we began our focus group discussion.

Our focus group discussion centered around our learning experiences, most especially focused on the social justice and inequality issues that we found in the community. As a group, we agreed that social inequalities are inevitable in society and that our evidence in Baybay was based only on glaring differences in physical structures such as houses. Other than those, we were in a quandary as to specific social inequality issues in the community. In our second visit, we felt like it was too early for us to explore the topic fully. In fact, we sensed an awkward feeling, both in us and our informants, every time we asked questions related to social inequality and injustice. It seemed like it was a taboo to ask questions related to such a topic.

Based on our experience, it was difficult to get any substantial information from our informants regarding their notion and experience of social inequity and injustice in the barangay. Instead of focusing on social justice issues, our focus group discussion turned into an "ode of praise" to the barangay officials. Many of the research team members expressed admiration and amazement at the kind of development that was taking place in Baybay. Tomas and Mario, for example, expressed their high regard for the barangay officials, particularly Tatay Rodolfo, for all the efforts he exerted in making Baybay progressive. Trixie could not help but compare how good Baybay was in relation to her barangay in the city. Leslie, Candy, and Chennie said that they found no evidences of social inequalities in the community. They said that everything seemed good.

Among the student participants of our team, Ben was the only one with a dissenting opinion. On our way to the city, Ben reminded us that our perception was blinded by the "good side" of the barangay because we interviewed the barangay officials first. He said that the barangay officials will always talk good about themselves. He said that he did not feel free to speak his mind during the focus group discussion because of the presence of Eduardo, the SK chairman who served as our tour guide. He also insinuated that Manang Rosita and his son might also have felt constrained to discuss social justice issues because of the presence of Eduardo.

Back to our focus group discussion on the hill of Baybay, we generated some possible ideas for service learning projects for our community stay. Since our first visit, we were always impressed with the historical landmarks found in the barangay. For example, during our focus group discussion, about 50 feet away from us, we saw ruins of an old bantayan. Made of brick, stone, and cement, the bantayan, according to a village

elder, served as a lookout for the raiding pirates during the pre-Spanish era. Also, in our interview with Tatay Rodolfo, he pointed out a structure across from the barangay hall, a commemorative landmark of the first ambush in the region against Japanese imperial forces in World War II.

In our focus group discussion, we toyed with the idea of putting up a mini-museum for our service learning project. We brainstormed how we might tie together the community-based mini-museum and our community immersion activities in Baybay. Trixie, for example, believed that through the museum, the barangay people might help crystallize their development experience vis-à-vis their group identity. Tomas, citing the preliminary historical information that we collected from the village people, expressed agreement to the proposed service learning project, as he saw the need to document "what is left behind for the future generation." Vicente also shared the possibility of linking social justice issues with the proposed project by citing his experience of visiting museums for historically marginalized groups in the United States such as the Museum of the Cherokee Indians in North Carolina and the Civil Rights Institute in Birmingham, Alabama. These two museums, he said, strongly depicted the marginalization experience of Americans Indians and African Americans, respectively, in the United States.

Community Immersion Student Seminar

It was Friday. We gathered for the community immersion seminar-workshop. The seminar-workshop was intended to provide in-depth and intensive background information and practical training for community immersion participants on important topics ranging from action planning to portfolio making. The room was full with 41

physics and chemistry majors who served as student participants. Marian and Vicente were resource persons and workshop facilitators.

The community immersion seminar-workshop included a variety of topics such as action planning, ethnographic interviewing, participant observation, journal writing, collecting and documenting of artifacts, and portfolio making. For action planning, Vicente first introduced the research team's plan of putting up a community-based mini-museum as a service leaning project in Baybay. He discussed the three service learning paradigms—social justice, communitarian, and project-based—and how they might relate to our plan of putting up a community-based mini-museum. After listening to opinions and reactions from students, Vicente proceeded to lead a brainstorming session on how to best implement the project.

The brainstorming session generated four important themes for museum project displays focusing on (a) marginalization experience of underprivileged groups in Baybay; (b) arts, crafts, and livelihood; (c) history and historical landmarks, and (d) cultural practices relevant to science teaching and learning. Since our class was divided into four clusters with one group comprising the research team, we negotiated as to our theme assignments for the museum. Our research team was assigned to depict the cultural practices relevant to science teaching and learning.

After we finalized the group assignments, Vicente proceeded with his presentation on the process of developing an action plan. He introduced a matrix, which would serve as a template for our action plans. The template was made up of columns with the following headings: date, time, objectives, activity, persons involved, and materials needed. The rows in the template corresponded to the number of days in a week of

community stay. After discussing the template, we broke into groups to brainstorm our action plans. Vicente reminded the group that the action plans should revolve around the assigned theme for our community-based museum project. An improved version of the action plan is found in Appendix A.

After our action plan presentations, Marian discussed tips on how to conduct an ethnographic interview. From Marian's session, we learned the proper decorum in conducting an interview, how to approach participants for an interview, and the "dos" and "don'ts" in qualitative interviewing. Two members of the research team, Ben and Trixie, presented a role play depicting proper ways of asking interview questions; afterwards, the class critiqued the role play. Vicente showed samples of his interview transcripts and discussed how to transcribe interview data.

In addition to learning how to conduct a qualitative interview, Vicente discussed some tips in writing qualitative observations. He also discussed the importance of a journal notebook in a community immersion course. He further introduced the time-activity log, an observation technique that allows one to record every kernel of an event in an observation site. He also taught the class how to transform the information in the time and activity log into descriptive writing for journals.

As a finale for the seminar-workshop, Marian and Vicente discussed the basics in portfolio making. They also demonstrated how to collect and document artifacts for portfolio and museum displays. We brainstormed possible objectives for the portfolios and presented them to the class for critique.

The seminar-workshop ended at about 4:00 p.m. but we, members of the research team, stayed behind for a focus group discussion. Again, we shared what we learned

from the day's activities. Before we left, we also organized our five-day schedule of household chores and the group menu for the community stay. The products of these planning sessions are presented in Appendix B and C.

Book II

Baybay, Here We Come

The room was dark. Except for a lighted candle at the middle of the room, all of the lights were out. At Ben's cue, all of us sat around the candle. Ben picked up the candle and began to speak. He invited his classmates to open up their grudges against him, narrated the misunderstandings that made him felt bad towards his classmates, and at the same time apologized for his shortcomings. After Ben, everyone took turns in holding the candle while the rest of the members of the research team spoke their thoughts, both positive and negative.

That was our first night in Baybay. The open forum was a twist in our plans. Sensing the tension in relationships, Ben initiated the open forum to clear out the emotional baggage we carried with us in Baybay brought about by school and research related tasks.

Unaware of what was taking place, Vicente was surprised, as revealed in the open forum, to learn the strains in relationships among members of his research team. All along, he had assumed that everything was alright. Mindful of the action plan for the day, Vicente was thinking that the night was supposed to end with a focus group discussion centering on learning experiences in the first day of community stay and the next day's plan of action. "What is wrong? What is happening with my students? Is there anything that I did not know?" Vicente asked himself.

The first day in Baybay was quite awkward. It was January 2. Still nursing a holiday's hangover, everybody, it seemed, was not yet ready to go to school or proceed to Baybay for a community immersion. When we arrived in school for the assembly, two members of our research team did not make it for the scheduled departure time. Tired of waiting, we decided to leave the latecomers and proceeded to the immersion site through a rented jeepney— fully stuffed with all the things needed for the week's stay.

When we arrived in Baybay, we proceeded directly to the barangay hall where we conducted our opening program. The barangay officials and some village people were present. The hall became more crowded when we arrived. Upon arrival, we immediately started our opening program. It was short and quick. The program began with welcome remarks from the barangay captain who then introduced his barangay officials and important contact persons in the village. The leader of each student group—four groups in all to include the research team—also took turns in introducing their members. After the opening program, we proceeded to our respective quarters / host families.

We were ready to proceed to our quarters when Tatay Rodolfo informed us that we would be billeted in the Day Care Center instead of the health center as previously agreed. We were surprised because we originally thought—based on the drawing of lots in our first visit—that the Barangay Clinic would serve as our quarters. Tatay Rodolfo also reminded us to clean up everyday and secure our stuff in one corner of the room because there was an ongoing daily morning class for preschool kids in that building. A little bit disappointed and with heavy heart, we settled into the day care center and started cleaning the studio-type building. That experience taught us to become flexible—to be ready for whatever eventualities that might take place in Baybay.

It was close to sunset when we finished cleaning up and setting up our things. Some of us decided to move around the beach area. On our way to the shore, we saw bamboo and nipa houses, all located close to each other. A high cemented wall separated the nipa and bamboo huts from big, tall houses in an adjacent subdivision. We also noticed that the shore was busy in the late afternoon. We were told that the fishermen usually leaved before sunset and returned back at dawn the following day.

We saw fishermen loading their nets into the boats. A man caught our attention. He was carrying an earthen pot with smoke coming out of its mouth. We came closer to investigate. We asked questions. We found that he was performing tu-ob, a ritual of passing smoke into fishing materials to ensure a bountiful catch. The guy told us that the smoke comes from the burning charcoal, coconut husks, red sugar, tanglad [lemon grass], and incense inside the earthen pot. We wanted to asked more questions but we sensed that the man was somewhat aloof and uncomfortable. After strolling along the beach, we proceeded back to our quarter for dinner.

Our first dinner was like a feast. We feasted on our holidays leftovers. Each one of us brought something to share with the rest of the members of the research team .Some students from other groups came into our quarter to partake of the extra food. We had so much fun during the dinner.

After the dinner, Ben turned off all the lights. He lit his candle and placed it in the center of the room. He suggested an open forum. In the open forum, we talked about relationship issues. One of the team members shared how hurt she was when another member of the group dropped her out of a thesis partnership. Another student mentioned that he felt slighted when some members of the research team failed to do their pre-

immersion tasks and assignments. In the open forum, everyone said something to his or her classmates, both positive and negative. Vicente was not even spared during the open forum as his students expressed the pressures they felt brought about by academic and research activities and requirements. The open forum went well as everyone promised to forgive each other's shortcoming, forget hurts, and learn from one's mistakes.

After the open forum, we continued our discussion, focusing on preparation for the community stay and the lessons we learned from the day's experiences. According to Trixie, "Before we go to a new place like this, we should be organized, mindful of things that we need to bring and of activities that we are going to do. For example, we need to prepare our streamers, stick to our agreed schedules, and pay on time our contribution for the group's fund. We should do what was assigned to us because a failure of one will affect the entire group. We don't want to blame anybody here. From our open forum, I realized that we are all different here. We looked and reacted at things differently. That's why it is important to talk things out to avoid misunderstanding."

Learning from the Cultural Practices: Narratives from Baybay

Our days in Baybay were full and tiresome. We started our second day with an ethnographic observation of life on the shore of the village. From our previous day's observation, we learned that the late afternoon and early morning were the busiest time on the shore. This was the time when fishermen left and returned from their day's work. The early morning observation in Baybay also served as a spring board for identifying prospective informants for cultural practices relevant to science teaching.

Armed with tape recorders, pencils, and journal notebooks, we proceeded to the shore before dawn. It was still dark when we arrived but we could see the silhouette of

busy people. We sat down—some on driftwood, others on the sand—on different areas of the shore, all silent. The silence engulfed our senses, making us more sensitive to the sound of the water, movement on the beach, the fishy smell of the air, and the cold touch of early morning breeze. With all senses open, we recorded everything we saw, heard, smell, touched, and sometimes tasted. We also recorded our feelings, hunches, and interpretations of our observations. We became silent recorders and interpreters of community life in the coastal area.

After the breakfast, we conducted a community mapping. Instead of using a map, we made use of people to accompany us in mapping the place. The community mapping, we believed, was more than the physical—geography, land area, number of households, community landmarks, etc. Instead, we understood the community better through and with the people. From our activity, we came across different people from all walks of life. We interacted with them, participated, even for a short while, in their activities. We met people with good and bad attitudes. We also came to realize that the essence of community mapping was not just moving around Baybay. In the process of mapping, we related the physical characteristics with cultural, social, economic, religious, environmental, and other realities in the community.

The community mapping provided a gateway for all of us to explore further the cultural practices of the barangay people. The days that followed were devoted to the exploration of these different cultural practices relevant to science teaching. Little by little, we picked one cultural practice after another until we were saturated with so many topics to explore. Our tasked directly brought us to actual village practitioners—rice farmers, fishermen, shrimpers, tuba gatherers, mongo planters, albularyos [village

shamans], manoghilot [therapeutic massagers], manogginamos [ginamos makers], etc. These village people served as informants for our cultural memory banking.

We brought what we learned from the village people to the group for discussion and reflection. Through our focus group discussions, we were able to identify the different cultural practices we found relevant to science teaching and learning. At first, we tried to identify as many cultural practices as we could throughout the community. However, we came to a point where we needed to focus on specific cultural practices around which to conduct cultural memory banking. After identifying specific topics for memory banking, we broke into pairs for in-depth interviews with the village people. Since the barangay people were a close-knitted community, in many cases, they referred us to our next informants. Appendix D shows the student-pairs and their corresponding interview assignments for the generation of community funds of knowledge.

Night after night, we routinely gathered for focus group discussions. With tape recorders at the center, we sat together and shared our stories. The tape recorded voice messages provided a permanent record of our experiences—actions, thoughts, feelings, interpretations, etc. What did we do for the day? What cultural practice did we explore? How did we describe the cultural practice? Who served as our informants? What did we learn from the experience? How might we relate the cultural practice to science teaching and learning? The following vignettes are representative stories of our community immersion experience focusing on the different cultural practices we learned about in Baybay.

Narrative 1: Mario's Fisherman Story

After our qualitative observation on the shore, Tomas, Vicente, and I went to the house of Lolo Tasyo, a village elder and fishing expert in Baybay. From our interview, I learned so many ideas and techniques on fishing. For example, I learned the different terminologies such as pamukot, panahid and palupad.

According to Lolo Tasyo, he started fishing at the age of 10. He told us that he mastered all the traditional techniques in catching fish—name it and he can tell about it. The pamukot, he said, is a fishing technique using the net with "big eyes." This could be done near the shore or far from the shore—usually in a paddled boat. Lolo Tasyo considered pamukot as an environmentally friendly fishing technique because it only catches big fish.

The panahid, on the other hand, uses finer nets. Fishermen ride in a small paddled boat and throw the net on the water near the shore. Washers are attached to the bottom part of the net, about one foot apart. This makes the bottom part of the net sink on the mud, thus, preventing the fish from coming out. The fishermen paddle the boat from one edge of the shore to another, the net forming a half-moon shape. They then stand at the edge of the shore and slowly pull the net towards them until both sides of the net come closer; its entire content is unloaded onto the shore. According to Lolo Tasyo, "The use of panahid is sometimes abused because some fishermen use very fine nets." He further said that the use of fine nets is illegal because it also catches small fingerlings.

In addition to pamukot and panahid, I learned from Lolo Tasyo another fishing technique called palupad. This technique utilizes the force of nature—the

high tide and low to bring fish and shrimps into the net. In palupad, the net is attached to two coconut posts planted off shore under the water. The palupad is harvested twice, right after the water level rises up and ebbs down. Like panahid, the use of palupad is also susceptible to abuse because most often, fishermen use very fine nets.

We also interviewed Lola Maria, Lolo Tasyo's wife who told us different techniques in fish and shrimp preservation. She taught us how to make binulad, binudo, tinabal, and ginamos. In binulad, fish are washed in sea water and sun dried. In binudo, fish varieties such as hawol-hawol, tabagak, and aloy are washed in clean water and are stuffed and covered with rock salt. After several days of curing, they are washed, ready for cooking. In tinabal, small fish such as anchovies are sprinkled with salt and cured for several days until the fish juice comes out. In ginamos, the shrimp-salt mixture is pounded into pastelike consistency and cured for about a week.

From our interviews, we learned that there are both traditional and emerging fishing practices in Baybay—some are environmentally friendly; others are not. We found that some practices are open to abuse, most especially on the use of small size of holes for fish nets. In addition, we learned some traditional fish and shrimp preservation techniques in Baybay. These techniques were used to improve the shelf life and they added value to fish and shrimps. We learned that the fish preservation techniques did not require much capital; all the materials needed were available in the community. However, we saw the need to monitor

the fish and shrimp preservation processes as they are susceptible to unclean practices.

Narrative 2: Cherry's Pamulong Kahoy-kahoy

The morning was sunny but windy. Ynes, Ben, and I went to the house of Lola Trinidad, a well-known albularyo [herbal quack doctor] in Baybay. Lola Trinidad lived in a nipa and bamboo hut, a mushroom-shaped structure protruding at the edge of the hill. Her hut is located at the upper left side of the hill, close to the anterior portion of Sitio Sinikway.

We did not find difficulty in locating Lola Trinidad. Everybody in Sinikway knows her. In fact, her neighbor brought us to her house As soon as we reached her hut, I had no doubt that Lola Trinidad uses herbal plants to treat ailments. I saw on her small kitchen table different kinds of leaves—alibhon, kasla, organo, herba buena, pasaw, maritana, etc.

Lola Maria showed us different herbal plants and explained their uses. For example, alibhon, she said, "is used to treat heavy cough. Its bud can be eaten raw or the leaves can be made into tea." Kasla's bark, she said, can be used as a poultice for sprain. Maritana leaves can be used as hampol, something like the leaves are tied around the forehead with a piece of cloth to relieve the patient from very high fever.

Lola Trinidad also showed us a little bottle. We examined it and found that it contained some leaves, stems, and roots of different kinds of plants—all soaked in coconut oil. We asked Lola Trinidad, "What are they for?" She mentioned the term "pamulong kahoy-kahoy" and "panghilot."

As the term implied, pamulong kahoy-kahoy is a healing practice of using herbal plants—roots, leaves, barks, etc.—to treat common ailments. In some cases, these herbal plants are placed inside a bottle filled with lana [coconut oil], which is used to treat wide range of ailments ranging from fever, headache, sprains, skin infections, etc. Most often, pamulong kahoy-kahoy is associated with panghilot, a therapeutic massage. The oil from the herbal bottle is used to rub the patient's body.

I noticed that the practice of pamulong kahoy-kahoy and hilot still existed in Baybay. In spite of the new scientific technologies in medicine, I learned that people in Baybay, most especially the poor ones, did not hesitate to go to the albularyo and asked for help in treating common ailments. They said that herbal plants are free while doctors and medical services are expensive. In urban areas, however, I noticed that only few people utilize pamulong kahoy-kahoy and panghilot. I assumed that these dwindling practices in urban areas are brought about by the busy schedule of the people and the availability of hospitals, doctors, and drugstores to help them cure of their illness.

As to the terminologies I mentioned earlier, pamulong kahoy-kahoy and panghilot refer to the cultural practice of treating common ailments using herbal plants and/or therapeutic massage, respectively. The albularyo or mangbulong is the local shaman who uses herbal plants to treat common ailments. The manoghilot is the person who does the hilot or therapeutic massage to facilitate the natural healing of the body.

Narrative 3: Leslie's Liwit and Barera Story

Chennie and I decided to gather local knowledge about fish in Baybay. We also planned to use these stories to complement our fish collection exhibit for the proposed community-based mini-museum project.

As early as the dawn of the day when we conducted our first qualitative observation on the shore of Baybay, we fixed our focus on the collection of local knowledge associated with fish in the community. One day, we decided to go to the shore to wait for the arriving fishermen. As soon as we arrived on the shore, we saw some boats approaching. We waited until fisherman came out, bringing with them bañeras [large tin containers] full of fish. We ran towards them. Having grown up in a coastal village in a nearby province, some fish looked familiar to me, others, unfamiliar. We scavenged the fish inside the bañera. We were surprised. We saw liwit [Chirocentrus dorab] and barera [Chirocentrus dorab] as the most dominant fish in the bañera. Why?

I asked Manong, Lito, our fisherman informant, "Manong, maayong aga. Mangkot kami tani Nong kung ano na ang pagkilala n'yo sang barera?" [Good morning, Sir. We would like to ask what do you know about barera?]. A fisherman replied, "Ah ang barera, damo bukog, daw silver ang itsura, daw pareho ka dang lata nga da ho!" (Ah, the barera , it has lots of fish bones. Its color is silver, similar to that can over there.)

Based on our interview with Manong Lito and Lolo Tasyo, we learned that barera typically measures between 2 to 3 feet long. Its width ranges from about 1 to 3 inches. Its body is elongated, covered with very small scales. Its upper mouth

has two pointed teeth. According to Manong Lito, barera is a seasonal kind of fish. It is very common between January and May. However, it is most abundant in March.

From our interviews with Manong Lito and Lolo Tasyo, we learned that bareras often stay at a distance from the shore, about 40-90 meters depth above the sea bed. When young, they stay in groups. They are territorial as they occupy a specific place in the ocean, most often in a deep pit under water. Manong Lito said, "Whenever I discover their territory, I mark it in my mind by remembering its intersection with two landmarks such as the tip of a mountain, rock, or large tree. Once I identify their territory, I can come back to that place. Most often, I get an abundant harvest of bareras in their territory."

Manong Lito also told us that large bareras tend to stay in the deep during day time. At night, they go out and graze upon shrimp fries called hipons and small fish such as sirum-sirums. Most often, fishermen can catch bareras in areas where hipons and sirum-sirums are most abundant. I asked, "Why?" Manong Lito replied, "Bareras feed upon hipons and sirum-sirums. Most often, we caught them along with shrimp fries and small fish in the palupad."

I also asked Manong Lito how to cook the barera. He said, "It could be cooked in any menu you want. You can use barera for sinabawan, pinamalhan, and pinirito." In sinabawan, the fish is cooked in plenty of water with sliced tomatoes, onions, sibuyas dahon [green onions], salt, and vetsin [MSG]. In pinamalhan, as the term implies, the fish is cooked in water and vinegar, soy

sauce, ginger, garlic, and salt and brought to a boil until the liquid becomes moist dry. In pinirito, the barera is simply fried in a deep oil.

Another fish variety that looked like barera was liwit. From our non-discriminating eye, we thought they were the same—their silver color and their elongated body. But we heard from Lolo Tasyo that liwit, when alive, is steel blue in color. It only turns silver after death. A closer examination of a liwit specimen revealed a physical structure distinct from barera. For example, liwit has an elongated body that tapers off into a pointed tail. We also learned from Manong Lito that a liwit can grow longer than barera, about 5 feet. Like barera, liwit loves the muddy bottoms of the coastal water and feeds on small fish, shrimps, and crustaceans. He also told us about its strange feeding behavior. Adult barera tend to feed at the surface during the day and stay at the bottom during the night. Young ones tend to stay together in group. They migrate to the muddy sea bed at night time and start feeding on the surface during day time. According to Manong Lito, liwit is good for pinaksiwan and pinirito.

That's all folks. That is the knowledge I learned from Manong Lito and Lolo Tasyo about liwit and barera. Whenever I buy liwit and barera in the market, I will always remember the stories I learned in Baybay.

Narrative 4: Ynes's Panginhas

One afternoon, I was visiting the seashore of Baybay when I noticed some people in the intertidal zone. They were carrying some baskets with an old bolo in one hand. I noticed that after a short walk, they stopped and then picked something from the sand. Sometimes they dug the ground. "What are they doing?," I asked

myself. My curiosity led me to ask an old woman. She said, " Nagapanginhas, Inday, ah, para may isud-an kami karon. Lingaw-lingaw man lang ni amon." [I am doing panginhas, young lady, for our dinner tonight. This is just to keep us busy.]

From this initial interaction, I decided to use the cultural practice of panginhas as a topic for further investigation in Baybay. From my interviews, I learned that panginhas is the practice of collecting shells from the sandy shore of the intertidal zone. The pakinhasons or seashells are most often used as a viand for steamed rice. Tahong, green shells, sisi, tuway, and litog are some examples of edible shells. Some shells are also used as accessories. They are sold in the market as part of earrings, bracelets, anklets, pendants, etc. Children also use the shells as toys. For example, the shells called batad (sundial) are often used in bug-oy, a local children's game.

Not satisfied with what I learned about panginhas, I approached another shell gatherer and asked this question, " Nga-a ginagamit ninyo ang umal nga binangon? [Why are you using an old bolo?"] She answered, "Ginagamit ni namon Inday ang umal nga binangon para pangkutkot sang pakinhason nga ara sa idalom sang balas." [I am using this old bolo, young lady, to dig the shells that are buried under the sand.]

I asked another woman, "Paano mo mabal-an nga may panginhason sa idalum sang duta?" [How do you know that there are shells under the soil?]. She answered, "Kon tuslukon mo gani and duta, may gabura-bua, nagapiswit. Bu-ot silingon, may unod ra sa idalum" [When you prick the sand with a bolo, there is a

bubble coming out from the shallow water. That means that there is a shell under the sand.] When I asked her if she gets a lot of shells everyday, her daughter answered that they sometimes gather many shells, sometimes few, and sometimes none at all.

From my interviews, I realized that panginhas is both an economic and recreational activity of some people, most especially women, in Baybay. I found that this practice has an impact on community life. Through panginhas, women can help their husband bring food to the table because pakinhason is best eaten with steamed rice. Some shells are worth more because they can be crafted into lampshades, chandeliers, wind chimes, saucers, ash trays, picture frames, buttons, beads, earrings, necklaces, and many other sea shell crafts that could spell additional income to the family.

I realized that panginhas is a valuable cultural practice in science education. Using the practice, science educators can study the different kinds of shells found in Philippine marine waters. They can also teach the value of shells in health—they are a good source of calcium. In addition, collecting shells in the shore is a good form of leisure and exercise. I also realized that science educators can utilize a panginhason collection to teach the taxonomy of shellfish.

From my readings, to complement my interview data, I learned that shells belong to phylum mollusca and are classified as either bivalve or univalve. Univalves are often collected from the shore by dredging. Examples of univalves are triton, conch, murex, volute, turban, tun, tulip, and nutmeg. Meanwhile, bivalves are usually made of two symmetrical calcareous shells held together by a

strong adductor muscle. Examples of bivalves are tahongs, mussels, scallops, clams, pearl oysters, arkshells, etc.

Learning about Baybay's Rich Historical Legacy

In addition to its cultural practices, we also studied Baybay's rich historical legacies. Our stay in Baybay could not be complete without visiting two of its important landmarks—the bantayan overlooking the sea and the memorial for casualties of the first ambush against the Japanese imperial army in the region during World War II. Bantayan is a remnant of a stone, brick, and cement structure believed to be constructed before the Spaniards came to the Philippines. The site of the first ambush in the region is a village-constructed landmark embossed with names of soldiers and civilians who died during the Japanese-Filipino encounter in Baybay.

We were seated around the table in the day care center as we shared our understanding of Baybay's rich historical legacies. In addition to our presence as members of the research team, students from other groups, assigned to explore the barangay's history and landmarks, were around to share with us the oral history they documented from the village people.

One important topic of our discussion was the sharing of village elders' stories about bantayan. From our focus group discussions, we were able to reconstruct snapshots of the cultural memories associated with Bantayan. For example, we learned that Baybay's floodplains, where most of the current houses stand, used to be under water. Except for the hill, the current coastal area of Baybay was believed to be covered with water at one point in time.

During the pre-Spanish period—although some elders believed it also occurred during the Spanish colonial rule—the natives of Baybay put up the bantayan to serve as a look out for approaching Muslim pirates. These pirates, according to the elders, used to capture young men and children and sell them as slaves to rich datus or chieftains in Mindanao and in neighboring countries.

To protect themselves from coming raiders, the natives of Baybay took turn in serving as lookouts in bantayan to signal the arrival of enemies. Once arriving vintas or sailboats are spotted at the horizon, a lookout must either beat a native drum or blow the budyong, a trumpet-like object made from a carabao or cow's horn, or seashell. The sound coming from the budyong or drum signaled the natives to run away and hide from raiding pirates.

From our focus discussion, we also learned how Baybay got its name. The real local name of Baybay, not the pseudonym, is associated with a vernacular term to describe a mosquito-infested village. According to village elders, when the water subsided to its current level in Baybay, the coastal area and floodplains were swampy. The land was uneven, mostly filled with potholes, natural ponds, and swamps—perfect breeding grounds for mosquitoes. The prevalence of mosquitoes in the early coastal formation of the barangay resulted in its reputation as a "village infested with so many mosquitoes."

When we stayed in Baybay, we saw few remnants of swamps, now planted with nipa (palm variety used for thatched roofing) and kangkung (water spinach). From our interviews we learned that residents little by little filled the potholes in the floodplains until the place became even and suitable for building homes. Due to Baybay's location,

we also learned from the village people how the community prepared for possible calamities. For example, they listened to radios for weather reports such as coming typhoons and tsunamis. These reports kept them vigilant, aware of possible flooding. If flooding happened, residents sought the hills of Baybay as an evacuation area.

Meanwhile, an embossed cement structure along the highway served as memorial for guerilla and civilian casualties during the first ambush in the province. The ambush was carried out by Filipino guerillas against the Japanese soldiers who forcibly took over the country during World War II. The village people constructed the landmark to remind them of the bravery of Filipino soldiers and civilians who fought the Philippine-American war against the Japanese imperial forces. The incident took place September 2, 1942—somewhat in the early stage of Japanese invasion in the Philippines. Erwin, the leader of the group studying the historical landmarks of the community, shared with us this story:

> *I would like to tell a story about the first ambush in this island. I got this story from Tatay Juan, son of one of the civilians beheaded after the ambush; Tatay Doming, a village elder who was about nine years old when the event took place; and Tatay Andong, a tuba gatherer on top of a coconut tree who witnessed how the ambush took place.*
>
> *The ambush took place in September 2, 1942. The night before the incident, guerillas warned the residents to evacuate into nearby mountains. The told them to completely abandon the barangay and seek refuge in a distant mountainous barangay. To prepare for the ambush, the guerillas used a huge palomaria tree, wounded with barbed wires, as a barricade across the road.*

When a truck full of Japanese soldiers arrived, the guerillas immediately cross- fired, raining bullets unto the enemies. According to Tatay Andong, a tuba gatherer hiding on top of the coconut tree, there were twelve Japanese soldiers who died on the spot. The guerillas, however, did not preempt the approaching Japanese convoy trailing behind the truck. Since they were using low-powered guns—Tatay Doming said something like one load, one shot—the guerillas were overpowered. Two of their comrades died during the encounter and the rest of the guerillas retreated into the hills of Baybay.

According to Tatay Juan and Tatay Doming, the guerillas made the mistake of retreating into an area where some civilians were hiding. The Japanese convoy immediately hunted the retreating guerillas until they reached the place where Lolo Pedring—Tatay Juan's father—and his family had taken refuge. To save his wife and children, he showed himself to the soldiers and made negotiations to give time for his family to run for their lives. Tatay Pedring and two other civilians were caught by the Japanese soldiers and brought into the center of the village, the spot where the current stage stands. Right there and then, they were beheaded by the Japanese soldiers. The houses in Baybay were also burned into ashes.

From Erwin's story we learned the atrocities committed by the Japanese soldiers in Baybay. We also gleaned from the village people their commitment to preserving their rich historical legacies and antebellum landmarks, to honor residents who fought for the freedom of the country.

Learning About Social Justice Issues in Baybay

One important dimension of our community immersion experience was the inclusion of the social justice service learning paradigm to guide our activities and projects in Baybay. At the outset, we met the challenge of identifying social justice and inequity issues in the community. As outsiders in the village, we found difficulty in establishing the trust of Baybay residents in discussing their experiences of social injustice and inequities. When asked about their experience, our informants often gave us suspicious looks. Our journey towards the goal of addressing social justice and inequality issues in the community was not easy. First of all, it took time to build the trust of our informants, which we found crucial if they were to share their stories. Second, we experienced the awkward tension of establishing good relationships with the barangay officials—our gatekeepers in entering the village and possessors of power and privilege in the barangay—while serving the interest of the marginalized sector of the community.

Faced by the burden of addressing so many things in a very short stay in Baybay, our research team decided to delegate the burden of exploring further the social justice issues in the community to the other student group, also part of the large cohort of 41 physics and chemistry majors. During the community stay, the group was tasked to identify and document social justice and inequality issues in the community. In other words, when we came to Baybay, we did not have any solid plan to address social inequality and injustice issues because we had difficulty in identifying them during our preliminary visits. It was a big challenge for us to identify these issues straight from the horse's mouth, so to speak.

When we came to Baybay for the community stay, we had nothing but a list of possible informants and a transcript from an initial focus group discussion, to inform us of what it means to have a lived experience of social inequality and injustice. The list of possible informants included members of the community whom we thought were living at the margin of power and privilege— the poor, the sick, widows/widowers, non-natives of Baybay, gays, persons with special needs, etc. We contended that the barangay officials, based on our preliminary experience and by virtue of their position, could not give us a true picture of social justice issues in the community.

Students outside our immediate research team—Kay, Levi, Marie, Dennis, Fely, Jean, Emma, Angel, Liezl, and Herman— comprised the group who explored further the social justice issues in Baybay. Through our focus group discussions with them, we learned the lived experience of marginalized people in Baybay and this furthered our understanding of social justice issues.

Narratives from the Margin

The presence of ten other students, in addition to the research team, crowded the miniature tables where we regularly held our nightly focus group discussion. To remedy the problem, we added more tables on the sides to allow additional space for students to sit. Except for some few clarifying questions, we listened and took notes as students outside our research team took turns in telling their community immersion experience focusing on the social justice issues faced by the marginalized sectors of Baybay.

It must be recalled that in our previous focus group discussions, we found difficulty in identifying social justice issues because we interviewed people of power and privilege in the barangay. We contended that we could get a better picture of social

justice issues if we listened to the voices of people on the margin of power, hence, these stories:

Social Justice Issue 1: Fely Retelling Manang Virgilia's Tales of Pag-antos

Pag-antos is a vernacular term to describe great difficulty, intense suffering, or persistent trials.. Pag-antos was the word that I heard from Manang Virgilia to describe their predicament in Baybay. Manang Virgilia was one of the residents living at the periphery of the barangay. She and her distant neighbors live near the boundary of the village. Their sparse neighborhood is surrounded by vast rice fields atop the hills of Baybay.

Like a giant chessboard, the plateau where Manang Virigilia lives was checkered by squares or rectangles of rice paddies extending from the boundary of the barangay to the slope of the hill leading towards the main highway and the barangay hall. A rice paddy was made of elevated soil serving as bridge from one edge of the rice field to another. The entire plateau was made of so many rice paddies. Like a bridge, farmers used the paddies to cross from one rice field to another. In Baybay, the rice paddies also served as a narrow foot walk connecting Manang Virgilia's neighborhood to the high way.

Residents atop the hill told us that they had been experiencing difficulty in going to and from the highway, most especially during the rainy season. The distance from Manang Virgilia's neighborhood to the highway was about one kilometer. The difficulty was not due to the distance. Rather, it was due more to the danger and burden of walking the kilometer-long rice paddies.

We understood what they meant. First of all, the rice paddies were narrow. They became sticky during the rainy season; nobody can come out of the neighborhood clean after passing through the wet rice paddies. In some portions where grasses grow, residents found them dangerous—the grass-covered paddies became slippery after rain. School children often faced this danger every time they went to and from the school. In addition, farmers often paid a lot of money and exerted a lot of effort to bring their products into the highway. Women, after buying groceries in town, had to pay the kargadors (carriers) to carry stuff on their shoulders because no vehicles could pass through the paddies.

When Manang Virgilia told us that only human beings could pass by on the rice paddies, we exactly understood what she meant. On our way to her house, we found it difficult to balance ourselves while walking on the rice paddies. On our left and right were rice fields. It's a good thing it was not raining. "What if the rice field is filled with water during the rainy season?" I said to myself, when we went home. We just imagined the danger that school children must go through everyday just to get an education.

For so many years, Manang Virgilia and her neighbors, mostly farmer-tenants, have been requesting help from the barangay officials. They wanted the barangay officials to negotiate with the land owners for a right of way so that they could construct a small road that would connect them to the high way. However, Manang Virginia said that their request fell into deaf ears because up to the present they were still suffering from the difficulty and danger of trekking the rice paddies.

We considered Manang Virgilia and her neighbors' predicament as a case of social inequity because they could not avail of basic public services such as a decent road. From our perspective, the inequality was likely due to the fact that they live at the periphery of the barangay. As residents of Baybay, Manang Virgilia and her neighbors should also benefit from development projects rather than concentrating them all near the barangay hall.

Social Justice Issue 2: Emma Retelling Tatay Pikoy's Pagbakho

Pagbakho is a local term for mournful wailings brought about by extreme pain and suffering. Pagbakho is a term I use to describe Tatay Pikoy and his current situation.

I am Emma. I am part of the group who explored the social justice issues in Baybay. My classmates and I interviewed Tatay Pikoy, an indigent resident referred to us by a barangay official. He lives on the other slope of the hill, far from the shore. His house is dilapidated and shabby looking with everything fitting together in one-room—kitchen, dining, bed, and living rooms.

Tatay Pikoy was sitting in front of his house when we arrived. When I first saw him, it seemed like I don't want to ask questions anymore. His face spoke all the answers—problematic, sad, in agony, and in pain. Upon arrival, he ushered us into his house, the poorest I ever visited in Baybay. Except for a bamboo bed, the house was virtually empty—no electricity, no appliances, only few plates and spoons. I was moved with pity.

Tatay Pikoy is 57 years old. He is a non-native of the barangay. He only came to the barangay at the age of 27. Uneducated and unschooled, he used to

work as a laborer in the vast sugar plantation of the barangay. At the age of 30, he met his wife in Baybay. They got married and produced 6 children, three boys and three girls. Most of his children are uneducated too, except his middle child who was adopted by his brother in Manila. All the children are married.

As I said earlier, Tatay Pikoy was a picture of pain and suffering. His wife died a year ago due to tuberculosis. A week after the burial of his wife, his son followed. He committed suicide. Tatay Pikoy could not tell us the reason why his son committed suicide. Like his wife, Tatay Pikoy is also suffering from tuberculosis. When his wife was alive, he used to drive a trisikad, a three-wheeled bike with a side car. Now that he is sick, his eldest son does the driving. From time to time, his son dropped by and gave him food.

After my interview, I asked myself, "Why are there poor people? Why should people suffer and experience pain and sorrow in life?" When Sir Vicente asked me what lesson I learned from my interview, I told him, "Even though I am poor, there are still people who are poorer than me." But with all honesty, I think education is very important to improve one's lot under the sun. One possible reason of Tatay Pikoy's predicament could be attributed to lack of education. It was okay while he was young. But as he got older, he could no longer trust his muscles for a living. Without a college education, his children might be trapped in the same cycle of poverty. People like Tatay Pikoy are left outside the periphery of power in Baybay. They are present but never heard as poverty and lack of education silenced them. They are left out in community decision making.

Social Justice Issue No. 3: Jean Retelling Dudut's Story

Dudut was born on July 25, about twenty years ago. His parents were very happy; their baby boy was a guarantee that someone will carry the name for the family. As the years went by, Dudut's father noticed something. His son was drawn towards interests common to women. While other boys loved toy guns made of banana stalks, Dudut liked to dress dolls.

Dudut was a self-confessed homosexual in Babay. His ways were atypical of a male resident of the barangay. While most of his contemporaries do the male thing like going out unto the sea and fish, gathering fire wood, fetching water from the distant well, or helping in the construction of a house, Dudut's interests revolved around cleaning and arranging the house to make it presentable, cooking food for his family, table setting and skirting tables during barangay occasions, and beautifying females for school and community presentations. If given the chance, Dudut wanted to finish a course in hotel and restaurant management.

At first, he told us that his parents, relatives, and neighbors did not approve his sexual identity. As years passed by, they learned to accept him—probably because he has lived all his life in Baybay. However, he admitted that he experienced discriminations from people, most especially those who do not know him personally. Sometime, it was inevitable that he heard insults and judgmental remarks from people. "As if I am the worst sinner in the world," Dudut said.

When asked as to his sources of income, Dudut said that he is often hired as a make-up artist in special occasions such as weddings and school programs.

He is also hired to arrange flowers in funerals, decorate a stage during programs, and skirt party tables in social occasions such as debut and wedding celebrations. In addition, he joins gay beauty pageant. He said, he makes people happy and at the same time, he wins a prize, thus bringing food to the family table.

Despite bad impressions about homosexuals, Dudut said that he's happy about himself. "Not everybody is given the talent to make the ugly beautiful," Dudut laughed. He admitted that "homosexuality is still not fully accepted in the Philippines. Many still consider it immoral, abnormal, and sinful." That's why, people like him are often ridiculed and cursed when they walk on the street. However, he believes that if one has respect of himself, other people's respect will also follow. He hopes that someday, people like him will be fully accepted in society.

Integration of Social Justice Service Learning: A Narrative of Failure(?)

The stories of Manang Virgilia, Tatay Pikoy, and Dudut, as told by Fely, Emma, and Jean, respectively, are representative cases of people in the margin of power and privilege in Baybay. Their stories also served as spring boards for our discussion about social justice issues. From our discussion, we identified several types of marginalization in Baybay, namely: (1) marginalization due to geographical location as in the case of ManangVirgilia; (2) marginalization due to poverty, old age, and lack of education as in the case of Tatay Pikoy; and (3) marginalization due to sexual orientation as in the case of Dudut.

After we discovered some root causes of inequality issues in Baybay, we faced the dilemma of how to address them. We did not know what to do. We were caught in the

middle, questioning our roles in Baybay and challenging our capacity to address them. For example, we found that Manang Virgilia's case was not as simple as the provision of a right of way and construction of a foot walk in the middle of the rice field.

We realized the underlying philosophical and practical issues that needed to be resolved before we could take some concrete actions. One of these issues was related to the question of whose interest must be served in Baybay: Was it the majority or the minority? Considering the meager budget that the barangay receives from the national government, to what extent should the majority sacrifice for the sake of the minority?

In principle, we hoped that everybody, regardless of location, sexual orientation, economic status, age, and level of education could have an equal share of the benefits that come from the government's coffer. In reality, however, because of lack of funds, we also understood that a priority must be made on how to appropriate projects for the barangay. Herman and Ben explained these understandings during our focus group discussion.

According to Herman, a member of the team who interviewed Manang Virgilia, "The residents near the boundary of the barangay feel that they are left out. When there are free medicines coming from the national government, everything is gone before they go to the barangay hall for their share. In terms of projects, they also notice that all development efforts are concentrated at the center of the barangay. Their request for a right of way has never been granted. I think this is not fair because they are also legitimate residents of the barangay. They deserve every right to avail of every project implemented in Baybay. Besides, they have a legitimate request. It is the safety of their children that is at stake here."

Ben, possibly playing a devil's advocate, presented a conflicting but legitimate argument: "In my opinion, their request is not ordinary. If you live near the boundary, away from the center of the barangay, it is inevitable that you will be left out of infrastructure projects such as water system, electricity, cemented road, irrigation,, etc. People up there must understand that the barangay officials can not give all their needs because they also cater to the needs of the majority. Why? It is because most of the people live near the barangay hall, and so, development projects must be concentrated in areas where many could avail. ...They must understand that congressmen give only a small amount of money for the barangay projects. If you were the barangay captain, what would you do? The barangay officials usually make a feasibility study. They always think of the good of the majority."

After we discussed the pros and cons of issues faced by the peripheral residents of 'Baybay, Vicente raised this question, "What must we do to address the problem?" One student said that the problem was too much for the group to handle because "if the barangay officials cannot solve them, who are we to help them, anyway?" Another student expressed fear that we might be undermining a good relationship that we built with the barangay officials. She mentioned that "we are just visitors in the barangay" and that "we must be mindful of touching sensitive issues that might make us appear ungrateful for all the help that the barangay officials are extending us."

Our focus group discussion was supposed to generate courses of action to the problems we identified. Instead, we generated sentiments of fear, apprehension, doubt, and confusion. Even the case of Manong Pikoy and Dudut seemed to be big issues that presented challenges to taking action. Marginalization due to poverty, age, gender, and

sexual orientation are not easy problems to solve. When asked how to solve them, nobody answered. Instead, we uncovered a web of social justice issues too huge for us to solve. A student said, "I hope we can just give them a sack of rice and our problem is solved."

We had one more day left for our stay in Baybay. Vicente threw out the question, "Can you tell us of your plans for representing your data in our service learning project of the community-based mini-museum?" Everybody in the room, including the research team, expressed his/her apprehensions of not completing the service learning project. In our five-day stay in Baybay, we collected a lot of data but we struggled with how to represent it for our museum displays. On our last night in Baybay, we decided to postpone the implementation of our service learning project. The student members of our research team were not ready for their demonstration teaching of culturally relevant science lessons. The entire class felt inadequate to put up their displays for the museum. Students begged for another month to finish their project.

We left Baybay the day following after our closing program .It was attended by some barangay officials and village people. During the program students represented their learning experiences in the Baybay through songs, pantomime, and skit. We gave our gifts and certificate of appreciation to host families and barangay officials.

After our closing program, everybody was happy to leave except Vicente. He felt downhearted. He felt that the important goals for the research were not met. First, the research team was not able to develop their culturally relevant science lesson plans. Second, they did not conduct demonstration teaching to school children of the village. Third, students were not able to put up the community-based museum as part of their

service learning project. Finally, the stay in Baybay did not produce concrete actions to address social justice and inequity issues.

On his way out of the village, Vicente felt like he brought home narratives of failure from Baybay.

Book III

We Shall Return

A week after the community stay, Vicente immediately went back to the university to motivate students to work on their projects. He met student groups and discussed with them their plans for portfolios and museum displays. In addition, the team examined transcripts of interview data conducted from barangay informants and of focus group discussions generated as members of the research team. The team also analyzed observation notes, journals, and reflections to ground narratives from personal experiences.

The research data became our ready reference in the development of cultural memory banks and culturally relevant science lesson plans.

Cultural Memory Banking

Mindful of the challenge of making sense of the community immersion data, Vicente introduced the research team to the idea of cultural memory banking, an analytic tool to locate our community immersion experience at the intersection of the village people's cultural practices. He explained how cultural memory banking would serve as a bridge between the data collected from the community and one of the intended outputs or products of the research—the culturally relevant science lesson plans. In doubt of his expertise about the topic, Vicente requested Dr. Lenny Palomar, one of the leading

scholars in the country on cultural memory banking, to conduct an orientation seminar on the topic.

The session with Dr. Palomar was very interesting and informative. First of all, she shared her experience of doing collaborative research focusing on the documentation of cultural practices of rural village people and how these cultural practices might be utilized to make science more relevant to the lives of students. She mentioned that memory banking is adapted from the idea of Virginia Nazarea, a Filipino anthropologist, who used it as an anthropological tool to complement genetic diversity in gene banking..

In a traditional scientific practice of seed banking, genetic information is collected to preserve the diversity of plants. However, Nazarea found that the conventional gene and seed banking techniques were not enough. The cultural knowledge associated with the growth and cultivation of heirloom seeds were often left out in the documentation process. Thus, memory banking was used as an anthropological tool to collect and document heirloom-seed related cultural knowledge to complement the scientific information in gene banking.

Dr. Palomar shared samples of cultural memory banks drawn from her experience in a collaborative project. The cultural memory bank starts with a chart summarizing the link between a cultural practice and the different dimensions of community life, followed by a narrative. The narratives describe either an informant or a researcher's detailed account of the nature, scope, and other relevant information of a cultural practice. Building on Dr. Palomar's discussion and our review of literature on cultural memory banking, we began our long journey of transforming community immersion data— focusing on cultural practices of Baybay— into cultural memory banks.

In our research, the cultural memory banks served three-fold functions. First, the individual members of our research team utilized cultural memory banking as an analytic tool to make sense of learning experiences surrounding Baybay's cultural practices. The framework of our analysis included (1) the examination of a cultural practice in relation to economic, political, religious, social, environmental, educational, and other dimensions of community life; (2) the development of a narrative showing the dialectical account of a cultural practice at the intersection of the researchers' and informants' experiences; and (3) the identification of relevant science concepts, processes, and skills that might inform us of our next task—that of the development of culturally relevant science lesson plans.

Our cultural memory banks served as a neat reference to guide us in the development of culturally relevant science lesson plans. For that reason, the memory banks stood as a mediator between the raw research data we gathered in Baybay and our finished products, the culturally relevant science lesson plans.

Our research required the individual team member to come up with a cultural memory bank to represent the knowledge that he/she learned about a cultural practice in the community. Consequently, ten narratives were written by individual members of the research team— Tomas's ginamos, Ben's panghilot, Mario's pananggot, Trexie's pagsab-og monggo, Candy's pamulong kahoy-kahoy, Leslie's liwit and barera; Diane's panguma; Chennie's, pangisda, Ynez's panginhas, and Carla's pang-abono palay— served as preliminary cultural memory banks. They also served as centerpieces for negotiation among members of the research team in order to come up with a collective

understanding, not only of the cultural practices but also of their relevance in science and science education.

As a consequence, the cultural memory bank served as a context for negotiation of meanings among members of the research team. It must be recalled that the research data underpinning our cultural memory banks were also products of collaborative effort. During the community stay, we worked either in pairs or as a group in interviewing the informants to gain insight into cultural practices. Our tools for negotiation—focus group discussions, critiquing sessions, and written feedbacks from the supervising faculty—helped improved the preliminary cultural memory bank and shifted the focus of memory banking from an individual experience to the group experience. To illustrate our point, we provide "Ginamos the Stinky Smell that Sells," an illustrative case of cultural memory banking as a product of collaborative effort and negotiation of meanings.

Ginamos: The Stinky Smell that Sells

The Memory Bank Chart

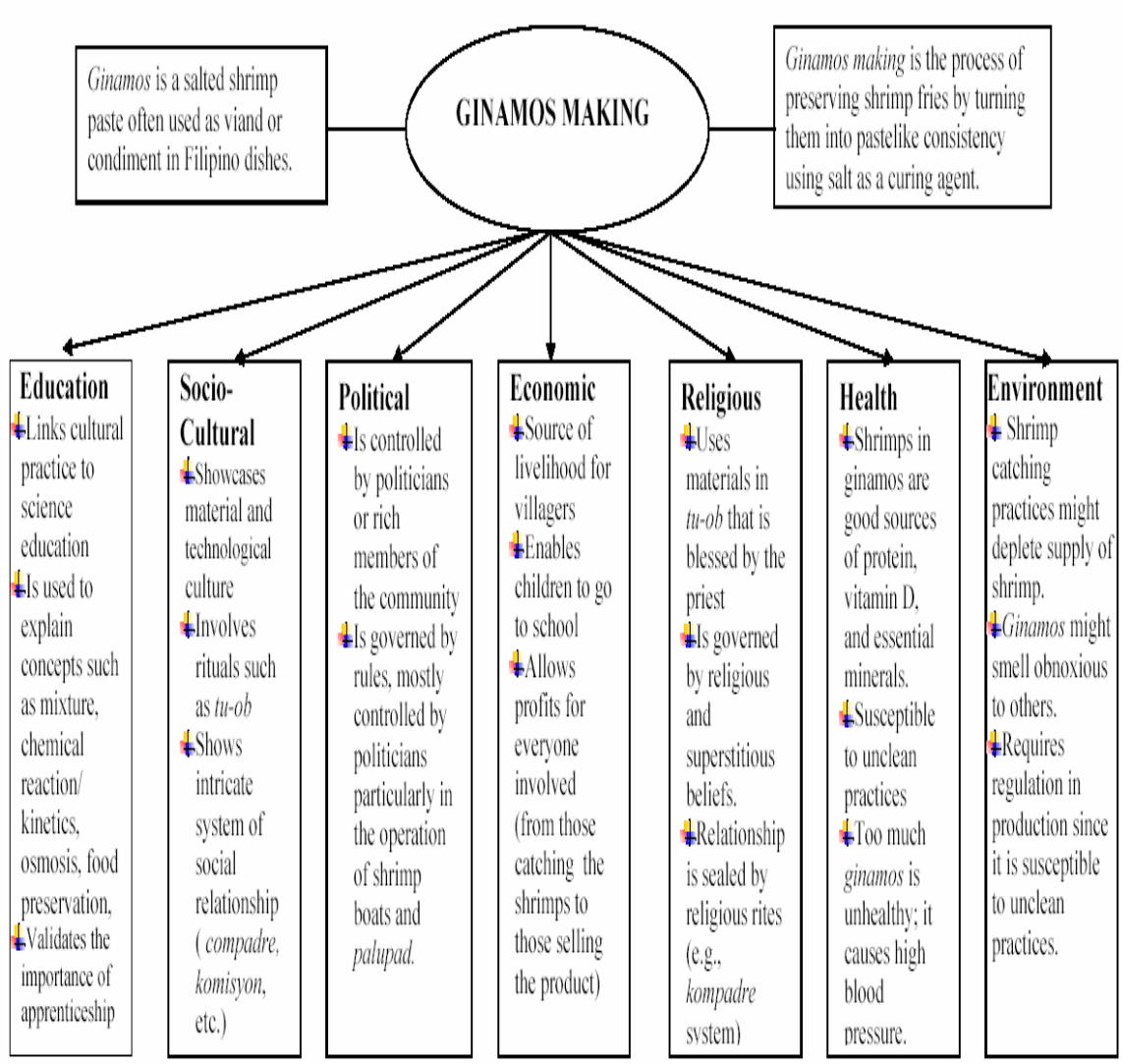

Figure 5.1. The memory bank chart in *ginamos* making.

Our Narrative

It was 8:30 in the morning but the sun was hot. We were standing on the shore waiting for the coming boat. Along the shore were villagers, mostly women, waiting for whatever catch their husbands might bring for the day. A small medium-size boat arrived at daryahan, a shallow water in the inter-tidal zone about knee-deep high. Five muscular,

tanned fishermen disembarked from the boat and carried on their shoulder wooden crates filled with the day's catch. Women hurriedly picked their alats and bakags, shallow baskets knitted from thin bamboo strips, to meet fishermen at the edge of the shore. We moved closer to investigate while crates were opened. We thought the crates contained fishes of different kinds, only to discover that they were filled with hipons, shrimp fries or krills of shrimp-like variety. Women slowly loaded the hipons into their bamboo baskets while bystanders gravitated toward a crateful of fish that they might buy for their breakfast. "Fishes are getting scarce nowadays," a fisherman commented as he unloaded his small crate, full mostly of liwit and barira- fish family that are usually long, slender, and silver in color.

Our attention focused on hipons that women carried in their baskets. They spread their hipons into a papag, which looked like a table made of bamboo slats. The papag was elevated from the ground, about a shoulder tall. Atop the bamboo slats were fine nets where women poured their shrimps. We asked Manang Linda, one of the women, what they were going to do with the shrimp. She mentioned that they were meant for ginamos making.

What is ginamos? The closest English translation for ginamos is shrimp paste. Dubbed as a poor man's viand, it is popularly eaten by rice farmers in the Philippines most especially during rainy season. Saucy or pastelike in consistency, ginamos is made of sun-dried, grounded, and fermented hipons that exude a repulsive odor for those who are unfamiliar with it. Most often very salty, and sometimes spicy, it is used as toppings on green mangoes and as a sauce for kare-kare, a popular dish made of beef, vegetables, and ground peanuts.

We decided to include ginamos making in our memory bank because of the pervasiveness of the practice in Barangay Baybay, our immersion site. We discovered that most of residents along the shore practice ginamos making. In their backyards, we also noticed the prevalence of materials for ginamos making such as papag (bamboo table), lusong and hal-o (wooden mortar and pestle), bakag (bamboo basket), fine nets, and earthen or plastic jars. We explored deeper into the nature and process of ginamos making by conducting interviews and focus group discussions with community people, locating the practice at the intersection of community life, science, and science education.

Our first interviewee was Lola Maria, 60 years old. She is the wife of Lolo Tasyo, who has been a fisherman for the past 46 years. Lola Maria and Lolo Tasyo are natives of Barangay Baybay. They were born, grew up, got married, and raised their children in the village. In order to augment their family income, Lola Maria has been engaged in ginamos making because "it adds value to the price of shrimps" that her husband catches in palupad, a fishing technique that we examined in another memory bank. Ginamos making as a preservation technique uses lavish amounts of salt in the curing process. Lola Maria prided her ginamos as "clean" as it may "stay for a year without getting spoiled." To prove her point, she ushered us to a papag, a highly elevated bamboo table. She reasoned, "Dogs and other animals could not touch my shrimps while they are being dried." She also pointed out her fine mesh nets that she uses to cover her hipons from houseflies during the drying stage. "Look at my lusong and hal-o; they are always washed and dried before I start making ginamos," she quipped as she wiped clean the remaining droplets of water from her wooden mortar and pestle.

We were curious how ginamos is made. This brought us to the couple Arsenia and

Segundo, famous ginamos makers in Baybay. We found that Segundo, a native of the village, learned the trade from his Lola (grandmother) and taught his wife who came from a nearby town. The couple was in their mid-40s and admitted that ginamos making is their only source of income to send their children to school. Most often, they get their ginamos from the shore on a "komisyon" basis (get- now-pay-later-plus-interest). From a wooden crate, they dry their hipons under the sun, on a rice field in front of their house. This normally takes 4-6 hours depending on the weather. "A seasoned ginamos maker does count the number of hours in sun drying," Segundo said. "By touching hipons with your bare hands, you can estimate if they are dry yet soft enough for pounding." After drying, hipons are brought into the house for salting. The couple also mentioned that they do not measure the amount of salt they place into hipons because "an expert ginamos maker knows how to estimate." However, we pleaded for the right proportion and they mentioned "about 1 part of salt in 6 parts of hipons." After salting, the hipon-salt mixture is transferred into the lusong (wooden mortar), batch by batch, for pounding. Using a hal-o (wooden pestle), the mixture is pounded to produce a pastelike consistency. During the pounding stage, Segundo can also gauge if ginamos is under- or over-salted. Right proportions of salt and hipons create a soft, paste like consistency. Too much salt makes ginamos bitter and a little salt makes it smell like a rotten fish in just a few days. A well-prepared and well-proportioned ginamos may last for more than a year. After pounding, ginamos is stored in plastic containers. The container is properly covered during the curing stage as the smell invites house flies. The couple also took pride in their clean ginamos. In fact, they mentioned that they send a box of about 40 kilos of ginamos to their relatives in Canada who consume them in a year.

Manang Maya, our next interviewee, is in her early 50s. She is also a veteran ginamos maker. In addition, she is an expert in marketing ginamos to nearby towns and provinces. A glassful of ginamos, according to her, costs 90 pesos. Most often, she sells her ginamos in volume as she has suki (regular vendor-buyer) in different towns. Early morning during market days, she drops a crate of ginamos to her suki in different towns and collects money in the afternoon. She has regular customers to deliver her stuff in the town. Sometimes, she barters her stuff with rice farmers. For example, a ganta of ginamos is bartered for a sack of rice. She mentioned that through ginamos, she was able to link with other businesspersons in different towns. In fact, she is sometimes asked to serve as Maninay (godmother) during weddings of their children. We also asked Nang Maya her ginamos recipes. She mentioned "ginamos nga ginisa sa baboy" (ginamos sautéed in pork cubes). To prepare the dish, oil is heated in the skillet. Then the garlic, onions, tomatoes, pork cubes (usually the belly fat), and ginamos are sautéed on a skillet. Some sugar, vinegar, and powdered chili are added to make it a little bit sweet, sour, and spicy. "Just a little bit of this stuff can bring a plateful of rice into your stomach," quipped Nang Maya.

From our interviews, we realize how ginamos making is situated at the intersection of community life in Baybay. The presence of ginamos in Baybay is as pervasive as its stinky smell; we could hardly ignore the role it plays in the community's economy, culture, social relationship, among others. Through this memory bank, we might be able to bridge science concepts we learn in the university and the practice of ginamos making in the community.

Science/Chemistry Behind Ginamos Making

Ginamos, a paste like viand made from shrimp and salt, is a rich context for teaching chemistry/science concepts. For example, the use of different sizes of net holes in palupad and sungkit can be connected to the concept of separation of mixtures. The use of bakag may highlight a simple yet useful technology in sorting shrimps from big fishes and squids. In the process of drying, we might introduce the role of sunlight in killing pathogenic bacteria and in removing water from the shrimp, which aids in its preservation. In the salting process, we can introduce the concept of osmosis, a spontaneous removal of water, through a semi-permeable membrane in shrimps' cells, from a region of lower concentration to a region of higher concentration of solute. The curing process also facilitates food preservation. Salt, a chemical compound, is added to the food to keep it preserved. Its chemical formula, NaCl, is useful in teaching concepts about compounds. Drying nets, wooden mortar and pestle, bakag, and earthen or plastic jars are low cost materials. The technology in ginamos making does not require expensive capital. Ginamos making is an example of a culturally relevant practice that meets local needs without too much capital. It can be used to develop a culturally relevant lesson plan for chemistry teaching.

Key Players in the Development of the Cultural Memory Bank

The development of Ginamos: The stinky smell that sells was a product of our collaborative effort as members of the research team. Table 5.1 shows the key players and their major contributions in the development of the cultural memory bank exemplar.

Table 5.1. Contributions of Key Players in the Development of Cultural Memory Bank

Key Player	Description	Contribution
Tomas	Chemistry major, male, grew up in a rural community	Primary participant in the data collection and writing of the cultural memory bank; shared the popularity of *ginamos* as a viand among rural rice farmers in their community during rainy season; researched on the relevance of *ginamos* making in science and science education
Mario	Chemistry major, male, grew up in the suburb	Primary participant in the data collection and writing of the cultural memory bank; researched the science education dimension of *ginamos* making
Vicente	Advanced level science education doctoral student	Primary participant in the data collection and writing of the cultural memory bank; focus group facilitator; provided expert opinion on the development of the cultural memory bank
Lola Maria	Village elder, fisherman	Funds of knowledge: shrimping practices, methods of separating shrimps from fishes, ethnoknowledge associated with shrimps and fish; environmental impact of shrimp catching practices
Lolo Tasyo	Village elder, *ginamos* maker	Funds of knowledge: materials, process, methods, and storage of *ginamos*; community beliefs associated with *ginamos* making
Segundo	*Ginamos* maker	Funds of knowledge: "politics" behind *ginamos* making, demonstrated the process of *ginamos* making
Arsenia	*Ginamos* maker	Source of funds of knowledge: demonstrated the process of *ginamos* making
Maya	Makes and sells *ginamos*	Funds of knowledge: economic and business dimension of *ginamos* making, *ginamos* recipe
Rest of the members of the research team	2 males, 7 females; 1 teacher educator, 8 chemistry majors	Participated in focus group discussion related to *ginamos* making; reader and feedback group

One Step Backward, Two Steps Forward

We left Baybay after our community stay without implementing our planned service learning projects. We suffered two major blows in our plans. First, we were not able to conduct the demonstration teaching of culturally relevant science lesson plans for school children in the village. Second, we failed to put up a community-based mini-museum, a service learning project that we intended to leave behind for the village people. In our focus group discussion, we identified major constraints that prevented us in the implementation of our projects.

First, our community stay was too short. Most of our time was devoted primarily to data collection and interaction with the village people. We did not have sufficient time to transform our data into useful displays for the museum. Our research team also needed more time to make sense of the data, particularly on the use of cultural practices as contexts of relevancy in science teaching and learning. We realized that we needed extra time to develop our cultural memory bank, an analytic tool serving as a springboard for our culturally relevant science lesson plans.

Second, we were stuck with some issues that needed to be resolved before we could formalize our displays for the museum. For example, the group of students in charge of documenting the social justice issues in Baybay were confused about how to depict the marginalization experience of people at the margin of power and privilege in village. Mindful of confidentiality issues in research and the tension brought about by the need to maintain good relationships with the barangay officials while serving the interest of marginalized sectors of the community, we were unsure of how to represent our data for the museum displays. We needed time to examine the pros and cons of our actions

until we finally agreed to represent the marginalization experience of our informants through poems and fictionalized stories.

Third, we did not have enough resources to implement our service learning projects in such a short a time. Putting up exhibits required a lot of money. After our community stay, students were short of money to finance their service learning projects. We had no choice but to step backward so that in due time we could make more steps forward.

Return with a Vengeance

It was Friday. Students were not busy. At University in Central Philippines, Friday was considered as a class-free day. Faculty members and students most often did not have classes on Fridays as the day was devoted for meetings, student activities, field trips, and other co-curricular and extra-curricular activities. Thirty-five days after our community stay, we returned back to Baybay to implement our service learning projects.

We arrived at the barangay hall armed with all the materials we needed for the museum display. Tatay Rodolfo, the barangay captain, gave us the go signal to make use of the second floor of the barangay hall as the venue of our displays. Except for a table and few chairs, the second floor of the barangay hall was virtually empty. Upon arrival, we began the task of transforming the empty hall into our concept of a community-based mini-museum, one of our service learning projects in Baybay.

The hall became crowded, not only with our presence but also with materials we brought from the university—diorama, cultural artifacts, preserved animal and plant specimens, pictures, fictionalized stories, essays, poems, etc. As early as the morning of Friday, we began working on our projects—painting the walls, constructing a miniature

nipa hut, setting up the displays, etc. We had 24 hours left to prepare for the opening program the following day. Our preparation of displays went well except for a few glitches typical of collaborative undertakings. For example, Tomas wrote in his journal:

> *We arrived in Baybay hungry, confused, tired, seemed out of ourselves, and worried about what would be the outcome of tomorrow's event. We brought everything we needed and were ready to put up our displays for the museum. Upon arrival, we were disappointed of what we saw. Filled with other group's clutters and stuffs, our display area was messy and narrow. We made negotiations with other group members to clean up their mess and give us more space for our display. We did it several times and nobody was listening. Everybody was busy. It seemed like we were talking to ourselves. Ynes, a member of our team, was angry and confronted the other groups. It created a tension to the class but we need to push ourselves, because if not, we could not finish our display for tomorrow's opening program. Besides, we needed to finish our display ahead of other groups in order to prepare for our demonstration teaching the following day.*

Except for minor misunderstandings at the outset of our display preparation, the rest of the day went smoothly. Students were focused in their work. The silence was sometimes punctuated by laughter and chatter among students. In one corner, a group of students were building a nipa hut to house their display of cultural artifacts. Some students set up their diorama depicting the first ambush in the region against the Japanese soldiers. Another group of students—through poems and fictionalized short stories and narratives—were putting up their displays depicting the marginalization experience of residents at the periphery of power and opportunities in the village. Another group of

students were busy working on their mural painting depicting sceneries in the coastal area. Meanwhile, members of our research team were meticulously arranging their displays on the table while others were making labels for their herbal plant and fish collections. Except for the student members of the research team who left the hall early to prepare for their demonstration teaching the following day, the rest of the cohorts worked until midnight to complete their displays for the museum.

Service Learning Project 1: Community-based mini-museum

In addition to our displays, the second floor of the barangay hall was crowded with people. Some students had to stand on the staircase to accommodate more village people inside the hall. At about 11 o'clock in the morning, 41 physics and chemistry majors, two supervising faculty, barangay officials, and some village residents were present to attend the formal turning over of the barangay museum to residents of Baybay.

The ceremony began with the cutting of ribbon. Marian, our teacher educator-collaborator gave a short speech as she formally turned over the rights and privileges of the museum to residents of Baybay. On behalf of the village people, Tatay Rodolfo accepted the museum project, thanked the students and faculty members, and promised to take care of the community immersion outputs that students left behind in Baybay.

Our community-based museum was divided into four major sections commensurate to the themes that community immersion participants explored in Baybay. The first section depicted the arts, crafts, and livelihood of the village people.. Dubbed as the "people at the margin," the second section of the museum depicted the marginalization experience of residents at the periphery of power and privilege in the community. The third museum theme was labeled as the ethnoscience section, a display

of specimens and artifacts depicting a hybrid of cultural practices and natural history in the village. Finally, the fourth section depicted the historical events and famous landmarks in the Baybay.

In order to view our display, we scaled a cemented staircase connecting the ground floor to the second floor. A big mural on the wall, painted by students, greeted us. Atop the mural were letter cut outs signifying the theme of the display, "Arts, Crafts, and Livelihood." The mural depicted shoreline images such as nipa huts under the fronds of coconut trees; sailboats, some on the shore while others floating on blue and white patches of the frothing sea; brown and gray hues of the sand; and green, creeping vegetations growing near the shore. Four coconut poles of various lengths—finished by a mahogany varnish— served as borders on both sides of the mural. Pictures and descriptions of different sources of livelihood in the community were pasted on the wall. On the floor, in front of the mural, we saw representative artifacts from the village such as driftwoods, shells, pots, clothing, etc. Figure 5.2 shows the displays depicting the arts, crafts, and livelihood of Baybay.

Figure 5.2. Picture of students working on their displays for the museum, depicting Baybay's arts, crafts, and livelihood.

Dubbed as "People at the Margin," this section of the museum displayed artifacts collected from marginalized sectors of the community. The artifacts were accompanied by written narratives, poems, essays, and fictionalized stories of students inspired by the life history of their informants. The displays were enclosed by a knee-length bamboo fence highlighted by a miniature artificial tree at the right side of the enclosures. When asked to explain their concepts, students answered:

In general, our museum display depicts the marginalization experience of people at the margin of power and opportunities in the village. The artifacts that we collected from our informants such as medallion, novena booklet, make-up kit, old shirt, etc—possibly their most cherished possessions—represent our desire to lift them into a higher status in the community, instead of the rich, the famous, and the powerful in Baybay. These are the people who need public and government attention.

Our section in the museum was occupied by a tree symbolizing the continuity of life. Despite life's trials, life must go on, so to speak. We placed flowers on the tree to symbolize hope. As long as one is alive, there is hope. The fence represents the limitation in opportunities and privileges that the people at the margin experience in the village. We consider the fence as a symbol of exclusion experiences that marginalized people often feel.

The artifacts on display were accompanied by narrative accounts, poems, fictionalized stories, and essays alluding to the life history of persons in the margin of power and opportunity. For example, a student wrote an essay entitled "Mournful Memories," reflecting on the sad story of a poor villager and suggesting possible courses of action to help the old, the sick, and the uneducated. Inspired by the achievement of a special child, another student wrote "Ang Medalyon ni Herman" [Herman's Medals], a poem capturing simple joys, happiness, and deep faith in God of parents in rearing special children. "Ang Maliit na Isda" [The Small Fish] was a fictional story written by a student in allusion to the problem of unjust and illegal fishing practices in the village. "Ang Natatanging Ina" [To the Singled Out Mother] was a poem honoring the sacrifices

of single parents in raising their children. "The Story of Dutdut" was a fictionalized narrative account written by a student to depict the marginalization experience of a village homosexual. "Ang Matatag na Lola" [To the Tough Grandmother] was a comic strip written and drawn by a student depicting the life story of a widowed village woman who evolved from a courageous single parent into a long-suffering and strong-willed grandmother.

When asked what they had learned through this service learning project, students documenting the social justice issues in the community gave us varied answers. One student realized that problems are inevitable and marginalization comes in many forms. However, he realized the value of a college education as a way to break the cycle of poverty. Learning from the life story of her informants, another student realized how lucky and blessed she was. Unlike her informants, many who considered themselves helpless, she felt that she should not take for granted her many options in life, most especially her parents' support for her education. Most students expressed difficulties in drawing concrete solutions to the social justice issues in the village. One student said that if she had the power to solve problems in the village, she would do it in the snap of a finger. Like the marginalized people, she also felt helpless because the challenge was too big for her to handle. However, everyone agreed that community immersion is an important avenue for students to see and experience real life situations in the village. In fact one student commented that the title of the book, "Community immersion: A dialogue of life," was an apt description of her experience in Baybay.

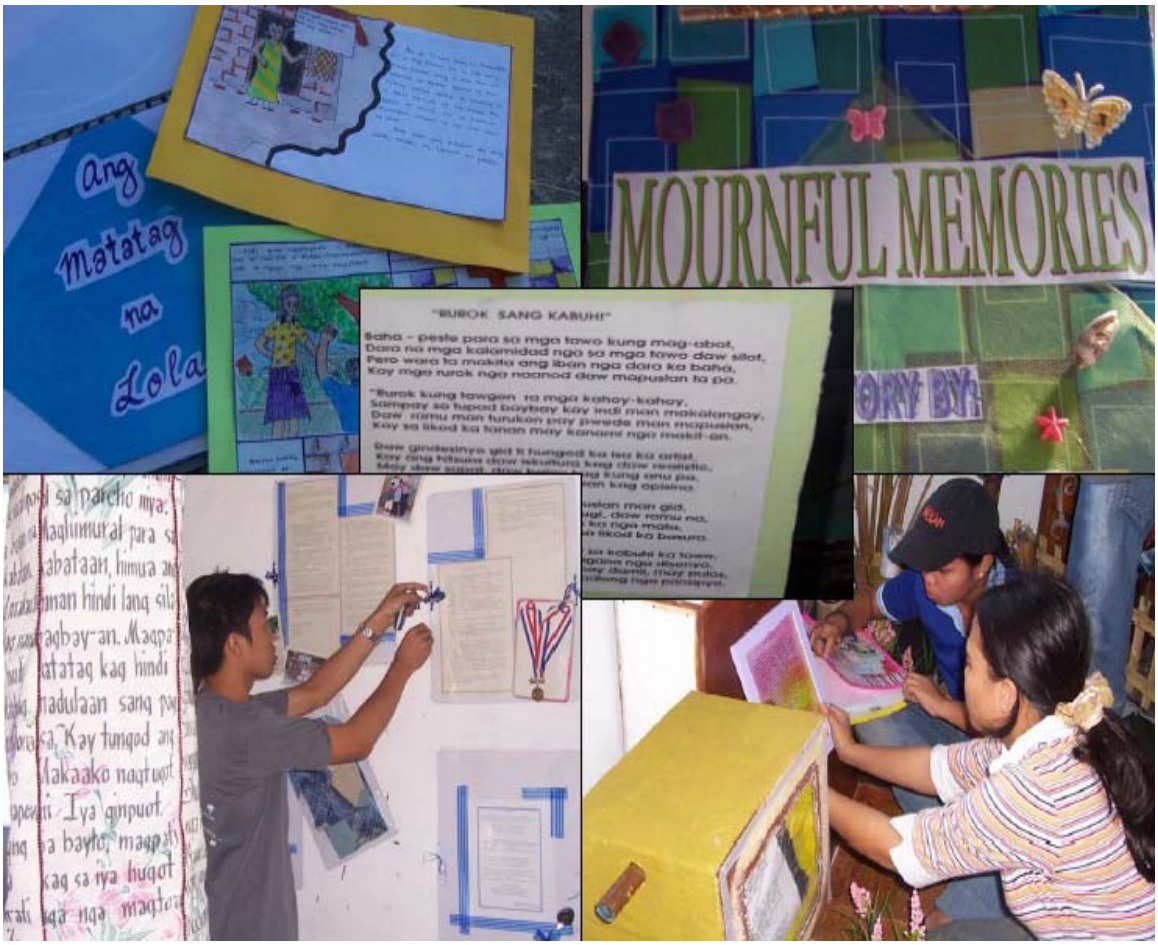

Figure 5.3. Picture of students working on their museum displays depicting the marginalization experience of some Baybay residents.

Labeled as the "ethnoscience section," the third display in the museum was composed of two major collections: fish and herbal plants. The fish collections were located on the left side of the table. Fixed in a formaldehyde solution, the fish were placed inside jars and labeled as to their scientific, national, and local names. Fish descriptions from books—e.g. habitat, physical characteristics, breeding season—were juxtaposed with narratives drawn from village informants showing the intersection of

both local and scientific knowledge. The jars were displayed on top of a fish-net covered table.

The herbal plants collection was housed in wooden frames with press-dried leaves under a glass top. Some members of the research team collected the herbal plants from the vicinity of the village based on interviews conducted with local alburlaryos or shamans. From interviews, students collected relevant information such as plant's characteristics, propagation, growth, uses, and preparation of parts to treat ailments. Students compared the information drawn from informants with scientific knowledge published in books and on-line references. In addition to the basic information about the plants such as local, national, and scientific names, the display was accompanied by the albularyo's narratives complementing the scientific with cultural information.

In addition to the herbal plant and fish collections, the exhibits under the ethnoscience section also included some artifacts collected from local rice farmers. For example, a 30-year old garab, a local scythe used to manually harvest the rice, was displayed with an accompanying story drawn from an interview. An antiquated arado, a carabao-drawn metal furrow used by farmers to pulverize the soil, was also on display to depict the traditional way of clearing and cultivating rice lands.

Figure 5.4. Picture of students working on their fish and herbal plant collections for the museum.

The fourth and final section of the museum showcased the historical legacies of the barangay focusing on village leaders and landmarks. The displays were housed inside a student constructed nipa hut. At the center of the hut was a small papag, a makeshift table made of bamboo slats, where a diorama depicted the first ambush in the region against the Japanese imperial forces in World War II. Students made miniature trees and grasses, constructed the flat

road and a hilly terrain similar to the ambush site, and placed toy soldiers and mini-trucks to depict the ambush scene. On one side of the nipa hut's wall hung pictures and biographical sketches of barangay leaders from 1950s up to the present. A written narrative on the brief history of Baybay was placed on another side of the wall with pictures. Along with written narratives, pictures of Baybay's historical landmarks such as ruins of the pre-Spanish bantayan [watchtower] and the old mascuvado sugar central were tucked on the wall.

When asked what they had learned through their work on the service learning project, students gave varied answers. Some students learned how to negotiate ideas within their group particularly in relation to the implementation of their service learning project plans. Some students realized the need for long term planning since transformation of interview data into concrete displays in the museum required ample time for preparation and action. Some students expressed specific learning of concepts and/or skills related to the identification of local fish varieties, classification and characterization of local herbal plants, preservation techniques of fish and shrimps, and analysis of the relevance of cultural practices in science teaching and learning.

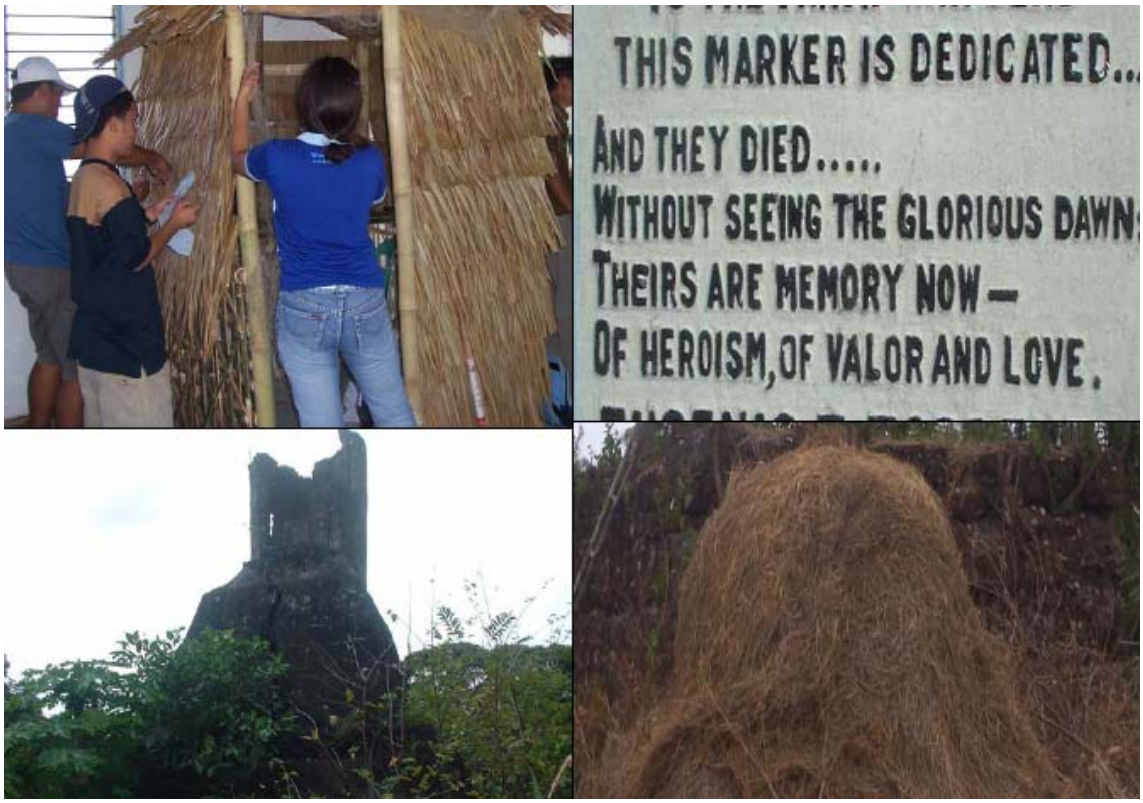

Figure 5.5. Picture of students constructing a *nipa* hut to house their displays depicting Baybay's historical landmarks.

Students also realized that in a rural community, some villagers are situated outside the periphery of power, privilege, and opportunity and that working toward social justice and equity was a tough challenge for prospective science teachers. Some students realized the rich historical legacy of Baybay and worked towards its preservation through museum displays. In a collaborative undertaking, many students realized the inevitability of conflicts, diverse opinions and perspectives, and differences in personalities that played a major part in the process of negotiation.

Service Learning 2: Teaching the Village Students Culturally Relevant Science Lessons

The morning was still dark but the barangay hall was well lit. As early as 5:00 o'clock in the morning, the community immersion participants continued their work at the barangay hall. Everybody was very busy for a special day—the culmination of our service learning projects. First was the formal turning over of our community-based mini-museum to the barangay officials. Second was the demonstration teaching of culturally relevant science lessons to high school students in Baybay. We choose high school students because the student members of our research team were secondary science education majors.

Compelled by the need to return back the funds of knowledge that we drew from the village people, we came back to Baybay for the demonstration teaching of science lesson plans as inspired by our cultural memory banks and ethnographic data. A day before our demonstration teaching, we sent invitations—through the barangay officials—to village high school students to attend our session. It was Saturday and so students were free to attend our session.

At 8:00 in the morning, we gathered together in the day care center to prepare for the demonstration teaching. We arranged the chairs, tables, the sound system (a karaoke), and all materials we needed. In a short while, twelve high school students from the village arrived. Some members of the research helped them settle in while Ben, Chennie, and Cherry were busy preparing for their lesson.

Science Lesson 1: Panghilot: A Quack Practice (?)

The day care center was full of people—the research team, physics and chemistry majors outside our research team, village high school students, resource persons, supervising faculty, and curious villagers. We began our demonstration teaching at 8:30 in the morning, three hours before the formal opening of exhibits. Ben, Chennie, and Candy comprised the first team of demonstration teachers. Their lesson was entitled, Panghilot: A quack practice (?). As background information, Ben informed the audience of the reasons that compelled them to come to Baybay and sources of data that informed their lessons. He also introduced Chennie and Candy, his partners for the demonstration teaching.

As a motivation, Ben played a segment from a tape recorded interview conducted in Baybay. He suddenly stopped the tape and teased the students, "Ooopps, what was that? Do you have any idea what our lesson will be about today?" Nobody answered. Ben played the tape further and asked the same question. A student raised her hand and answered, "Panghilot."

Panghilot or hilot is a traditional healing practice in the village, which uses a body massage, coconut oil, and/or herbal plants to treat common ailments such as sprains, headache, fever, etc. Ben, Chennie, and Cherry presented their lesson using the symposium as a teaching strategy. At the outset, they introduced their resource persons.

Manang Norma, a famous manoghilot in Baybay, spoke about and demonstrated the practice. Marian, our teacher educator collaborator, discussed the psychological basis of panghilot. Ben, a chemistry major explained the science behind panghilot. Vicente, a science teacher educator, explicated the implications of the practice in science

teaching and learning and in science teacher preparation. Before the first resource person started her speech, Chennie and Candy distribubed a worksheet that students could answer while listening to the speakers.

The first speaker was Manang Norma. She described how she became a manoghilot. She claimed that panghilot was like an "inheritance," a skill that was transferred to her after the death of her mother, also a manoghilot. At first, she refused to accept the responsibility of panghilot because she considered the job very demanding. For example, she could not refuse to meet with people even if they came for help at unholy hours such as midnight. She claimed that her refusal to practice panghilot made her very ill. She was only healed when she accepted the "inheritance" through a ceremony performed by a babaylan or shaman.

Manang Norma requested Chennie to come forward and serve as her patient. She demonstrated how to use a small piece of luy-a or ginger to assess the patient's condition. She claimed she was guided by a spirit as the ginger had a strong effect on her senses, making her sensitive to the patient's body. She then began the demonstration of hilot. With her two bare hands, she started massaging Chennie's head, shoulders, arms, back, and legs. As a finale, she took oil from a flask filled with coconut oil-herbal plants concoction and rubbed it on body parts she massaged. "The oil prevents the air from entering into the patients pores," she explained. She also explained that when the patient has fever or sprain, she uses medicinal leaves and a cheese cloth to wrap the affected area.

Marian served as our second resource person, an expert in educational psychology, she explained the psychological basis of panghilot. According to Marian,

hilot is a form of touch therapy. The process of massaging the patient's body promotes good physical and mental health because it communicates many things such as love and concern. She cited a scientific study showing the effectiveness of massage therapy on pre-mature babies. According to Marian, pre-mature babies tend to recover better when softly massaged by mothers and nurses.

The third resource person was Ben. He described the scientific basis of panghampol, which is the practice of wrapping the forehead with medicinal leaves after the hilot. According to Ben, the practice could be explained by thermodynamics, the study of heat transfer between regions of cold and warm temperatures. The cold medicinal leaves tended to absorb the heat from the forehead, resulting in a feeling of relief on the part of the patient.

Vicente discussed the potential of hilot in science education. According to him, panghilot is a cultural practice in the village that can be used for science teaching and learning. He explained that science education must be grounded in the real life contexts of the learner. By tapping cultural practices as resources for science teaching and learning, he claimed the science becomes more relevant and culturally responsive to the needs of students. He also mentioned the need to integrate community funds of knowledge in the science curriculum by documenting cultural practices and transforming them into culturally relevant science lesson plans.

An open forum followed after all the speakers finished their speech. Demonstration students asked questions. They were then given the chance to answer the guiding questions on their work sheet. Ben facilitated the discussion of answers to the questions on the work sheet.

Science Lesson 2: Cultivation of Mongo: Riding into the Wheel of the Nitrogen Cycle

Trixie and Dianne comprised the second team of demonstration teachers. To introduce their topic, they posted on the board 14 scrambled letters and laid down on the table different kinds of leguminous plants—mongo, soybeans, string beans, makahiya, and cowpea. They asked students to identify each plant. Trixie posed the question, "What is the common thread to describe these plants?" Students were referred to the scrambled letters as a clue. After several tries, a student answered "nitrogen fixers"—the cue word that Trixie waited to introduce her lesson on the role of mongo in the nitrogen cycle.

Using the different pictures as cues, Trixie led students to identify the different processes involved from planting to harvesting of mongo. For example, the first picture showed the paghulom, the soaking of seeds in water overnight to facilitate faster germination of seeds. The second picture showed the pagsab-og, a direct broadcasting of seeds on a field the day after a rice harvest. The third picture was pang-espri, an application of foliar fertilizer used when mongo plants show the sign of flowering. The fourth picture was panghugot, the manual picking of brown-to-black mongo pods from plants. Trixie emphasized that the harvesting of mongo can be done thrice with an application of foliar fertilizer after each harvest. The fifth picture was pagbulad, the drying of seeds under the heat of the sun. The sixth picture was paglinas, the trampling of mongo pads with bare feet to crush the pods and remove the seeds. The seventh picture was pagtahop, the separation of the seeds from the pods using a bamboo winnow.

After the pictures were posted, labeled, and arranged on the board, Trixie and Dianne took turns in explaining the role of mongo in the nitrogen cycles emphasizing the importance of nitrogen fixing bacteria in converting atmospheric nitrogen into soluble

nitrates. To emphasize their points, they distributed to students mongo roots showing the nodules where bacteria live.

To locate the importance of mongo in the community life, Trixie discussed the template for a consequence map. Dianne grouped the students into two groups and gave them materials such as manila paper and colored pens. Using the "pagsab-og sang mongo" as the centerpiece of the consequence map, students identified the chain effects of the practice in different aspects of community life—social, economic, cultural, environmental, political, health, and education.

The demonstration teaching was culminated by an oral report from students explaining their consequence maps.

Science Lesson 3: The Chemistry in Ginamos Making

Tomas and Ynes comprised the third team of demonstration teachers. Their lesson focused on how to make ginamos and the chemistry behind the process. Tomas introduced their topic by showing students diagonally sliced green mangoes. He asked students, "What comes into your mind when you see these sliced green mangoes?" After several attempts from his participants, a student said that she is fond of using ginamos as "toppings on green mangoes." The answer served as a springboard for Tomas to introduce his lesson for the day.

The lesson proper started off with the introduction of Manang Segundina, a famous ginamos maker in the village. Segundina demonstrated the step by step procedures in the process of ginamos making. As Segundina performed the procedure behind ginamos making, Tomas explained the process and the science behind each step.

Segundina explained that the first step in ginamos making is sorting of shrimps fries from small fish. Tomas explained the concept of physical separation of solid mixtures while Segundina used the bakag, a loosely woven basket, to separate the shrimp fries from the fish. Segundina introduced the second step, which was the drying of shrimp fries on a papag, a table made of bamboo slats, using a finely woven fish net. Tomas explained the concept of evaporation and role of sunlight in killing pathogenic bacteria. For the third step, Segundina demonstrated technique and the proportion in salting the shrimp fries while Tomas explained the concept of osmosis. The fourth step was pounding. While Segundina pounded the salt-shrimp fries mixture using a large wooden mortar and pestle, Tomas explained the role of pressure and amount of surface area exposure in facilitating the chemical reaction. The final step was the curing process. Segundina explained how the shrimp paste is stored for a week in a clean container to cure. Tomas tied together the concepts of osmosis, surface area exposure, and chemical reaction in the curing process.

After Manang Segundina's demonstration, students were divided into two groups and given materials for ginamos making. Each student group was tasked to make ginamos out of semi-dried shrimp fries. Their final task culminated in a contest—that of packing the ginamos in banana leaves. The student who produced the most appealing package for ginamos would win the challenge. To recapitulate the procedures in ginamos making, Tomas distributed procedures in ginamos making written on pieces of paper—sorting, drying, salting, pounding, and curing. Members of each student group were asked to stand in front showing the proper order in the process of ginamos making.

Science Lesson 4: From Tuba to Vinegar: Testing Acid Content through Titration

Baybay is a coastal village. Its shore is dotted with coconut trees. In fact many of the coastal houses in the village are situated under the fronds of coconut trees. Aside from fishing and farming, some village people engage in pananggot as a source of livelihood. Pananggot involves the drawing of coconut sap from what villagers called suwak, a stem where coconut flowers and fruits eventually grow. In pananggot, the suwak is cut by a sharp blade until the coconut sap slowly trickles into a bamboo container called salud. Villagers call the coconut sap tuba, a sweet tasting alcoholic drink popularly consumed by men and elders in Baybay. Unconsumed tuba is left in a glass container. After a month, it turns into vinegar.

The conversion of tuba into a vinegar inspired Mario, Leslie, and Karen to develop a culturally relevant lesson focusing on the measurement of acid content of vinegar made from tuba. At the outset, they presented to students two unknown liquid samples. Using a pop sickle stick, students were asked to taste each liquid sample for comparison purposes. When students returned back to their seats, students were asked to describe what they had tasted. Their identification of tuba and vinegar became the springboard for Mario, Leslie, and Carla to introduce titration as a way of determining the acid content of vinegar.

Mario, Leslie, and Karen utilized a traditional laboratory method of teaching. Mario started off with a pre-laboratory discussion focusing on the materials to be used in the activity, an overview of the procedures, the discussion of precautionary measures, and the assignment of students into work groups. Meanwhile, Leslie and Karen distributed the laboratory procedures and worksheets.

The laboratory activity took a long time for village students to finish. Since students did not have prior experience or knowledge of titration, the rest of the demonstration teachers assisted them in measuring mass using the Metler balance, measuring volume using the graduated cylinder, determining the titration end point, etc. They also showed students how to compute the volume in percent of acid content of the vinegar, based on the data they obtained from the titration process. The session was culminated by a post-laboratory presentation wherein students discussed their answers to laboratory questions and presented the results of their computations.

When we asked Mario for feedback on his team's presentation, he expressed how difficult it was teaching the lesson because of the lack of his students' prior knowledge, skills, and experience on use of the titration techniques. He was thankful that his classmates helped him in teaching the lesson by providing students with one-on-one instruction in how to go about with the laboratory activity and computations. He realized the need to pitch down his presentation to the level of students.

Assessing Student Learning through Portfolio Assessment

A group-generated portfolio was the last piece of collaborative work that students submitted to complete their requirements for the community immersion course. After a very short respite from finishing their service learning projects, Vicente called a meeting for each student group to discuss the progress of their portfolio and to clarify criteria in the rubric.

We first began planning for the portfolio during the community immersion student seminar. In the planning session, we agreed that the group-generated portfolio must include the following major parts: (a) introduction, (b) table of contents, (c) goals and

objectives, (d) description of the team, (e) discussion of learning experiences, (f) evaluation, and (g) summary and conclusion.

With due consideration to the course objectives, Marian and Vicente met for a preliminary discussion on what a good portfolio might look like. From their meeting, they outlined the agenda for negotiation with students in the development of a rubric to assess the portfolio. During the class discussion, we negotiated the required evidence and minimum criteria to satisfy each section of the portfolio. A table in Appendix E shows the product of this negotiation. It served as reference point in the development of the portfolio rubric.

Development of Rubric to Assess the Group-generated Portfolio

After we identified the important sections and specific areas for assessment, we began the painstaking process of developing the rubric for the portfolio. The tables in Appendix F and G, show the evolutionary process of developing a final rubric for the portfolio, after considering the comments and suggestions from community immersion participants and portfolio assessment experts. For example, the table in Appendix F shows a combination of quantitative and qualitative criteria in the rubric. However, after showing the rubric to three assessment/evaluation experts, we decided to highlight the qualitative dimension of our assessment criteria. The final rubric in assessing the group-generated portfolio is shown in Appendix G. As a caveat, the rubric was intended as a general assessment tool for all student groups in our cohort who conducted the community immersion in Baybay.

A Peak into Our Research Team's Portfolio

Our research team's portfolio was patterned after the shape of a bivalve shell. Leslie headed the design team after soliciting suggestions from members of the group. We designed the portfolio in such a way that when one opens the portfolio, he or she can see the title page, "Community Immersion Portfolio." The letters on our title page were made of corals pasted on a thick paper board. We decorated the title page with shells and miniature rubber fish to complement our coastal village-marine-inspired portfolio design.

In the second and third page of our portfolio, we pasted a computer print of our introduction. In the introduction section, we explained the rationale on the use of the portfolio to document and assess our community immersion experience. We also provided an overview of the portfolio contents. We also cited literature to connect portfolio assessment with our notions of community and our beliefs about the purposes, values, and goals of community immersion.

The next section of our portfolio was the table of contents. In this section, we outlined in Roman numerals the ten major headings of our portfolio—introduction, goals, description of the team, pre-immersion section, community stay, post-community stay, evaluation section, summary and conclusion, students' comments page, and teachers' comments page. Under each heading were specific topics and their corresponding page numbers.

In the goals and objectives section, we identified the following objectives for the development of our portfolio: (1) To document our notions and experience of community and our beliefs about the purposes, values, and goals of community immersion; (2) To

document our learning experiences before, during and after the community stay; (3) To document the cultural knowledge and practices of the community relevant to science teaching and learning; (4) To relate/connect our community immersion experience with science content and pedagogical knowledge in particularly in the development of cultural memory banks and culturally relevant science lesson plans; and (5) To showcase our collaborative efforts not only in the development of the portfolio but also in all activities that we conducted throughout the community immersion course.

In the next section of our portfolio, we presented the individual profile of team members. Each profile was accompanied by a self-generated autobiography highlighting not only personal background and achievement but also our family and experience of growing up in a community. We wrote a narration of how our team was formed. Despite our individual differences, we also discussed the common threads that bound us together as a group.

The next section of the portfolio documented the learning experiences and preparation before the community stay. In this section, we wrote our expectations and prior beliefs about the course, our notions and experiences of community based on the ideas we shared during our focus group discussions and class presentations, and our learning experiences brought about by our preliminary community visits and participation in the community immersion student seminar. We also pasted in this section our group-generated action plan, schedule of household chores, plans for our five-day group menu, and representative samples of creative works such as poems, essays, and drawings.

In the community stay section, we wrote a narrative detailing our learning experiences during the qualitative observation session on the shore and the community mapping activity. We also pasted representative transcripts of the interviews we conducted in the community, focusing on cultural practices relevant in science teaching and learning. We also wrote fictionalized and non-fictionalized accounts of our observations and experiences in the community. We also documented what we learned from our informants and connected this to the science content and pedagogical knowledge we learned in the university. We supported our narratives with pictures, drawings, actual artifacts, and other creative works.

In the post-community stay section, we showed samples of interview data converted into cultural memory banks and culturally relevant science lesson plans. Through a photoessay, we showed evidence of our service learning projects—the putting up of Baybay's community-based museum and the teaching of culturally relevant science lessons to village high school students.

In the evaluation section, we placed individual assessments of the portfolio using the rubric that was developed. Qualitative comments from members of the team were used to support the table summarizing our individual assessments of the portfolio.

In the summary and implications sections, we summarized all of our learning experience through community immersion—from informants, ourselves, supervising faculty, etc— and tied them to our science content preparation, professional education courses, and our future careers tasks of educating students of science.

The last two pages of our portfolio were devoted to students' and teachers' comments. On the student page, we wrote not only our joys, insights, and thanksgivings

but also our difficulties, challenges, heartaches, and pressures brought about by the demands of the community immersion course.

Epilogue

I am sitting in front of my computer, more than three-quarters finished with my dissertation writing. All the individual and group narratives for my dissertation have been written. I neatly piled into my luggage bag all stacks of papers containing the transcribed interviews and focus-group discussions of my research. I also returned my students' portfolios and journals, stuffed full, in a second luggage bag. Hundreds of photographs, a video compact disc, and piles of archival information—all stored in a third luggage bag.

I said to myself, "I am done." The huge set of data has been tamed. They have been transformed into narratives, waiting for another level of analysis. I am sure I will go back again to the data set. But at least, I can say that they have been transformed into kernels of narratives-- more focused, less cluttered, more organized.

Am I justifying my work, soothing my tired mind? Honestly, I have been sick and tired of this deluge of data. It has been a year now that I ate with, slept with, struggled with, sometimes cursed, and often buoyed up in moments of breakthrough by these data. I just want to take this sigh of relief after finishing another stage of my data analysis. In a short while, probably tomorrow, I will start my analysis of narratives, still contemplating possibility of going back again to my original data.

After going through the tedious process of writing the narratives for my research, I am tempted to revisit my research purpose and tie them with the narratives still fresh in my mind. At the outset, I intended to build a community of researchers and inquirers who

were mindful of their community immersion experience to inform the theory and practice of community-based science teacher education. Now is a perfect time for a reality check. Did I really build a community of researchers? Are we still a community? Where are we now in relation to our research purpose?

In as much as I want to claim that I built a community of researchers, our current research team's situation reflects both all paradoxes, the multi-faceted, and nuanced meanings of community. A part of me says, "No, we are no longer a community." Except for sparse e-mails I receive as a feedback for the narratives I wrote from the members of my research team, our communication is as rare as the Philippine government's action on the social justice issues expressed by the marginalized people in Baybay. I feel like I live a separate world, doing my business here, while my students live their own separate world, doing their own business there.

Did I build a community of researchers and inquirers from among members of my research team? A part of me says yes, because for a certain span of time, we came together and shared a common sense of purpose—that of accomplishing our research goals. But wait...how sure am I that we shared a common purpose? It might be that I was obsessed with accomplishing the research objectives in order to get my doctoral degree. Or it might be that my students were forced to embrace our research objectives in order to complete the community immersion, a requirement for their program of study.

Did we build a community of inquirers and research? A part of me says no, because all of us are no longer confined in one territory. But wait...my students might still be a community because they still share a common space in school. In fact, they said that their community had been formed long before the research process began.

Did I form a community of inquirers and researchers from among my community immersion participants? A part of me says yes because sense of community is not only limited to a territory; it can be a sense of place, of memory, and of kinship—the friendship and support that I got from my research team. The spirit of community might still be around despite the limits of distance and physical presence. Finally, I could still say yes, we are still community. Does my current situation exemplify a post-modern notion of community—in constant motion, never static, shifting, moving, leaving behind traces of memories in other's lives, building communities in multiple places and spaces and in a continuum of fleeting time?

Community, hhmmm....I hope there is only one meaning of community in order for me give a simple straightforward to my question, "Did we build a community?"

Chapter 6

ANALYSIS, DISCUSSION, AND INTERPRETATION OF NARRATIVES

Introduction

This chapter focuses on the analysis, discussion, and interpretation of narratives and the formulation of emerging theory from the research. Analysis of narratives centered on the generation of themes drawn from findings in Chapter 4 (Specific Individual Case Narratives) and Chapter 5 (Schematic Group Narratives). The themes were generated using some inductive analytic procedures of grounded theory. Polkinghorne's (1995) notion of paradigmic reasoning was used to complement the analysis, discussion, and interpretation of narratives..

This chapter is organized into four major sections commensurate to the research questions of the study, namely: (a) research participants' notions and experience of community and their beliefs about the purposes, values, and goals of community immersion; (b) research participants' learning experiences brought about by their participation in community immersion with emphasis on the integration of communitarian, project-based, and social justice service learning paradigms; (c) assessment of research participants' learning through community immersion with emphasis on the use of portfolio as an assessment tool; and (d) transformation of community immersion experiences into useful practices in science teacher education through the development of cultural memory banks and culturally relevant science

lessons. Each major section in this chapter is further divided into themes drawn from the analysis of narratives.

Research Participants' Notions and Experience of Community and Their Beliefs About the Purposes, Values, and Goals of Community Immersion

This section is divided into two major parts. The first part focuses on findings highlighting the discrepancies between the research participants' notions of community and their lived experience of community. The second part focuses on findings tracing the evolution of research participants' beliefs about the purposes, values, and goals of community immersion.

Finding 1: Discrepancy in typologies between notions and experiences of community

Research participants gave varied notions of community. These notions were clustered towards elements of community as a place, people, relationship, activity, and culture. For example, Tomas, a member of the research team, defined community as a group of people occupying certain territory, interacting with each other, and sharing common beliefs, traditions, and customs. Trixie considered a community as "composed of family, houses, and establishments.... with people having varied sources of income." Manuel, a teacher educator, described a community as a "group of people living together in a particular area....[who] share common values, beliefs, or sources of living. It may also refer to a place where one grew up and feel the sense of attachment and belongingness." Ben characterized a community as a "group of people with differences in personalities, livelihood, culture, and tradition."

Except for Ben, who focused more on individual differences rather than shared identities, the majority of research participants expressed a clean, unruffled, and

romanticized notion of community. From their verbalized definitions, one can apparently glean a strong parallelism between the participants' notions of community and those found in classical anthropology or sociology—somewhat rote or static conceptions of community. For example, Agrawal and Gibson (1999) conceptualized community as a "spatial unit, as a homogeneous social structure, and as a set shared of norms" (p. 633). Consistent with these three major categories, the research participants, at some point, described simplified conceptions of community, contrary to the tensions and anomalies that characterized their lived experience of community.

Analysis of narratives revealed discrepancies in typologies of participants' notions and experiences of community (Table 6.1). Four anomalies or discrepancies were abstracted from narratives to complement the traditional typologies of community, namely: (1) blurred and shifting boundaries of community as a place, (b) tensions in relationships among group of people, (c) problematic notion of shared culture, and (d) concentric versus de-centered images of community.

Table 6.1

Research Participants' Traditional and Emerging Typologies of Community

Traditional Typology (Notions)	Emerging Typologies (Experience)
I. Community as a place	• Blurred and shifting boundaries of community as a place
II. Community as a group of people	• Tensions in relationships among groups of people
III. Community as a shared culture	• Problematic notions of shared culture
IV. Community as process	• Concentric versus de-centered images of community

Discrepancy 1: Evidence of a multi-place community resulting in the blurring and shifting of boundaries in a community

The traditional typology of community as a place was apparent in the research participants' narratives. This was not a surprising finding. Affiliation to a place as a seedbed of Filipino sense of community is not new to the Philippine context. In fact, according to Landa Jocano (2001), a foremost Filipino anthropologist, the place-based notion of community is grounded in a "communal" world view of Filipinos wherein close relationships are forged within a spatial unit, particularly in a neighborhood or in a *barangay*.

Analysis of narratives drawn from research participants' notion and experience of community revealed compelling evidence pointing to the place as a hotspot of community formation and experience. All members of the research team at some point spoke about their *barangay*—the place they were born, grew up, developed consciousness about the physical world, and forged relationships with family and other people surrounding them. In some cases, participants no longer lived in the place they considered their community. Their search for "better" life (e.g., getting a college education, professional advancement) often physically pulled them apart from the place they called community. Sometimes, the *barangay* became their refuge, a place where they could go home on weekends (e.g., cases of Chenny, Carla, and Ben) or on special occasions (e.g., case of Dianne and Ynes). In some cases, it was described as a place of memory that they long to visit—a reminder of Sergiovani's (1994) notion of community. This spot was kept in their mind, or possibly heart, reminding them of a place called home and/or community.

Evidence of a traditional typology of community in the narratives might be attributed to the fact that most of research participants have had experience growing up and/or living in rural *barangays*. For example, Tomas described his community as rural agricultural—a *barangay* surrounded by towering mountains, a house in the midst of vast rice fields, and a river dividing the village asunder. Located at the periphery of the city, Trixie's descriptions of her *barangay* were laced with images typical of a poor urban community, e.g., close adjoining houses, a crowded neighborhood, a dirty *talipapa* or wet market, a small chapel, and a river. Ben, having lived in temporary housing situations, described a *barangay* as a cluster of rich neighborhoods in a subdivision adjacent to a crowded squatter's area .

In addition to their romanticized, unruffled notion of a community, the research participants' also expressed in their narratives a life experience troubling the traditional typology of community as a place—a specific location with physical, legal, and political boundary. The *barangay* for example has permanent characteristics. Its boundary can be physically identified, legally claimed, and politically governed. Most often, definitions of a community as a place is limited in some respect: they do not include anomalies associated with the people's experience of shifting and blurring boundaries within and across communities.

Thematic analysis of narratives revealed an experience of community among participants that goes beyond the traditional typology of a place. Research participants' narratives revealed the existence of a multi-place, multi-space community whose boundaries are relative and sometimes shifting. For example, some research participants talked about a community with reference to their respective homes in a *barangay* and

sometimes to their temporary housing situations (e.g., rented house, boarding house, relative's house). They also talked about a community within a community—a cluster of houses in a neighborhood, a *sitio* within a *barangay*, and a *barangay* within a district. In fact, Ben expanded this notion by suggesting a community with no physical or territorial boundary. He was referring to a global community, a small speck of "place" with respect to the limitless expanse of the universe.

The research participants also talked about a community where they could come and go, thus challenging the notion of a permanent community. Ben aptly described this experience in a statement, "Someday, I might move again." Research participants also described the *barangay* not only as a complete whole but also as a place literally and figuratively subdivided by "walls" as evidenced by a fortified subdivision adjacent to slum houses and a physical distance that separates peripheral from central houses within a community.

The experience of a multi-space and multi-place community might also explain participants' perceptions of the blurring and shifting boundary within and across communities. Further, it might explain the existence of community within a community, a stark contrast to some traditional images of community found in individual and group narratives. For example, Tomas, Chenny, and Leslie spoke about their temporary housing situation in the city and their experience of community in schools and in boarding houses. However, they still looked forward to going home every weekend to visit their respective families. They sometimes called their neighborhood, their *sitio*, and their *barangay* as community. Apparently, the boundary became blurred to them, as one spatial unit is a subset or an intersection of another place.

In addition, Trixie's narratives about her *barangay* and Baybay's squatter residents brought into fore the idea of "displaced community" due to land ownership issues. Like the squatter residents of Baybay, Trixie also feared the possibility of being displaced because her father does not own the land where their house stands. Trixie's fear was fueled by the same problem she learned in the immersion site: Coastal residents did not own the land where their house sits. Many of them were forced to vacate their lots and were transferred to a relocation site. Although the process was facilitated by the *barangay* officials, many of these displaced residents were still insecure of their situation because they did not hold a piece of paper to prove ownership of their house lot.

As additional illustrative cases, the notion of a multi-place community with blurring and shifting boundaries can be gleaned in the narratives about Baybay. The *barangay* was clustered into neighborhoods of squatters near the coastal area, of rich residents enclosed by a gated fence in an adjacent subdivision, of displaced villagers in a relocation site, and of peripheral houses at the outskirt of the village. These physical divides were a few examples of an emerging experience of community contradicting the research participants' traditional concept of place as fixed, immovable, homogenous, intact, undivided, and permanent spatial unit.

Discrepancy 2: Tensions in relationships troubling the typological "sense of belonging" among a group of people in a community

Analysis of narratives revealed two contrasting sides of a spectrum describing the relationships among a group of people in a community. On one side of the spectrum, participants described notions of community that suggest a group of people living together in harmonious relationships; its members have feelings of attachment and a

sense of belonging. On other side of the spectrum, they painted images of struggling to belong and become part of a community. These tensions in community relationship were brought about by participants' awareness of the changing nature of the Filipino family; their feeling of confusion in group undertakings brought about by differences in personal circumstances and personalities; and their past experience of alienation and problematic situations within a community.

The narratives in Chapters 4 and 5 were spruced with evidences of a "romantic" notion of community relationship. This notion was made concrete through their images of family—sometimes of the nuclear type as in the case of Candy—living together under one roof, eating together, helping in household chores, and telling each other's family stories. These images were further amplified by clichés drawn from research participants' narratives such as "We have a close family relationship, " A family comprises a community," "The family is the center of the community," "I am glad I have a family to support me," " I felt the support and camaraderie of my friends," "I trust my friends," "We are like a family," " I feel I belong to the group", "I am a member of a community," and so forth and so on. However, these images and clichés describing community relationships—a reminder of McMillan's (1996) psychological sense of community—are not enough to capture the participants' lived experience of community.

By contrast, research participants also shared life experiences that challenged the notion of harmony and sense of belonging in a community. For example, Tomas, who came from a traditional rural family, shared experiences that shook the unproblematic notion of smooth relationships across families and within a community. He grew up learning the family and community traditions (e.g., *paentero, panurong-surong, dal-ag*)

and was grounded in a strong sense of place and history brought about by his rural agricultural community upbringing and his close relationship with parents and siblings. However, he shared a family secret that tainted a rosy picture of a peaceful family and community. These were spoilers of harmonious family and community relationships—a sister raped by an uncle, a brother who planned a vendetta, a young sibling/nephew troubled by the neighbors' ridicule and revelation of a secret, and a family alienated from and misunderstood by relatives in the community.

The narratives in the findings chapter also revealed problematic and troubled family and/or community relationships among other members of the research team: Ben, product of a broken family, holding a grudge against his unknown, unseen father; Carla and Trixie accusing their *barangay* captain as "corrupt" and "biased," respectively; Ynes wanting to, but not feeling close to her parents who gave her away to relatives when she was young; Aldrin feeling excluded from a clique, not sure if he was part of the research team; Candy feeling suffocated by a strict spinster aunt; and research participants' community immersion experience troubled by pressures brought about by class and research requirements, misunderstandings due to personality differences, and tensions caused by uncooperative group members and research informants.

The formation and experience of community in this collaborative action ethnography might serve as an illustrative case of a troubled sense of community. The purpose of the study was to create an inquiring and learning community among research participants, mindful of their community immersion experience as a context for creating community-centered and culturally relevant pedagogies in pre-service science teacher preparation. The process of creating a community of learners and inquirers through

collaborative action ethnography brought into fore tensions in relationships due to differences in motives, personalities, and levels of interest; dearth of time and resources; and issues of power and authority.

Although members of the research team agreed to take part in the research and embraced the goal of the project, they were also confined in their self-serving interests: Vicente, to complete his dissertation, and members of the research team focused on completing their requirements in order to pass the course. These differences in motives also influenced the levels of interest and extent of participation in the research process. In addition, members of the research team, most especially the students, expressed feelings of stress due to the demands of the course and research requirements. Their lack of time due to full academic loads, tight budget and heavy spending for class requirements and service learning projects, resulted in a tension-filled experience of a collaborative research process.

Feelings of exclusion within and outside the team were also evident in the narratives. Aldrin, after sensing exclusion from the group, decided to leave the team. Student members of the research team also felt the gap with other student groups—possibly due to the "special attention" given to the research team as the other groups claimed, or due to unintended consequences when a group forms a community. When a community was formed, it seemed like the feeling of exclusion was inevitable among those who were not part of it.

Discrepancy 3: Evidence of a problematic notion of shared culture in a community

Traditional notions of community often point to shared identities, goals, traditions, and values—broadly categorized as culture—as the unseen knot that binds the

community and its members together. This experience was evident in student-generated conceptions of community: “We have a community tradition.” “We share common beliefs, traditions, and customs.” “We understand each other better after listening to each other’s stories.” “We have shared identities.” “We have a shared culture.” Apparently, these conceptions are clichés of traditional notions of community.

The study, however, revealed another conflicting finding. There were members of the research team who believed that a community should exist and thrive not only on commonalities but on differences as well. For example, Ben would rather look at a community with members having varied sources of income, distinct personalities, diverse interests and goals, and dissimilar beliefs. He suggested that diversity, in contrast to similarity, should be the worthy goal in the formation of a community.

As mentioned earlier, formation or building of a community might result in negative backlashes. The feelings of inclusion and exclusion become apparent when a community is formed—the we-versus-them, the insider-versus-outsider mentality so to speak. For example, student members of the research team noticed the gap between them and other group members. Meanwhile, students in other groups felt that the research team was given special attention. The tension between groups was more evident in the later part of the semester, particularly in the preparation of displays for the museum. Student members of the research team felt that other student groups “ganged up” on them by giving them limited space and a cold shoulder during their preparation of displays. Again, the research team did not intend or expect this consequence in their goal of building a community of learners and inquirers from among themselves.

Analysis of narratives also revealed a microcosm of the problematic notion of culture in a community like Baybay. For example, the peripheral residents in the hills of Baybay expressed the feeling of exclusion due to the high priority in development projects implemented near the coastal area, the center of the community. A closer analysis of their exclusion experience may also point to the cultural differences between uphill and coastal residents. The uphill villagers were mostly upland farmers; they have cultural practices (e.g., *dapog, sab-og, panudlak*) different from fisher folks living near the coastal area (e.g., *palupad, panginhas, tu-ob*). In addition to the physical divide, a cultural divide amplified this feeling of exclusion within the community, thereby challenging the primacy of homogeneous beliefs, traditions, and ways of living as the identifying factor of a community.

Discrepancy 4: Evidence of concentric individual versus de-centered group experience of community

The findings in the narrative chapters painted two strong images delineating an individual and group experience of community. One is a concentric individual experience and the other is a de-centered group experience of community. In a concentric individual experience, the person is the nexus of community experience; he/she is surrounded by circles of people, often starting from immediate family to next layers of people such as friends and acquaintances. The group experience of community was a contrast to the first—defocused, cluttered, and shifting. It centered neither on an individual nor a group of people but on activities, goals, and processes—the nexus of group community experience and formation.

Ben's statement, "I am a community," might be a good starting point to explain an individual's experience of a community. The locus of community experience resides in a person as she/he is surrounded by concentric layers of people who are part of his/her community. These layers of people include immediate family members, neighbors, friends, cliques, relatives, classmates, acquaintances, etc. The order of circles of people comprising one's experiences of community may vary—and should be taken on a case to case basis—however, family and friends in the narratives appeared to be the first two closest to the center of the circle.

In the case of Tomas, Trixie, and Ben, it appeared that their respective family was the closest group of people who provide them the sense-of-community experience. The next layers included their friends, classmates, and *barangay* people although the order was not clear. This might be influenced by several factors. It seems like personal circumstances and family background appeared to exert an influence on the order of circles of people surrounding an individual experience of community. For example, Trixie's narratives had more direct reference to friends as part of her circle of community experience—possibly due to her being an only child and orphaned of a mother. Having lived and grown up in a rural agricultural community, Tomas's narratives were centered on his experience of community with relatives and *barangay* people. Ben did not mention much about his circle of friends. Rather, his narratives focused on his experience of moving from one relative to another, placing more weight on community experience with respect to his relationship with his mother, sister, uncle, and aunt who helped support his college education.

Contrary to the individual experience, the group experience of community was not concentric. The pattern of experience appeared to center not on people but on activities, goals, and processes that bound the group together. In the case of the research team, the group was formed not in a natural way but by consent. The group formation was part of the structure of the community immersion course; it was also formed and instigated out of the principal investigator's interest to implement his dissertation research. Despite the consensual expression of support (i.e., signed consent form and verbal affirmations), members of the research team had different levels of interest, participation, and attitudes towards the collaborative action ethnography, usually influenced by what they thought they could draw from the experience. Obviously, Vicente had the strongest stake in the research process while the student members may not have the same level of enthusiasm and interest as Vicente's.

Apparently, the dominant forces that bound the research team together as a community were centered on goals, tasks, processes, and activities. Members of the research team were involved in fine tuning the goals of the project and expressed commitment to support their accomplishment. Their participation in research and class activities— e.g., interviews with village people, implementation of service learning projects, discussion of memory banks and culturally relevant lesson plans— provided a rich context for interaction. Through focus group discussions, co-generative dialogues, sharing of experiences, and critiquing of ideas and research products, the members of the research team were drawn near each other, thereby facilitating the community building process. The group experience of a community was tentative, de-centered, and shifting

because activities, goals, and processes changed depending on consensus and informed decisions among members of the research team.

Finding 2: Evolution of beliefs about community immersion—from naïve to operational to advanced— through experience and reflection

Analysis of narratives revealed a change in sophistication of prospective science teachers' beliefs about the purposes, values, and goals of community immersion. This claim proved contrary to common notions about beliefs—that they are resistant and difficult to change. Although the basic tenets of belief about community immersion were maintained by the research participants, the level of sophistication appeared to increase as they progressed in their experience of community immersion. Table 6.2 shows the categories of participants' beliefs experienced at different stages of the community immersion course. The findings revealed a slow progression of change from plain to sophisticated beliefs brought about by the experience of community immersion.

Table 6.2

Evolution of Research Participants' Beliefs about the Purposes, Values, and Goals of Community Immersion

Stage	Categories of beliefs	Contextual Triggers
Beginning	Naive beliefs • Informed by others, i.e., grapevine source • Borne out of confusion and/or lack of information • Not grounded in experience • Either negative, apathetic, or affirmative	• Informal interaction with students and faculty who had community immersion experience • Vicarious experience through interviews and sharing of experiences
Formative	Operational beliefs • Grounded on knowledge and experience • On going, developing, working • Developed out awareness and discovery • Confrontation with reality • Centered on belief-practice relationship • Affirmation and/or rejection of prior beliefs • Partial and incomplete because it is context specific	• Experience of community immersion • Exposure to problematic situations • Living with the village people • Interviews and observations with village people
Terminal	Complex beliefs • Knowledge grounded in deep reflection • Perspective change • Attitude change • Affirmation of values • Sense of fulfillment • Integration of beliefs and experience • Comprehensive and holistic	• Reflection • Memory banking • Sharing of experience

Categories of Beliefs about Community Immersion

Research participants' beliefs about the purposes, values, and goals of community immersion are clustered into three major categories, namely: (a) naive beliefs, (b) operational beliefs, and (c) complex beliefs. These clusters were drawn from research participants' beliefs about the purposes, values, and goals of community immersion at different stages of the collaborative action ethnography. Community immersion participants appeared to increase the level of sophistication of their beliefs—although the basic tenets were still maintained— as a result of their exposure to community immersion. This means that the experience of community immersion was an effective context for belief change among research participants.

Naïve beliefs. As a caveat, at the early stage of community immersion, the research participants did not have well integrated belief sets. Their naïve beliefs about the purposes, values, and goals of community immersion were most often preliminary perceptions about the course. These "beliefs" were informed by their prior knowledge about the course—often influenced by their interaction with previous community immersion participants. For example, the interviews conducted by members of the research team with faculty members and students with prior community immersion helped shaped their preliminary beliefs. Research participants also mentioned their awareness of community immersion activities through exhibits and portfolio displays that previous students had put up as a terminal requirement of the course. Most often, fourth year students shared their community immersion experiences with third year students through informal conversations. The telling of experience provided a vicarious

experience for prospective community immersion participants, thereby shaping their preliminary beliefs about the course.

Analysis of narratives in Chapters 4 and 5 contained naïve belief statements about community immersion. For example, Tomas, at the beginning of the course considered community immersion as a mere exposure to a community different from his rural agricultural *barangay*. His idea of a "dialogue of life" was limited to a superficial description of "going into the community, living with the community people for a week, and then going back into the university." However, his interview with Amelia, a teacher educator and Roselle, a preservice science teacher, helped shape in a positive way his preliminary beliefs about community immersion. He vicariously experienced community immersion from stories shared by Amelia and Roselle. He reiterated the cliché "dialogue of life" to describe his belief about community immersion, although he could not fully describe its meaning and significance in his science teacher education preparation.

All except one participant presented positive preliminary beliefs about the purposes, values, and goals of community immersion. For example, research participants expressed positive belief statements about community immersion such as: "The purpose of community immersion is to ground students on the reality of life." "It will provide me a firsthand experience on how to behave in a rural community and compare my community with that of an immersion site." "It promotes better interaction between the people in the university and the community." These belief statements—obviously on the perception level— exhibited a certain degree of soundness, however, they were not grounded in experience. They were formed possibly because of what they had heard from

others. This researcher contends that such kind of belief is easily changed because it is not grounded in experiential knowledge.

Ben's beliefs statements at the beginning of the course were outliers in generally affirmative perceptions towards community immersion. The inclusion of research activities made him question the purpose and importance of community immersion. At the outset, he expressed confusion about the interplay of community immersion and collaborative action ethnography; he felt that the research activities were not enjoyable and useful to his science teacher education preparation. His apathetic attitude about the inclusion of qualitative research in community immersion was expressed in this belief statement, "I don't think we need to study the community because we are already familiar with it. The community is always around us." Apparently, the community to Ben was a common, all too familiar place that did not need further study. Some naïve beliefs were negative and the reasons for their existence might be due to lack of information.

Operational beliefs. The analysis of narrative also generated another broad category of belief statements. These are referred to as operational beliefs because they evolved alongside experience. As research participants went through community immersion, they developed a set of beliefs to complement their emerging experience of the course. As they confronted reality, they tested their beliefs—positive experience leads to belief affirmation while negative experience leads to rejection of beliefs. Also called on going, developing, and working beliefs, operational beliefs was grounded in and formed through experience. Research participants fine-tuned their beliefs as they confronted reality.

Several narrative segments support the evolution of beliefs—from naïve to operational—as research participants went through community immersion. For example, the value of social justice as an important dimension of community immersion was only realized by research participants during the course of their community stay. It can be recalled that they found difficulty in identifying social justice and inequity issues in Baybay at the early part of the course. As they immersed themselves in the lifeworlds of the village people, the research participants were able to uncover a lot of social justice issues that informed their beliefs about the importance of the course. In addition, they also realized the importance of community immersion and the role of community in making science more relevant to the lives of students. For example, Ben, who initially expressed the unworthiness and inferiority of local practices against Western science, embraced, at the latter part of the course, a more positive stance about community immersion by recognizing the importance of *panghilot* as a rich context in making science relevant to the lives of village school children. On the other hand, Tomas, after his demonstration teaching of a culturally relevant science lesson in Baybay, was very enthusiastic in saying that community immersion made him realize his calling as a prospective science teacher of and for the community. Trixie' discovery of upland farming practices in Baybay made her realize the value of community immersion not only in enriching her preparation as a prospective science teacher but also in expanding her total life experience as a person brought about by her limited exposure to rural living.

In addition to their beliefs regarding the importance of community immersion in learning science content and in bringing relevance to science education, research participants also believed that they learned social and managerial competencies as they

went through the planning and implementation of their community immersion activities. For example, they learned how to set goals, communicate plans, and negotiate their action plans with classmates, teachers, and village people. They also believed that community immersion taught them how to adjust and deal with various circumstances and people from all walks of life. The process of adjustment, sometimes tension-filled, was grounded in a series of experiences that continually informed their preliminary beliefs.

Another trend in the community immersion experience of participants was the development of specific belief statements applicable to a particular experience. Through community immersion, members of the research team realized the importance of local cultural practices as "capitals" in the teaching and learning of science. These realizations were grounded in specific contexts such as *tuba making* (Mario's), *pamulong kahoy-kahoy* (Candy's), *liwit and barera* (Leslie's), *ginamos making* (Tomas's), *panghilot* (Ben's), *pagsab-og mongo* (Trixie's), etc. This researcher contends that operational beliefs are more stable because they are grounded with knowledge and direct experience. Since beliefs are developed alongside knowledge formation, this researcher further contends that community immersion facilitated the narrowing of the gap between teacher beliefs and actual practice.

Complex beliefs. After or close to the end of the community immersion course, participants tended to embrace a more holistic, mature, and *more complicated* set of beliefs about the purposes, values, and goals of community immersion. Apparently, these beliefs systems were more stable because they were forged not only by the crucible of experience but also by reflection. In most cases, belief statements transcended beyond

knowledge—that is, community immersion participants acknowledged change in attitude and perspectives. In addition, they were able to affirm the values brought about by their community immersion experience.

While operational beliefs were context specific and sometimes initially characterized by tension brought about by discrepancies in beliefs and practice, the formation of complex beliefs were mellowed and tempered by time. Community immersion participants had enough time to step back and reflect on the significance of their experience. In fact, at the end of the course, all research participants echoed positive belief statements about the purposes, values, and goals of community immersion. The same belief pattern was found among students and faculty members who had prior community immersion. It seemed like time healed all the difficulties and tensions participants experienced during community immersion. What was left were sweet memories of the past and affirmations of change in attitudes, values, and perspectives brought about by their community immersion experience.

Perspective/Attitude change and affirmation of community immersion values were the dominant pattern of beliefs held by students and faculty who went through community immersion. For example, Roselle, a city-born preservice science teacher interviewed by Tomas, acknowledged a change in attitude brought about by her community immersion experience. After her exposure to a poverty-stricken community, she realized the need to save money and not to spend it on worthless things. She said, “In the immersion site, students [school children] have only 5 pesos a day. We realized that our snacks are worth a day’s meals for three children. Some school children even walked

far distances on slippers in order to go to school. We have change attitudes after the community immersion."

Marrisa, another preservice teacher interviewed by Ben, after going through the difficulty of fetching water using a *carabao* drawn *karosa* [bamboo sled] in a drought-stricken upland village, realized the importance of conserving water and the value of protecting the environment. In the same manner, after their lived experience in Baybay, the members of the research team recognized the importance of examining social justice issues in the community and reflected on the constraints that prevented them from implementing their service learning projects. They also looked at the community in a new perspective—not just a place to visit and explore but also a rich context to learn science content and to gain pedagogical inspiration on how to transform cultural practices into useful products in science education. The inclusion of participatory action research in the community immersion experience was first viewed with aversion by Ben, however, after going through the experience, he realized its importance in enriching his preservice science teacher preparation. Tomas, in his personal e-mail to the principal investigator, expressed his profound appreciation for the experience of doing qualitative research because he found it useful in finishing *his* action research, a final requirement for his undergraduate degree.

Belief statements after community immersion also revolved around the affirmation of values brought about by the experience. Narratives in Chapters 4 and 5 were filled with descriptions of values characterizing the community immersion experience, namely: cooperation, humility, patience, capacity to adjust with other people, sense of responsibility, awareness of environmental problems, generosity and

hospitability, congeniality, and aversion to injustice. Apparently, in addition to a huge knowledge based grounding complex belief systems, community immersion participants embraced the values and attitudes commensurate to their learning experiences.

Research Participants' Learning Experiences Brought About by Their Community Immersion Experience

This first part of this section describes the categories of knowledge that research participants learned through community immersion. Under each category of knowledge are themes drawn from the narratives to highlight the learning insights brought about the experience of community immersion. The second part of the section focuses on the learning experiences as a result of the integration of communitarian, project-based, and social justice service learning paradigms.

General Category of Knowledge Learned through Community Immersion

Anderson and Mitchner (1994), in their review of research in science teacher education, cited Feiman-Nemser's (1990) conceptual orientations in examining the goals of teacher preparation and the means of achieving them. The five conceptual orientations for teacher education are the following: (1) academic orientation, which focuses on the transmission of knowledge and developing understanding; (2) practical orientation, which focuses on the craft aspect of teaching; (3) technological orientation, which focuses on the application of research in classroom practice; (4) personal orientation, which focuses on teacher-learner's interest as the center of the educative process; and (5) critical/social orientation, which focuses on the goal of establishing new social order by addressing social injustice and promoting democratic values.

How do conceptual orientations in teacher preparation inform the interpretation of what students learned through community immersion? Are community immersion outcomes aligned towards the conceptual orientation for science teacher preparation? In what aspect do they converge and diverge? Answers to these questions require in-depth analysis of what was learned through community immersion. This section presents a broad category of knowledge that prospective science teachers learned through community immersion. It also intends to examine the dominant learning theme within each category of knowledge in order to ascertain the relevance of community immersion in preservice science teacher preparation.

As an organizing framework, six general categories of learning (Table 6.3) through community immersion were abstracted from the analysis of narratives, namely: (a) knowledge about science, (b) knowledge about students and how they learn, (c) knowledge about teaching, (d) knowledge about research, (e) knowledge about the teaching and learning milieu, and (f) knowledge about service learning. To complement the broad category of knowledge learned through community immersion, specific learning insights are highlighted to capture the dominant theme under each category.

Table 6.3

Categories of Knowledge and Specific Learning Themes Brought About by Students' Experience of Community Immersion

General Category of Knowledge	Learning Theme
A. Knowledge about science	• Learning science as a lived experience versus science as an interpretation of a lived experience
B. Knowledge about students and how they learn	• Learning how to bridge the varied foci of individual and group learning through negotiation
C. Knowledge about teaching	• Learning how to teach science using community-centered and culturally relevant pedagogy
D. Knowledge about research	• Learning research by doing research through collaborative action ethnography
E. Knowledge about service learning	• Learning the challenges and constraints in the integration of communitarian and social justice service learning paradigms in community immersion

Theme 1: Knowledge about science— Learning science as a lived experience versus science as an interpretation of a lived experience

Individual and group narratives presented a two-sided experience about science: one is the interpretation of science from the lived experience of coastal villagers and the other is practical science embedded in cultural practices of village people. Practical science in this context refers to the body of knowledge accompanying time-tested local

practices that have been adapted/adopted from one generation to another. Examples of local practices in Baybay embedding practical science included fishing techniques such as *palupad, pamukot, and panahid;* fish/shrimp preservation techniques such as *ginamos making, binulad, and binudo*; farming practices such as *dapog and sab-og*. The validity of knowledge claims associated with the cultural practice lies in its practical and intergenerational utility.

Village people who practiced practical science may not be aware that they were doing science—possibly because they lacked education to interpret science in their practice and/or because they didn't care about the label "science" at all. After all, village people's primary concern was practical living and not theorizing about science. For example, Lolo Tasyo and Manong Eddie did not claim to know science but they could talk about fish behavior, habitat, characteristics, and breeding season in ways comparable to the knowledge of science experts. In the same manner, Lola Maria could tell about the procedure in making ginamos from drying to pounding to storing but never claimed that she was doing science.

By contrast, the research team came to Baybay holding the lens of "western" science to examine the cultural practices of the village people. By virtue of their major, they had some knowledge about/of science that they could draw upon in the interpretation of cultural practices. For example, members of the research team were able to examine *ginamos making* and see how chemistry principles might be used to make sense of the shrimp preservation technique. Tomas used the lens of "western" science to interpret the theoretical basis of *palupad* construction. Ben, after his interview and

observation in the community, devoted himself to trying to relate science principles to the practice of *panghilot*.

The two faces of science found in this study—one that is practiced and the other interpreted—open up epistemological questions surrounding the nature of science. What is science? What counts as science? Who can speak about science? Is science an exclusive right of the "learned"? Do people doing science—although not aware of it—have the right to the knowledge extracted from them? Apparently, the research team was guilty of "knowledge mining" from the community. The principal investigator is doubly guilty in the sense that he had more benefits to gain from the research—a doctoral degree and possibly future publications—while the village people remain anonymous. It is not the intention of this research to discuss epistemological assumptions surrounding the nature of science and the right to knowledge claims. However, findings of the study seemed to open up epistemological issues troubling the divide between practical science and interpreted science and the claims to knowledge associated with them.

Theme 2: Knowledge about people and how they learn— Bridging the varied foci of individual and group learning through negotiation

Analysis of narratives appeared to delineate individual from group learning. Although they co-inform each other, there are peculiarities that set apart how an individual and how the group learn. As an advance organizer, Figure 6.1 shows the comparison between the two kinds of learning in a collaborative undertaking.

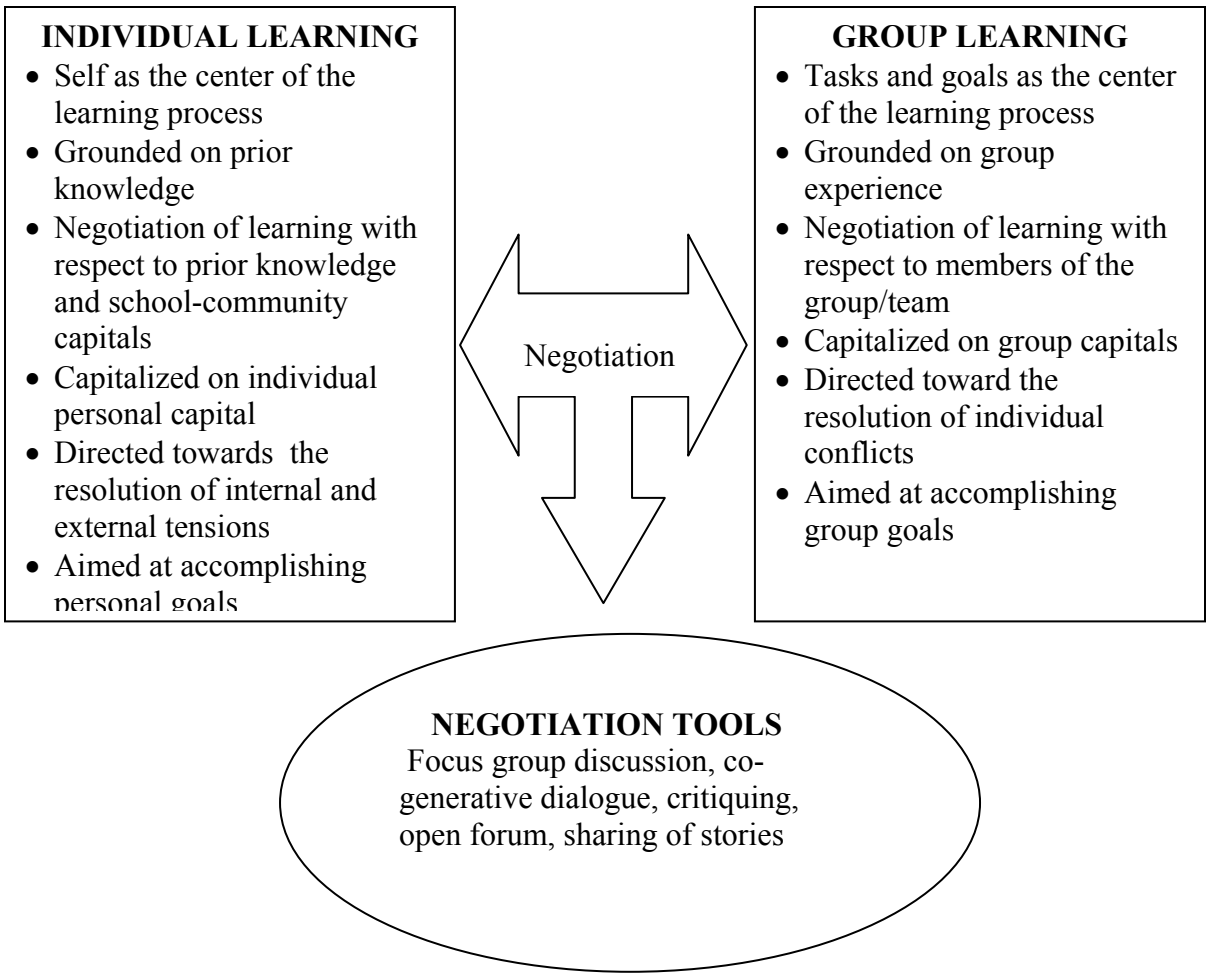

Figure 6.1. Comparison of individual and group learning though community immersion.

Individual learning. Analysis of narratives revealed differences in foci of learning between an individual and a group of people. For instance, individual learning was focused on the person trying to connect the new experience with respect to his/her prior knowledge. The process of negotiation was directed from inside out. In a learning situation (sometimes discrepant events such as Trixie wondering why mongo was planted in a rice field), the individual research participant seemed to connect the new experience with respect to his/her stockpile of previous experience. For example, Mario utilized his *pananggot* experience as a backdrop in studying the science behind tuba making and

vinegar making and how it could be utilized in the development of culturally relevant science lesson plans. Ynes's childhood experience of growing up in a fishing village made her chose *panginhas* as a topic for her memory banking. In some cases, an individual had limited knowledge about the cultural practice. Trixie and Tomas had limited exposure to mongo cultivation and *palupad*, respectively, but their curiosity led them to investigate this practice further.

As an example of individual learning, Tomas exemplified a student with limited knowledge about *palupad.* To him it was a strange fishing technique considering his background growing up in a rural mountainous farming village. However, he conjured images of *palupad* such as flying objects because of his prior knowledge about the root word *lupad,* which literally means fly. Eventually Tomas was confronted with reality—his interviews and observations proved him wrong about his initial knowledge about *palupad*. In order to resolve the initial conflict between his prior knowledge and the external reality, he further studied *palupad* by interviewing people, drawing from their community funds of knowledge so to speak. He then compared the community funds of knowledge with respect to his school funds of knowledge. School funds of knowledge, in this context, refers to the kind of knowledge that students learned in school. In other words, they are products of a western science or Euro-science formal education. For instance, the "science" Tomas used to make sense of *palupad* was an example of school funds of knowledge applied in a specific situation. His interviews with village people and his observations about *palupad f*acilitated the development of a cultural memory bank related to the practice. In the process, he satisfied his curiosity and found answers to discrepant or problematic situations that initially confronted him.

Group learning. While individual learning focused on the realignment of prior knowledge to new experience, the group learning was centered on the accomplishment of tasks and goals set by members of the research team. In a collaborative undertaking, the negotiation of tasks and meanings capitalized on the collective experience of individual members of the group. In order to accomplish the goals or tasks of the project, the members of the research team drew upon their collective group capitals. Collective group capitals, in this research, referred to the sum total of individual personal capitals—e.g., knowledge, skills, experience—that the group drew upon to produce an outcome.

While individual learning was directed towards the resolution of conflict between internal and external worlds, the focus of group learning was the resolution of conflicts among individual members comprising the group. The search for a middle ground to capture group learning experience, instead of mere individual learning, is a huge challenge in collaborative action ethnography. Interpretation of group learning experiences is muddled by power issues, conflict of interests, and limited resources. (The next section discusses how negotiation plays an important role in the resolution of differences in individual and group learning.)

The development of a group-generated cultural memory bank was a typical example of how group learning took place in this collaborative undertaking. For example, in the memory bank *Ginamos Making: The Stinky Smell that Sells,* the focus of learning was the group task: to develop a cultural memory bank that captures the collective experience and knowledge of all stakeholders involved in the research. Memory banking shifted the focus of learning from an individual to the accomplishment of the group task. In the development of the cultural memory bank, members of the research team drew

upon their individual personal capitals—a new addition was the community funds of knowledge "mined" from the village people—and deposited them into the common pot of group knowledge, a result of negotiation, in order to come up with a middle ground that captured the best representation of all knowledge and learning potentials of individual members. The common pot of knowledge became a resource in the development of the group-generated cultural memory bank. The finished product—the cultural memory bank in this example—was a representation of group learning.

Role of negotiation in individual and group learning. Negotiation played an important role in the individual and group learning. Negotiation as a term was used in several contexts in the study. It was used to explain how individual and group learning took place. As a caveat, negotiation had a different dimension in the context of individual learning. It was used to describe the process of smoothing the internal conflict with respect to discrepant events in the external world. An individual, a center of sense making process, negotiates the new experience with respect to what he/she already knows and connects it with his/her school experience. Consequently, the individual negotiation of meaning involves the process of integration of community, school, and individual personal capitals into a coherent whole.

Negotiation in a group context has a different twist. In this study, the process of negotiation was externally manifested in the form of focus group discussions, co-generative dialogues, critiquing, feed back sessions, etc. In the context of this collaborative undertaking, individuals negotiated with other members of the group. Apparently, negotiation was used in smoothening individual differences, i.e., different way of looking at the learning situation. This researcher contends that an efficient process

of negotiation leads closer to the collective experience of phenomena and provides better representation of group learning. A more comprehensive theory to describe individual and group learning in a collaborative undertaking —also called Theory of Negotiated Meanings—is presented in the succeeding chapter.

Theme 3: Knowledge about teaching—Learning about community immersion as an interplay of community-centered and culturally relevant pedagogies in science teacher preparation.

What is learned about teaching through community immersion? Figure 6.2 is a conceptual schema showing the two complimentary community-centered and culturally relevant pedagogies in the preparation of prospective science teachers through community immersion. The purpose of this section is to examine the trend in the pattern of teaching in community immersion and discuss how community-centered and culturally relevant pedagogies complement each other in the preparation of prospective science teachers.

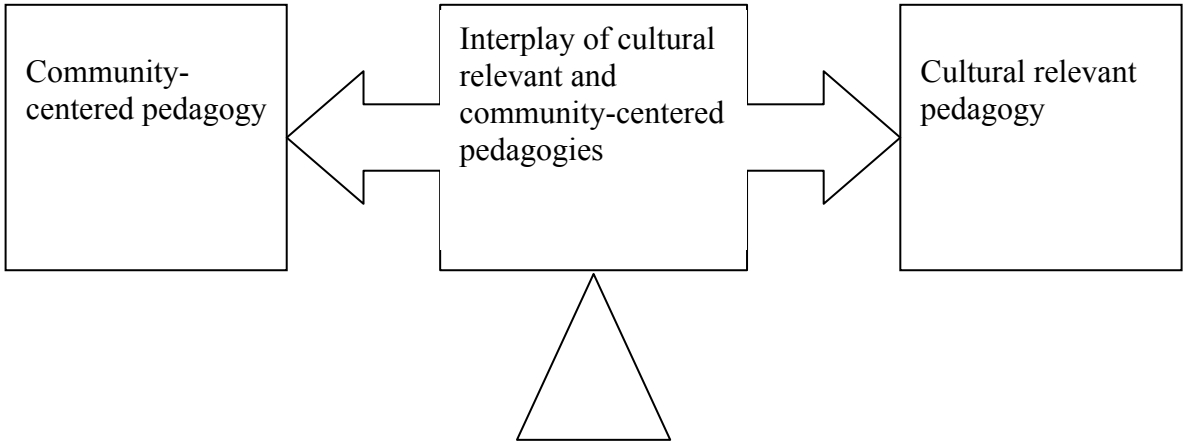

Figure 6.2. Conceptual schema in the integration of community-centered and culturally relevant pedagogies in the preparation of prospective science teachers.

The left side of the balance is heavily weighed on community-centered pedagogy in the preparation of prospective science teachers through community immersion. In this study, the community-centered pedagogy refers to the whole spectrum of activities and processes utilizing the notions of community to inform the teaching of community immersion—e.g., community as a place, as a group of people, as a process, and a shared culture. At the right side of the balance, a heavy emphasis is placed on culturally relevant pedagogy as the nexus of the community immersion experience. At the fulcrum is a combination of both pedagogical leanings.

Analysis of narrative focusing on how community immersion was taught revealed not contradictory but complementary community-centered and culturally relevant pedagogies. In fact, Tippins and Richie (2005) suggest that culturally relevant science education must be community-centered. Throughout the community immersion experience, at some point, one pedagogy is highly emphasized over the other, however, the interplay of both is evident in most cases.

Utilization of community-centered pedagogies. The integration of collaborative action ethnography in the community immersion experience placed a heavy influence on the use of community-centered pedagogies in teaching the course. Community-centered pedagogies in the study refer to all activities and processes that promote formation of community among community immersion participants. For instance, members of the research team were guided by theoretical ideas on community that informed them in their course of action and in making sense of their experience. The use of focus group discussion as a pedagogical and research tool was heavily grounded on the utility of the notion of community as a collaborative process. All throughout the community

immersion experience, the use of focus group discussion was one of the most prominent pedagogical and research techniques facilitating the interaction and communication among members of the cohort. In addition, the grouping of students into clusters—and putting them together in one quarter or host family in the village—was basically a way of facilitating sense of community among members of the group. The community stay in a fishing village—and using it as a context to examine cultural practices and social justice issues—was another way of utilizing notions of community as a pedagogical context in teaching the community immersion course.

Utilization of culturally relevant pedagogies. One important goal of community immersion was to make preservice science teacher preparation relevant to the lives of prospective science teachers. With respect to this goal, community immersion was designed to provide a true-to-life transformative experience for prospective science teachers who are mindful of the community as an important resource for teaching. The community immersion course was replete with activities geared towards making science teacher preparation relevant to the lives of prospective science teachers and to the lives of students they might serve in the future.

In this study, culturally relevant pedagogy refers to activities, process, and techniques geared towards the utilization of students' home, school, and community cultures as important capitals in teaching. An example is the use of prospective science teachers' home and community backgrounds as contexts to teach notions of community. Another is the utilization of local resources and practices in the development of culturally relevant science lesson plans.

Community-centered and cultural relevancy as complementary pedagogies. Community-centered and culturally relevant pedagogies were delineated for discussion purposes only. In the actual teaching of the community immersion course, these pedagogies were used to complement each other. The interplay of these pedagogies is placed at the fulcrum in Figure 6.2 to show the balance in teaching of the community immersion course. The use of focus group discussion to examine research participants' notions of community with respect to their home and *barangay* experience might qualify as an example of complimentary community-centered and culturally relevant pedagogies. Another example is the use of Baybay's cultural, historical, and social practices as resources to implement the service learning projects in the community. The use of farming and fishing practices of Baybay as resources in the development of cultural memory banks and culturally relevant science lesson plans also exemplified complimentary community-centered and culturally relevant pedagogies.

Theme 4: Knowledge about research—Learning research by doing research through collaborative action ethnography

There is another dominant learning theme in the narratives: research team members learned research by doing research. Findings of the study suggest the effectiveness of hands-on and direct experience in learning the nature, process, skills, and products of qualitative research. Table 6.4 presents the categories of "learning research by doing research."

Table 6.4

Specific Research Areas and Description of Learning Research while Doing Collaborative Action Ethnography

Research Area	Description of Learning
Nature/Process	• Collaborative • Exhaustive and confusing • Consensual • Acknowledgement of subjectivity • Multiplicity of data sources • Narrative representation • Time consuming
Skills	• Interviewing • Observing • Analyzing data • Interpreting data • Representing data
Products	• Cultural memory banks • Portfolio • Lesson plans • Museum displays

At the outset, students expressed apprehension in joining the research team because of their limited background about qualitative research. As they progressed in their participation in the research, they were able to gain knowledge and understanding about the nature and process of qualitative research, particularly the collaborative action

ethnography: It involves collaboration among members of the research team. Individual and group narratives showed evidence of members of the research team working together to achieve the goals of the project. In the process, they expressed exhaustion as they felt the course demanded so much of their time and energy. There were times they felt confused. They felt that after the end of every action cycle, the research path forked into many possible directions. In addition, they faced confusion as to what and how to collect data, how to analyze and transform data into narratives, and how to represent their learning experiences in portfolio and museum displays. Such experiences in doing qualitative research simply revealed the nature of collaborative action ethnography.

The dilemma faced by members of the research team simply confirmed the nature of collaborative types of action research—succeeding actions and decisions are fueled by the previous action cycle. Doing collaborative action ethnography also affirms issues inherent in it such as the interplay of power issues in research—e.g., who is the dominant person, who are subsumed, and what are the collateral damages of decisions. As an example, Aldrin represented a collateral damage brought about by power issues. He left the team because of a personal conflict with Ben. Vicente allowed Aldrin to leave for fear of the domino effect after Ben, the most influential member of the group, threatened to leave if Aldrin remained in the group. This case experience is consistent with Erickson's (2006) notion of collaborative action ethnography: power issues are highlighted instead of covering them.

Another aspect of the collaborative action ethnography that research participants learned was the consensual nature of the research process. The discussion of the consent form was something new to the members of the research team who were not familiar with

the ethics of doing qualitative research. Discussion of their rights as human subjects—and the rights of the people they interviewed— was something new to the research participants. Unlike U.S. universities, Philippine universities do not have an extensive protocol governing research on human subjects. Students' exposure to the protocol of collaborative action research made them aware and learn an important aspect of qualitative research—protection of human subjects.

Heavily influenced by the traditional positivist paradigm, student members of the research team were also introduced to memory banking, qualitative participant observation, qualitative interviewing, journal writing, and narrative data (re)presentation. The multiple data sources and different modes of representing data proved to be significant learning experiences for students who were exposed to the traditional positivist research culture of the university.

Research participants said that they learned qualitative research through direct participation in the collaborative action ethnography. They learned research skills such as interviewing, observing, analyzing data, and representing data through individual- and group-generated memory banks. In addition they learned how to represent their data through narratives and transform them into useful research products such as cultural memory banks, culturally relevant science lesson plans, and portfolio and museum displays.

Theme 5: Knowledge about service learning—Challenges, constraints, and gains in the integration of communitarian, project-based, and social justice service learning paradigms in community immersion

The design and implementation of service learning projects in Baybay was influenced by three service learning paradigms, namely: communitarian, project-based, and social justice. Among the three, social justice service learning was given prominent emphasis in narratives. However, the activities and values such as communal decision making and collaborative action associated with communitarian and project-based service learning paradigms was evident in the planning and implementation of service learning projects—the community-based mini-museum and the demonstration teaching of culturally relevant science lessons to village school children.

The aim of communitarian service learning is for the common good of all stakeholders with infusion of respect for human dignity and cultural diversity as important values influencing robust communal decision making and cross-group communication (Boyle-Baise, 1999). Findings of the study showed some evidence to support the realignment of community immersion activities to the goals and values of communitarian service learning: The role of focus group discussion at the heart of the collaborative process was highly emphasized in the individual and group narratives. The narratives were spliced with vignettes showing how students negotiated their activities among members of the group and with village people, particularly the *barangay* officials. The community-based museum was a product of collaborative effort among community immersion participants and village people.

However, the road towards communal decision and action in the implementation of service learning projects was met with constraints and challenges. There was evidence of "in-fighting" between individuals within the group and between student groups. Personality differences, power issues, and scarcity of time and financial resources created a tension in the dynamics of relationships within a group. These challenges and tensions were verbalized in the open forum that members of the research team conducted during their first night in Baybay.

Meanwhile, the goal of project-based service learning is to identify a need or a problem that leads to the design and implementation of a specific project (Fryer and Newnham, 2005). In this study, the research team's identification of the specific need and/or problem in the community was supplanted by the goal of identifying social justice issues and the purpose of transforming relevant cultural practices into science lessons for demonstration teaching to village school children. In ideal project-based service learning, the identification of a problem must evolve from preliminary data drawn from the community. In this study, however, the use of a social justice lens placed limits to possibilities of finding other problems in the community.

Although social justice and project-based service learning paradigms seemed to complement each other in the planning stages of the study, the research team faced the tension of balancing the two paradigms in the actual practice. The tension occurred when they found difficulty in identifying social justice issues during their preliminary community visits. The identification of the problem is the most important defining and guiding framework in the planning and implementation of project-based service learning projects. This was problematic at the start of the study because members of the research

team found difficulty in gaining the trust and confidence of the village people. Besides the physical manifestation of social inequities, the root causes of inequalities remained mysterious to them as their identification required elements of time and close interaction with the village people, which was possible only during the actual community stay.

The difficulty in identifying issues surrounding social justice might explain why students had to delay the implementation of their community-based museum project. In other words, project-based service learning was highly dependent on the outcomes of the social justice service learning. This was contrary to the complimentary nature of both paradigms as earlier conceptualized in the study. Findings such as this suggest a discrepancy in planning and actual practice. Integration of social justice service learning also suggests a restructuring in the order of community immersion protocol. Furthermore, collaborative action ethnography must be quick in responding to changes in the action cycle—as the research team did—brought about by the discrepancy in the plan and in actual practice.

Learning About the Roadblocks to the Path of Social Justice and Equality

Bell (1997, p. 3) defines social justice education as both a process and a goal. Social justice education aims at "full and equal participation of all groups in society that is mutually shaped to meet their needs." It is also a vision of an equitable society where social actors are psychologically safe and secure: They have "a sense of their own agency as well as a sense of social responsibility toward and with others and the society as a whole."

Mindful of this definition, members of the research team embraced the social justice service learning paradigm as an important framework to guide their community

immersion activities and community projects. According to Fryer and Newnham (2005), social justice service learning attends to the goal of social change by addressing the underlying structural causes of inequality and by advocating policy changes.

This goal of social justice service learned appeared to be simple in paper but its applications in actual practice proved to be arduous, challenging, and difficult. Analysis of narratives abstracted five categories of constraints that members of the research team met in their desire to address social justice issues in Baybay. These constraints revolved around problems with respect to (a) issues of trust and confidence; (b) time and resources; (c) apathy, helplessness, and other hosts of negative attitudes; (d) paradigmic clashes; and (e) power issues.

Constraint 1: Issues of trust and confidence. The issue of trust and confidence proved to be a daunting constraint in the conceptualization of the specific service learning project in Baybay. During the preliminary visit in the *barangay*, members of the research team had difficulty in identifying specific social justice issues in Baybay due to lack of trust and confidence from village informants. In fact, the team's initial explorations into social justice issues were met with suspicion from village people. Although they claimed that social inequality is inevitable, village people did not initially trust the research team with stories with respect to social justice and inequalities. This constraint proved to be a huge blow in the research plan because the preliminary visits were supposed to inform the planning of service learning projects to be implemented during the community stay in Baybay.

During the course of the community immersion experience, village people slowly opened up their stories—those that did not surface during preliminary visits and

interviews. This finding seemed to suggest the tricky issue of trust and confidence as important elements for social justice endeavors to proceed. Nobody trusts strangers, so to speak. The physical presence of students in the community and their close interaction with village people slowly broke down the wall of suspicion and mistrust. Eventually, village people shared their stories of marginalization, a window through which participants were able to examine social justice and inequality issues in Baybay.

Constraint 2: Limited time and resources. The five-day community stay was not enough to implement the service learning goals. The collection of evidence underlying social justice and inequality issues—in addition to other learning objectives such as examination of cultural practices relevant to science teaching—required a lot of time. The making sense of data and representing them in the form of stories, poems, essays, and visual displays required additional time. Consequently, the community-based mini-museum as a culminating service learning project was not implemented as planned at the end of the community stay, a normal practice in the five-year community immersion history. The community immersion participants returned to the university without implementing their service learning project in Baybay. The solution to the problem was to delay the implementation of the project in order to give time for students to plan for their museum displays.

The community immersion participants' dwindling and limited financial and material resources also served as a set back in the implementation of the project during the community stay. The transformation of data into useful visual and written displays required financial capital, a stress to students who paid for their own stay in the village. By delaying the implementation of the service learning projects, students were given the

time to replenish their scarce resources. The analogy, "one step backward, two steps forward" in the narratives suggests the element of retreat as a strategy to further accomplish the goals of the project constrained by limited time and resources.

Constraints 3: Apathy, helplessness, and other hosts of negative attitudes. The ability to empathize was evident in some research participants—e.g., Trixie could relate to the displaced villagers in the relocation site because of her experience living in a squatter area. However, the implementation of social justice service learning was also constrained by apathy, not only from the research participants but also from village people. Some research participants were neither hot nor cold, neither passionate nor dissatisfied. Apathy might be the appropriate term to describe the level of commitment that some students exhibited as they worked for social justice. For example, there were some students who were apathetic to inequality issues in Baybay. This might be due to their expressed feeling of helplessness when confronted by social problems in the community. When students were stressed out due to demands of research and limited time and resources, they tended to feel helpless and apathetic in terms of social justice problems and issues.

Some students felt that the problem of marginalization due to poverty, lack of education, sexual orientation, and unequal power distribution was too big for them to handle. Ben even rationalized this attitude by saying that social inequality is inevitable. Why bother? In addition, some students also expressed fear of troubling the "norm" in the village. After all, through their community immersion experience, they were able to realize that social justice was highly tied to the issues of power and privilege, which might put at stake a good relationship with *barangay* officials.

Constraint 4: Paradigmic clashes in perceptions of social justice and inequality issues. The age-old clash between liberal versus communitarian perspectives (Abowitz, 2000; Hester, 2004) seemed to echo the reason why students struggled in addressing social justice issues in the community. In the liberal perspective, individual rights and benefits must subsume the common good. By contrast, a communitarian perspective contends that individual rights and benefits must be sacrificed for the sake of the common good. The clash in these perspectives seemed to be the central theme in students' focus group discussion, justifying/critiquing the concentration of development projects near the *barangay* hall and not in the periphery of the village.

Some community immersion participants justified the *barangay* officials' decision to concentrate their development projects near the coastal area because most of the residents live there. For example, Ben cited the limited amount of money that the *barangay* received for development projects from local and national coffers. Project plans, he contended, should always look at the common interests of all, instead of a few, as a primary reason where to put the project in the community. According to Ben, since many people live near the coastal area, residents living in the periphery of the *barangay* (upland farmers) should understand the situation and not feel disgruntled about being left out in the implementation of the projects.

By contrast, some community immersion participants contended that such practice was a case of social injustice. Some students felt that as legitimate citizens of the village, peripheral people have every right to an equal share in benefits coming from the national government. Some students argued that the question is not where one lives but how a resource should be divided in order for everyone to have an equal share from the

public fund. Limiting certain groups of people to access and/or benefit from the public fund while favoring others, regardless of geographic location as in the case of peripheral villages in Baybay was, according to students, an example of social inequality.

Constraint 5: Issue of power and privilege. The integration of the social justice service learning paradigm in community immersion highlighted a constraint brought about by power and privilege differential in the community. Members of the research team realized the inevitability of a "head-on collision" with persons in power and authority when one has to work for social justice and equity. The seemingly complimentary intensions at the outset evolved into clashing oppositions at the later part of the study: One intention was to maintain a harmonious relationship with the village people, particularly the *barangay* officials who served as gatekeepers and collaborators for service learning projects. The other intention was to serve the interest of marginalized sectors of the community by addressing underlying structural causes of social inequality. The second intention proved to be challenging because it touched the sensitive issue of power and privilege in the immersion site.

As newcomers in the community, members of the research team worked closely with *barangay* officials in planning and implementation of their community immersion activities. The *barangay* officials were considered as gatekeepers and persons of authority that community immersion participants work with and refer to on matters concerning their courses of action. Furthermore, it was a tradition in the five-year curricular and research experience of community immersion that students and faculty members must work harmoniously with the *barangay* officials. To maintain a good relationship with the community, students were warned to be very careful in dealing with

sensitive issues. In the name of goodwill and harmonious relationships between the university and the community, it was expected that antagonistic and conflicted situations, as a general rule, should be avoided as much as possible.

By contrast, the integration of social justice service learning paradigm tended to trouble the previously established norm on community relationships. Working towards social justice was a tough balancing act to follow. In fact, it troubled the notion of harmony and good relationships between service learners and persons of power and privilege. The community immersion participants were caught in a middle of a dilemma: Whose interest must they serve? Should they remain in the middle or should they take a more proactive stance for social justice by taking the sides of the marginalized sectors? How should harmony and good relationships be maintained when the interest of the marginalized sectors challenges the decisions and actions of persons in power and privilege? These dilemmas served as a major road block in the implementation of service learning projects in the community.

As an illustrative case, the community immersion participants voiced their concerns and dilemmas about how to represent the social justice problems in the community while serving the interests of peripheral villagers. The specific and group narratives revealed some apprehensions on the part of community immersion participants as to how to address issues pointed out by peripheral villagers, e.g., need for a right of way, construction of a feeder road in the middle of the rice field, and equal distribution of projects and benefits from the national government. The research team was caught in a dilemma because the peripheral villagers were pointing to the *barangay* officials as "unfair" and "biased" in assigning community projects and as "deaf" to their requests and

pleas. The peripheral villagers felt that their woes and problems were not heard and preferential attention was always given to residents close to the *barangay* hall. The members of the research team had to struggle with how to deal with these issues because they did not want to destroy the good relationship they had built with the *barangay* officials.

The research team's dilemma implies the very issues that one has to face when working for social justice and equity. This researcher contends that the middle ground is not a good position for effective and responsive social justice endeavors. Service learners must eventually remove themselves from a safe position and take a more proactive and aggressive stance in defending the rights of the marginalized sectors, even at the expense of "creating trouble" in the community. This researcher further contends that an authentic path for social justice is radical—and such a pathway is contrary to the intention of building harmonious relationships between stakeholders of community immersion. One must always take a stand for social justice. Taking a middle ground (like the community immersion participants did) is not effective in the long run because it does not create visible and authentic change in the community. This finding suggests a deeper re-thinking and robust planning if one has to fully embrace the ideals of the social justice service learning paradigm.

Knowledge about Social Justice Issues: Learning the Many Faces of Marginalization in the Community

The integration of social justice service learning in the community immersion experience of prospective science teachers did not create a dramatic change in Baybay, however, it undoubtedly provided a rich context for students to examine the social justice

issues and inequity problems in the community. Analysis of narratives unmasked the different faces of marginalization in the immersion site, which were categorized into three major types, namely marginalization due to: (a) geographical location; (b) poverty, old age, and lack of education; and (c) sexual orientation.

Marginalization due to geographical location. A typical Filipino *barangay* is made up of about 50 to 100 households grouped into neighborhoods termed as *sitios* or *puroks* (Republic Act 7160). The *sitio* is a cluster of houses comprised of close-knitted families or neighbors in a sub-geographical part of the *barangay*. The central government in a *barangay* is located at the center of the village, usually marked by a *Barangay* Hall, where most of the residents live around in a cluster of houses. Most often, development projects are concentrated in this neighborhood both for practical and financial reasons: more residents can benefit from scarce government funds.

In the immersion site, villagers in the hills of Baybay comprised a *sitio* of upland farmers who lived at the periphery of the village. As shown in the narratives, peripheral villagers claimed that they were left out in the appropriation of government funds and projects. They felt that they were remembered only during elections or when their services were needed by the *barangay* officials. "*Malayo sa luwag*" [Far from the ladle] is the phrase they described to refer to the limited and unequal distribution of government projects and benefits due to their far distance from the *Barangay* Hall.

In addition to the far distance from central government in the village, the analysis of narratives also revealed an amplification of the marginalization experience of upland residents from geographical to cultural differences. The differences in sub-cultural practices within the village further amplified the feeling of exclusion between upland and

coastal residents. For example, the cultural practices of upland farmers (e.g., *dapog, dagyaw, panudlak, panurong-surong, pagsab-og mongo*) were different from those living near the coastal area (e.g., *ginamos making, palupad, binudo, pananggot*). Although not directly acknowledged by the villagers, members of the team contended that cultural factors might have amplified the experience of marginalization—the we-versus-them mentality—brought about by differences in geographical location. This finding seems to suggest some element of environmental determinism (Peet, 1985): behavior and attitudes are determined by environmental conditions and geographical locations. Apparently, the upland villagers' feeling of marginalization was largely attributed to their being far from the center of power and governance in the community.

Marginalization due to poverty, old age, and lack of education. A typical face of marginalization was exhibited by Tatay Pikoy: widowed, aged, poor, and illiterate. In a community where good education, health, and vitality were valued, people like Tatay Pikoy were left out—and possibly considered as a burden in the society. Except for a cultural demand for children to take care of their ailing elders, the local government in the immersion site did not have an established health care and support system for aged and sick members of the community. Most often, the old and sick people were left behind under the care of their immediate families. This support, however, was limited due to a cycle of poverty that family members experienced, a difficult and recursive problem due to lack of education.

Apparently, the marginalization experience was not so much because of the unequal and inequitable access to the basic health services in the community. Rather, it was the lack of it that amplified the marginalization experience of poor and ailing elders.

The researchers contended that the cultural demands for children to take care of their elders must be complemented by concrete local government support, at the *barangay* level, in providing the needs of marginalized sectors brought about by poverty, old age, and lack of education.

Faced with naked and painful truth about the predicament of poor and ailing village elders, the community immersion participants found themselves helpless because they had nobody to run to for help. The absence of an established health care and support system for poor village elders like Tatay Pikoy made them realized the need to confront this issue. However, their limited time and resources prevented them from making concrete actions to address the marginalized sectors. They realized that giving of dole-outs, a common strategy in charity paradigms of service learning, was the easiest thing to do to immediately address the needs of poor, ailing, and elderly villagers. However, the solution, they realized, was very temporal. Solutions to marginalization due to poverty, old age, and lack of education require a more robust, systematic planning and ample funds to successfully address the problem.

Sad to say, the community immersion participants did not have the financial and structural capabilities and resources to address the problem. Elements of helplessness and apathy were evident in the narratives of community immersion participants as they experienced the problem of marginalization due to old age and poverty in the immersion site. This finding suggests the need for a more robust participatory action research tied with systematic extension activities focusing primarily on systemic poverty alleviation and elderly health care provision in the community. Integration of social justice service learning in the community immersion experience provided an avenue for prospective

science teachers to have a "dialogue" about this community reality; however, concrete solutions and actions were not made due to their limited resources and capabilities.

Marginalization due to sexual orientation. A student's narrative on the life story of Dudut, a fishing village homosexual, provided a window through which to examine marginalization in a community wherein traditional activities such as fishing and farming were governed by village norms, roles, and expectations. As found in the narrative, Dudut was expected to perform traditional roles typical for village men such as fetching water, gathering fire wood, helping in house construction, and joining in community fishing activities. These community and family expectations, however, made Dudut feel like a square in a circular hole. He felt odd because at an early age he exhibited interest in activities traditionally associated with feminine roles such as cleaning the house, cooking, washing of clothes, sewing, and making floral arrangements.

The research team learned how the traditional role expectations amplified the marginalization experience of a village homosexual, an experience that Dudut had to endure and sometimes "fight" in order to survive. His experience of growing up in the village since birth, in a way, had smoothed out the pressure for Dudut to fit in a traditional community living situation. It seemed like time and familiarity allowed village people to accept his identity as a homosexual, although, he admitted that he sometimes experienced marginalization in an unfamiliar setting.

The selection of Dudut as a case of a marginalized member of the community offers an interesting twist on how students view the different faces of marginalization in the immersion site. Students saw the need to explore the marginalization experience of a homosexual, a reality that was openly accepted but seldom or never discussed in an

academic setting, particularly in their science teacher preparation. Students' exposure and open discussion of this type of marginalization might have created a little space in the void, although the impact was fully explored in the study.

Like the two previous types of exclusions, the experience of marginalization due to sexual orientation was not given concrete actions or solutions in the study. In fact, the narratives revealed the community immersion participants' dilemma on how to represent the marginalized sectors in their portfolio and museum displays. Their decision to write poems and fictionalized stories and essays to represent the marginalized sectors was the safest thing to do. However, it also revealed the dilemma that one has to face in doing research about people at the margin: they have rights as research informants. The research team faced dilemma on how to present their stories in the museum while protecting the identity of research participants.

Assessment of Community Immersion Learning Experiences

Theme 1: Evolution from bifurcated research and evaluation tools to a more complimentary assessment system to understand learning through community immersion

The curricular experience of community immersion evolved alongside research brought about by a cross-cultural science education inquiry across two Philippine and one U.S. universities. Amidst this backdrop, the early trends in the evaluation of students' learning experiences through community immersion showed a bifurcation of assessment tools (Figure 6.3). At one side of the fork were research tools to examine learning experiences of students through community immersion. Most often, results on what and how students learned through community immersion were not used to evaluate students' performance in the course. The other side of the fork was traditional evaluation tools that

largely determined how students were given grades in the course. Most often, these tools were traditionally designed to obtain an objective representation of students' performance.

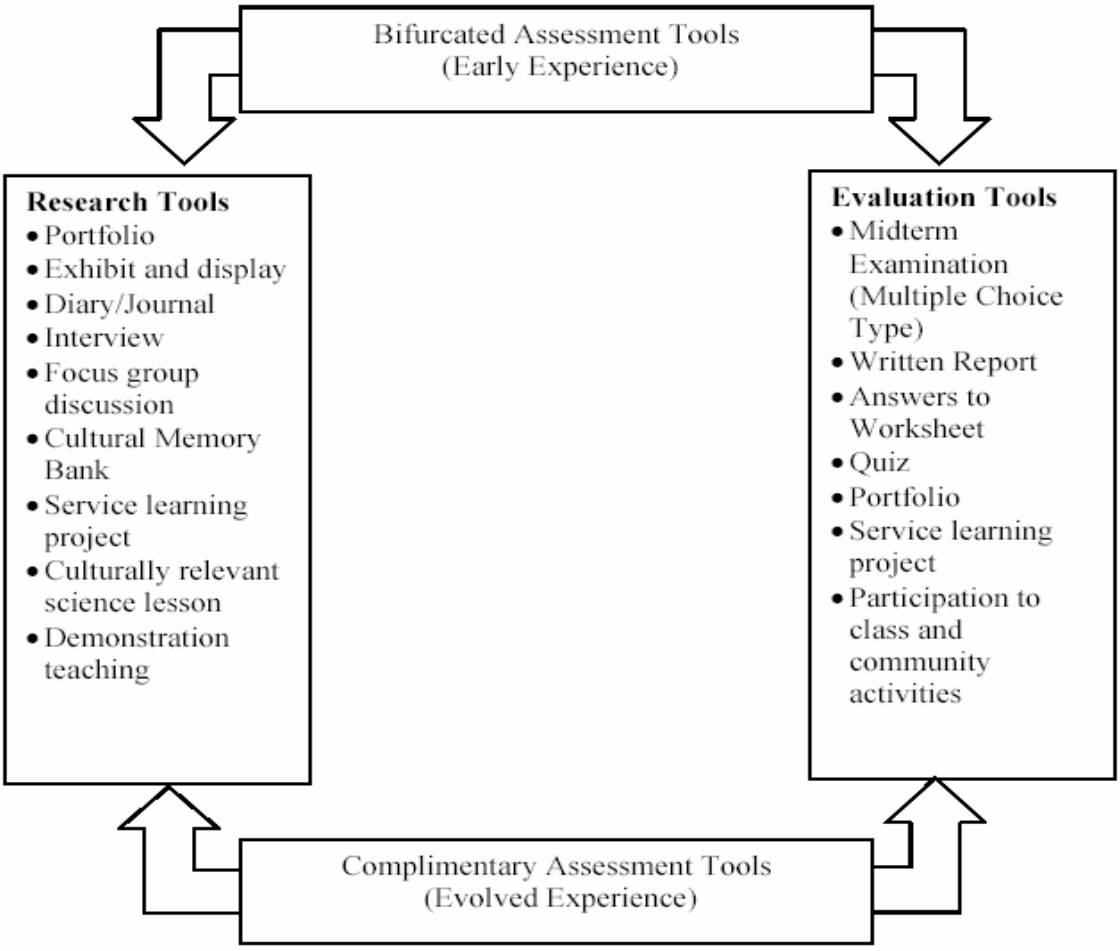

Figure 6.3. Evolution of assessment tools as used in a six-year curricular experience of community immersion.

Examples of traditional evaluation tools used to assess students' performance were the following: midterm examination, usually of objective type; written reports arising from community survey and insightful site-based observations; answers to worksheets that students completed after each segment of pre-immersion preparation lessons; quizzes that community immersion faculty members often gave to measure

students' understanding of assigned readings; portfolio, with assessment rubric to fit major objectives of the course regardless of majors; an evaluation of the service learning project in the immersion site often accomplished by supervising faculty and *barangay* officials; and a teacher's subjective assessment of students' participation in class and immersion site activities.

On the other hand, several research tools, particularly in collaborative action ethnography, were used to understand what and how students learned through community immersion: interviews, focus group discussions, memory banks, individual and group narratives, journals, culturally relevant science lessons, portfolio, and written and visual outputs for the museum. In the early curricular experience of community immersion, the research tools to assess students' learning were considered as separate entities and most often did not inform how students were evaluated in the course .The data were only utilized to meet the objectives of the research.

The six-year curricular experience of community immersion, however, had evolved an evaluation system utilizing the research data as a resource to understand what and how students learned. This approach complimented the traditional evaluation tools in relation to the inclusion of research data and products in the assessment of students' learning through portfolios. The collaborative action ethnography, for instance, showed a blurred boundary between an assessment for research and an assessment for curricular purposes because both co-informed each other, providing an in-depth and holistic understanding of student learning. In fact, the research data provided rich qualitative descriptions of what and how students learned through community immersion. All of

these data and outputs were highly considered in the development of assessment rubrics for the portfolio.

As a caveat, there is still so much to be done for the complete integration of research data and course evaluation tools to assess student learning. For example, no separate assessment rubrics were constructed for individual- and/or group-generated cultural memory banks, culturally relevant science lessons, demonstration teaching, museum displays, written outputs such as poems and fictionalized stories, and journal entries. Developing a rubric for each of these research outputs/data and integrating them in the entire evaluation/assessment system of the community immersion course remains a big challenge for future research.

Theme 2: Interplay of process- and product-based portfolio assessment to examine student learning through community immersion

Portfolio assessment played a central role in understanding student learning through community immersion. Figure 6.4 shows the process and specific activities conducted by the research team in the development of the portfolio. Each specific activity resulted interim products with specific outputs relevant to the development of the finished product. Both the process and interim products informed the development of the group-generated community immersion portfolio.

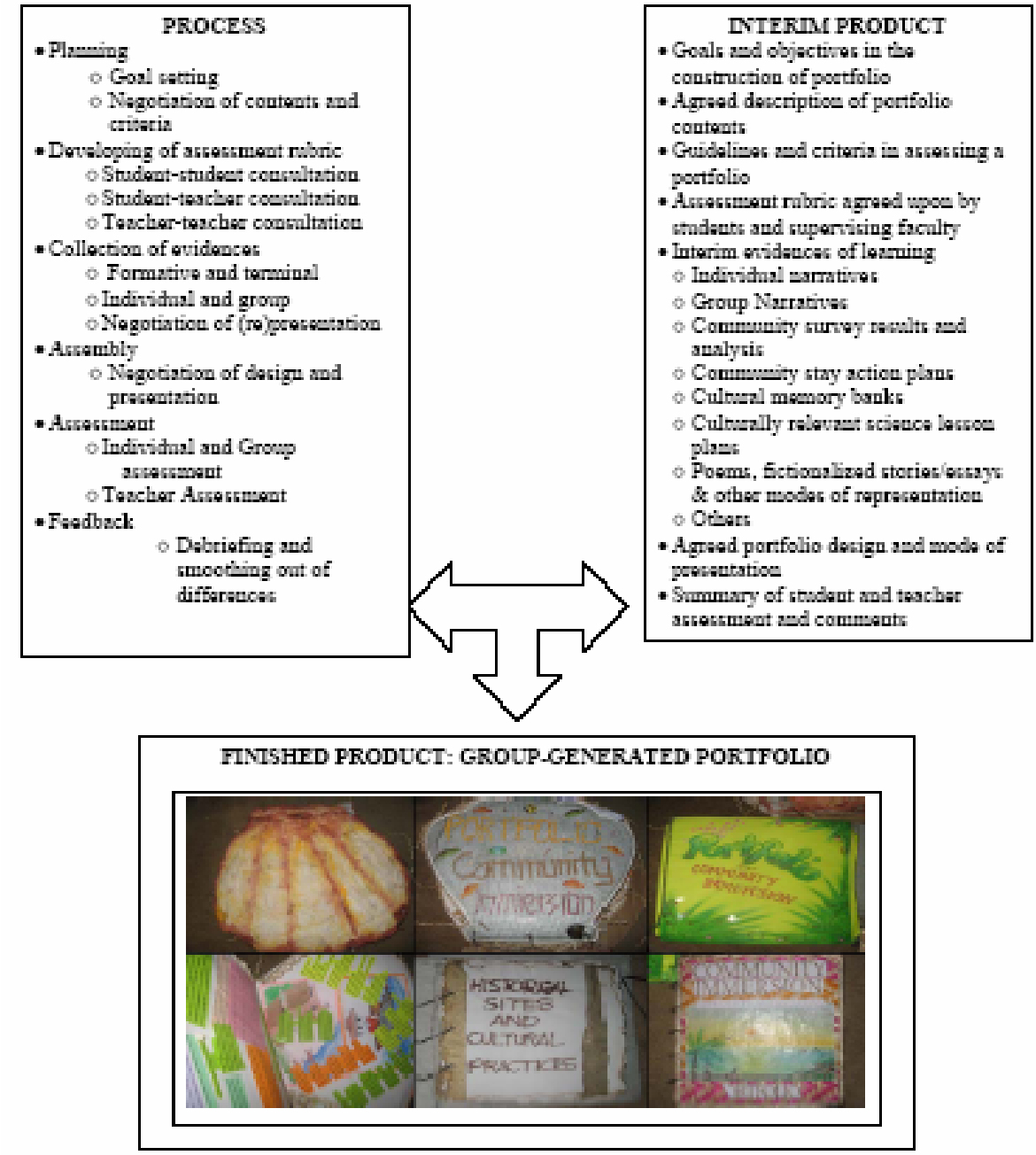

Figure 6.4. A schematic diagram showing the interplay of process- and product-based development of group-generated student portfolio.

The community immersion portfolio was a product of group negotiation among students and the supervising faculty. The first negotiation process involved the planning of contents and criteria for portfolio assessment. This process required a robust goal

setting among the major stakeholders. Based on agreed upon goals, members of the research team negotiated the contents of the portfolio and the guidelines and specific criteria for assessment.

The resulting interim products—negotiated goals, criteria, and guidelines for portfolio development— became a major reference point in the development of the assessment rubric. The assessment rubric was initially developed at the early part of the community immersion course to allow students to gather evidence of learning as they went through the community stay and integration and celebration phases. Rubric development involved a three-tiered level of consultation/negotiation: The first layer of negotiation involved the community immersion supervising faculty (Marian and Vicente) developing a preliminary rubric to test the applicability of the criteria and guidelines for rubric development. The second layer of consultation involved students developing an assessment rubric for their group based on assigned themes, e.g., cultural practices relevant to science teaching, social justice issues in the community. The third layer of consultation involved the tedious process of negotiation between students and teachers in order to come up with an assessment rubric that was agreed upon by all stakeholders.

After the development of an assessment rubric, students started collecting evidence of their learning experiences. The collection of artifacts and evidence of learning was both formative and summative It was formative because students collected support documents as they progressed in their community immersion experience. It was also summative because most of the evidence of learning was developed at the terminal part of the course. Examples of interim products under this process included the cultural memory banks, culturally relevant science lesson plans, and various modes of data

(re)presentation such as individual and group narratives, poems, essays, fictionalized stories, drawings, and others.

The assembly of evidence for the portfolio was done at the later part of the course. The assemblage and organization of evidence required another layer of negotiation among members of the group. The design and layout of the portfolio was discussed and agreed upon. Students also negotiated the order of presentation as well the choice of an artifact to best represent their ideas. Focus group discussion, co-generative dialogues, critiquing, and open forum were negotiation tools used to smoothen out differences in opinion and ways of doing things.

After the portfolio was made, individual members of the group created a separate assessment of the portfolio based on the agreed upon rubric. The individual assessments were summarized. The findings became part of the final portfolio submitted to the teacher. The community immersion faculty made the last layer of evaluation using a similar assessment rubric. Results were then integrated in the final rating for the portfolio.

The final process in portfolio assessment involved a focus group discussion to debrief students of the process they went through. The focus group discussion also served as a feedback session to iron out differences in ratings and to offer insights and lessons on the entire portfolio assessment process.

Transformation of Community Immersion Learning Experiences into Useful Practices in Preservice Science Teacher Preparation

One major objective of the study was to examine how the community immersion participants transformed their community immersion experiences into useful practices in science teacher preparation. Analysis of narratives revealed a cyclical nature of the entire

transformative process involving the elements of drawing, transforming, and enhancing of community funds of knowledge for the benefit of all major stakeholders in the collaborative action ethnography.

The cyclical nature of the transformative process in a community-based science teacher preparation

The community immersion experience was characterized by a cycle of transformative processes comprised of three major phases, namely: (1) drawing of community funds of knowledge, (2) transforming and enhancing the community funds of knowledge into useful science teacher education practices and products, and (3) giving back to the community the "enhanced" funds of knowledge through service learning activities. Negotiation among community immersion stakeholders was at the heart of the cyclical process of transforming community funds of knowledge into useful practices in science teacher education. The central role of negotiation and the cyclical nature of this entire transformative process are presented in a schematic diagram in Figure 6.5.

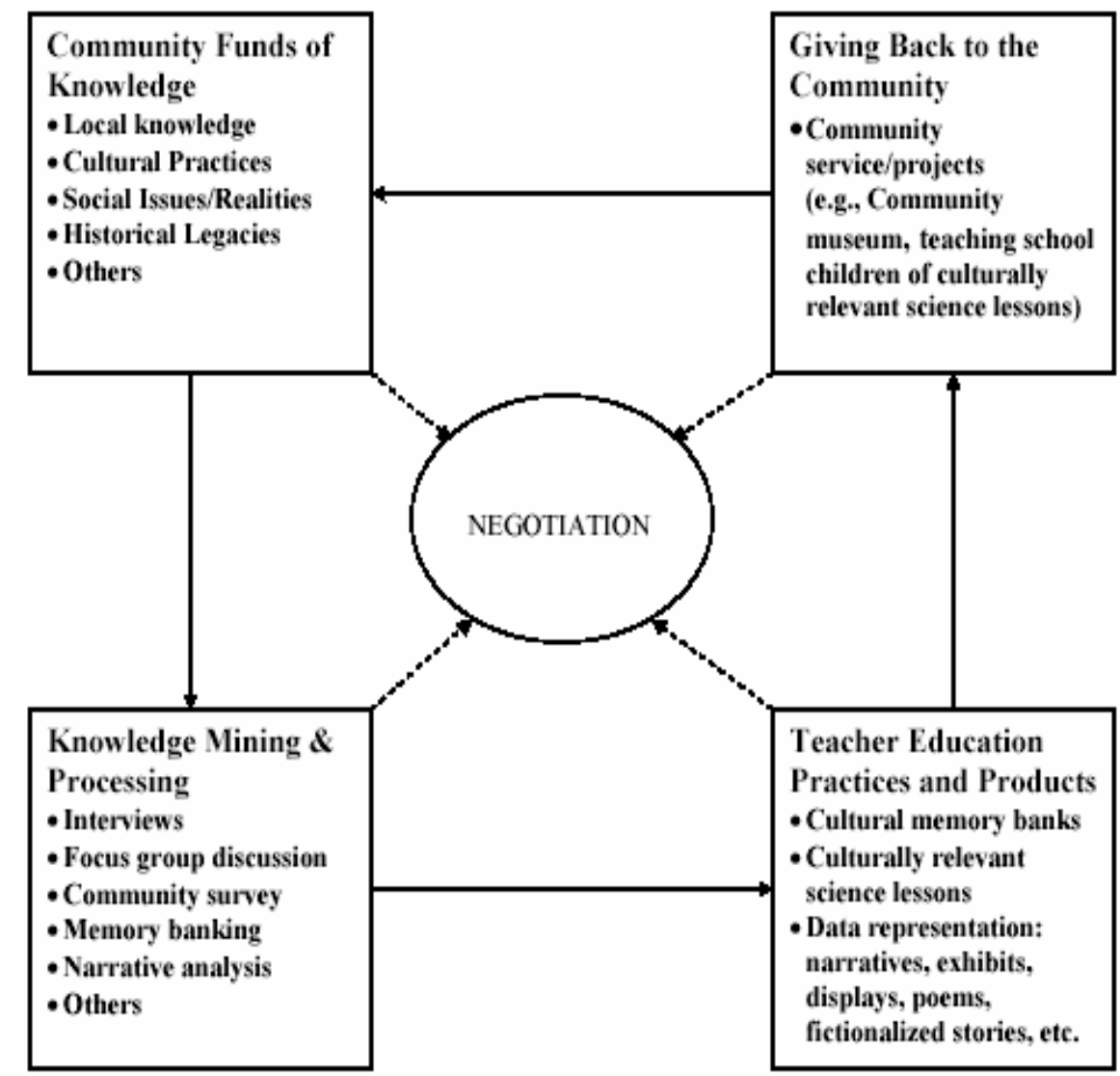

Figure 6.5. Schematic representation of the process involved in transforming community funds of knowledge into useful practices in science teacher preparation.

The grand scheme in the entire transformative process of "mining" from and "giving back" to the community their funds of knowledge started off with the community immersion participants' entry into the village. Recognizing the rich social, cultural, intellectual, and historical capital of the village, the community immersion participants engaged in activities aimed at drawing and learning from community funds of knowledge. They utilized "mining" tools such as community surveys, interviews, direct observations

of and participations in community activities, and focus group discussions. Most of these activities aimed at understanding how cultural practices and social justice issues in the community might be used to inform the theory and practice of community-based science teacher preparation.

The funds of knowledge from the immersion site then underwent a series of transformative processes. For example, the cultural memory banking served as an interim meditational tool and process in transforming community funds of knowledge into culturally relevant science lessons. In many cases, data drawn from these funds of knowledge were presented in forms of written individual and group narratives, fictionalized stories, poems, and essays. Some data were organized as part of portfolio entries and/or transformed into visual and written displays in the museum.

The transformative process in the study did not end with students returning back to the university solely for the purpose of curriculum development/enhancement. Yes, science curriculum was enhanced through the integration of community funds of knowledge such as the development of culturally relevant science lesson plans. But the action cycle continued—students returned back to the village and taught school children the "enhanced" funds of knowledge as part of their service learning activities. Aikenhead (2008) refers to the practice of curricular integration as the middle ground to accommodate the controversial dichotomy of local knowledge and western science in science education, a position relevant to culturally relevant science teacher preparation.

In addition, students organized the community funds of knowledge into written and visual displays for their mini-museum project. This researcher contends that service learning projects such as the community-based mini-museum and the teaching of

culturally relevant science lessons to village school children were the most powerful antidotes against Tippins and Ritchie's (2005) critique of "mining" from community funds of knowledge. The service learning projects in the community may appear theoretically sound, however, their impact on the community and village people were not fully explored in the study, a condition that calls for a follow- up stay in future research.

Summary

In this chapter, emergent themes evolved from the analysis of narratives surrounding research participants' notions and experience of community and their beliefs about the purposes, values, and goals of community immersion. This chapter also presented categories of knowledge of what students learned through community immersion, particularly with respect to the integration of social justice and communitarian service learning paradigms. It also analyzed emerging assessment themes particularly in regard to the use of portfolios to examine students' learning. Finally, it also described a model in the transformation of the community immersion experiences into useful practices in science teacher preparation.

Specifically, the analysis of narratives revealed discrepancies in typologies between participants' notions and experience of community. Research participants held traditional notions of community, however, their experiences revealed evidences of blurred and shifting boundaries of community as a place, tensions in relationships among groups of people, the problematic nature of a shared culture, and concentric versus de-centered images of community. Participants also exhibited a growing trend in the complexity of their beliefs about the purposes, values, and goals of community immersion as a result of reflection and direct exposure to reality in the immersion site.

Several learning themes complemented the six categories of knowledge that participants developed through community immersion, which are broadly classified as (a) knowledge about science, (b) knowledge about people and how they learn, (c) knowledge about teaching, (d) knowledge about research, (e) knowledge about the teaching and learning milieu, and (f) knowledge about service learning. The integration of social justice service in the community immersion experience was met with constraints; however, it offered a powerful experience for students to examine social justice issues in the community, particularly the different faces of marginalization.

Analysis of narratives further revealed the utilization of research data to compliment traditional assessment tools in understanding student learning. This finding was a deviation from the bifurcated research and evaluation tools of previous community immersion learning assessments. The study also utilized the interplay of process-based and product- based portfolio assessments to understanding the varied dimensions of student learning. Finally, analysis of narratives revealed a cyclical nature of the transformative process involved in translating community immersion learning experiences into useful practices in science teacher preparation, particularly with respect to the use of service learning as an avenue for community immersion participants to "return back" to the community the enhanced funds of knowledge.

Chapter 7

THEORETICAL CONTRIBUTIONS AND IMPLICATIONS

Introduction

This chapter highlights what the study can offer into the altar of science teacher education scholarship. It is called the theoretical contributions and implications chapter because it presents a theory and a framework as well as the theoretical, methodological, and practical implications of the study. This chapter is made up of two major sections: Theoretical Contributions and Implications of the Study.

In the Theoretical Contributions section, a theory and a framework are presented and discussed. The first important theoretical contribution of this study is the development of a "Theory of Negotiated Meanings," which attempts to explain learning in three simultaneous dimensions of meaning construction and negotiation in a collaborative context, namely: (a) negotiation of personal meaning, (b) negotiation of shared meaning, and (c) negotiation of group meaning. These three dimensions of meanings operate and influence each other in a reinforcing cycle in the context of this collaborative undertaking.

The second important theoretical contribution of the study is the formulation of a "Framework for Community-based Science Teacher Education." This framework infuses both theoretical ideas and contexts of community to guide researchers, extension workers, and policy makers in the design and implementation of community-based science teacher education research, curricula, and outreach programs. The development of this

framework was inspired by and borne out of the principal investigator's frustrating experience in trying to define, characterize, and delineate community-based science teacher education from multiple and often conflicting notions of community in science education. Through this framework, it is hoped that one can have a clear idea of what it means to conduct research or frame curricular programs under the banner of community-based science teacher education.

The Implications of the Study is the second section in this chapter. In this section, the theoretical, methodological, and practical implications of the study are presented and discussed in light of research findings. The implications of the study are also explicated to inform theory and practice of community-based science teacher preparation.

This chapter is presented in an alternative genre—the principal investigator's letter to his wife and children. This genre of writing is the researcher's attempt to make this chapter more personal and reflective of his experience as a beginning scholar, father, and husband who has been displaced from home in search of further education in a foreign land, hoping that his study will impact the theory and practice of science teacher preparation.

A Letter to My Wife and Children

March 8, 2008

Dear Novel, Kent, Vince, and Kris,

It has been three years, seven months, and 5 days since I left our little hometown in the Philippines in order to pursue a doctoral degree in science education in the United States of America. Oh, how fast time flew. At the beginning, I thought time was dragging its feet slowly, praying it would move fast as I dreaded the thought of not being able to

finish my degree due to homesickness. But now that I am close to finishing, it seems like time has moved very fast, with graduation just over the horizon. Oh, how I wish I could stop time for a while—like what Joshua did in a story book I sent home—begging for more moments to craft this remaining chapter and finish my dissertation before the university deadlines catch up with me.

Now that I am close to finishing, I come to reflect on the significance of my work with respect to the sacrifices that you and I have gone through in order for me to finish a Doctor of Philosophy degree here in the United States: Were the sacrifices worth the benefits we have gained? Were the efforts as well as financial and emotional investments in finishing this degree worth the gains that this study might offer to extend the theory and practice of community-based science teacher preparation? How I might justify the worth of this research work to my program sponsors (e.g., Fulbright scholarship from the U.S. Department of State, Institute of International Education, and Philippine-American Educational Foundations; dissertation completion fellowship from the University of Georgia (UGA) Graduate School; and graduate assistantships from UGA's Department of Mathematics and Science Education) who spent so much money and resources for my education? What does my study offer into the altar of science teacher education scholarship?

I want to believe that my efforts, your sacrifices, and the money invested in this research work are worth the gains this study might offer for the expansion of science teacher education theory and practice. Through this letter, I would like to share with you the theoretical, methodological, and practical contributions of this research to the altar of science teacher education scholarship. Please bear with me as I discuss with you the

"Theory of Negotiated Meanings" and the "Framework for Community-based Science Teacher Education." Using these theoretical backdrops, I will further discuss the implications of my findings in educational research and practice of community –based science teacher education.

Theory of Negotiated Meanings

At the outset, let me make a bold confession: I shudder at the thought that I am formulating a theory. I am afraid I might be too presumptuous to call my ideas as a theory. Sometimes, I have self doubts too. I doubt if I am truly advancing a unique way of looking at learning in a collaborative context in science education. I feel like there is nothing new in this world—it is just a recasting, reordering, and/or reconfiguring of what has been done, said, written, or discovered in the past. I must admit, the theory that I am advancing herewith is not really "original" in an honest sense of word; it is a combination of the results of my study and an in-depth analysis of relevant literature. It started to take shape in the middle of my dissertation writing and was informed and developed through a reiterative process of data analysis and literature review.

Having expressed and confronted my fears and doubts, I hereby take a bold step to advance my theoretical contribution dubbed as a "Theory of Negotiated Meanings." I just feel the need to write this theory and let my research committee and the public, who may read this humble piece of work, judge if I really formulated a sound theory that offers a perspective somewhat different from what has been previously expressed in literature. If this theorizing attempt is a failure in creating something "new," then let me glory in the fact that at least I attempted to organize my ideas in a cohesive whole, unique to my understanding of learning as a collaborative process in science education.

Why negotiated meanings?

I would like to use the term "negotiated" to connote my idea that learning and understanding in a socio-cultural context is never fixed. In particular, learning science (and other fields of study) is dynamic, continuously changing and shifting, largely determined by internal processes and socio-cultural factors. Since learning is not static, its process and outcomes are negotiated, negotiable, and/or results of negotiation. I don't believe that learning outcomes are packets of immutable, objective truths that need to be transferred from one person to another through learning situations or instruction. By contrast, I want to believe that the process and outcome of learning is relative and negotiable; it results in myriad ways of understanding and sense making of a learning situation.

I also prefer to use the term "meanings" to describe the many possibilities of learning beyond concept formation that might take place in a collaborative context. Meaning is a result of a configuration of learning outcomes such as—to include a few—conceptual understanding, insight development, perspective change, and even value formation and/or affirmation. First of all, I believe that meanings are very personal because they have direct connections to one's prior wealth of knowledge and experience. Something is meaningful to a learner because he or she can relate to a learning situation by virtue of his/her personal capitals accumulated through years of existence as a human being. Thus, when I say, "That is meaningful to me," it means I can relate to the learning situation—and that I have a some of knowledge and experience to draw upon in making sense of the new learning situation. I may not fully comprehend the new learning situation but what is important is I can connect to it by virtue of my whole stockpile of

experience. I should credit Ausubel (1967, 1968), who influenced my understanding of negotiated personal meaning. Second of all, I believe that meanings could be shared by an individual with members of the group through the process I call negotiation of shared meanings. And third of all, I believe that personal meanings are capitals in the configuration of group meanings, which could be utilized in the generation of negotiated products and outcomes in a collaborative undertaking.

What I like about the whole notion of "negotiated meanings" is the implication that it could be constructed, reconstructed, and deconstructed in many possible ways. Again, I emphasize that there are multiple ways of constructing negotiated meanings. The connections between ideas are not fixed. Rather, they could be assembled and re-assembled in many ways, each process creating a perspective unique, complimentary, or even contradictory to previously developed understandings. Negotiation of meanings suggests multiple ways of knowing, of doing things, and of creating multiple products—each process and/or product containing kernels of truth unique to multiple contextual factors from where they evolved. Since this possibility can occur at an individual level, I stand in awe at myriad possibilities of learning when a group of people work together in a collaborative context. I cannot just imagine the multiple possibilities of products that could be created when the negotiation of meanings is fully utilized in a collaborative undertaking.

Overview of the Theory and General Assumptions

The Theory of Negotiated Meanings is my attempt to explain how people learn both as an individual and as a group in a collaborative context. In a collaborative undertaking, I consider three dimensions of negotiation that might simultaneously take

place, depending on the robustness of the negotiation process, namely: (a) an individual negotiates a personal understanding of the external world with respect to his/her prior knowledge and experience (negotiation of personal meanings); (b) an individual shares his/her personal meanings to members of the group that may potentially enrich his/her and the group's meaningful construction of a learning potential (negotiation of shared meanings); and (c) the combined individual personal and shared meanings are part of a collective group capital that members of the group can draw upon in the generation of negotiated products (negotiation of group meanings).

Negotiation of personal meanings takes place when an individual negotiates within himself/herself a new understanding of an external world—usually but not limited to experiences in school and community —with respect to his/her internal stockpile of personal capital. I consider this as the first dimension of the group-meaning-making process because its outcome—individual meaning— largely determines what an individual could bring to the table of group negotiation. The second dimension of negotiation in a collaborative context takes place when a person utilizes his/her personal meaning as a capital to negotiate further meanings with respect to members of the group. I consider this layer of negotiation as the heart of the collaborative process because it explains the nature and the process of learning both as a personal and group process in a collaborative context. And finally, the third dimension of negotiation takes place when members of the group come together to seek the middle ground position in a collaborative undertaking. This process of negotiation produces group meanings that largely determine group outcomes and products. I consider this dimension of negotiation as the heart of community-building endeavors. Specific assumptions under each

negotiation type are presented in succeeding sections. For an overview, the schematic representation of the theory is presented in Figure 7.1.

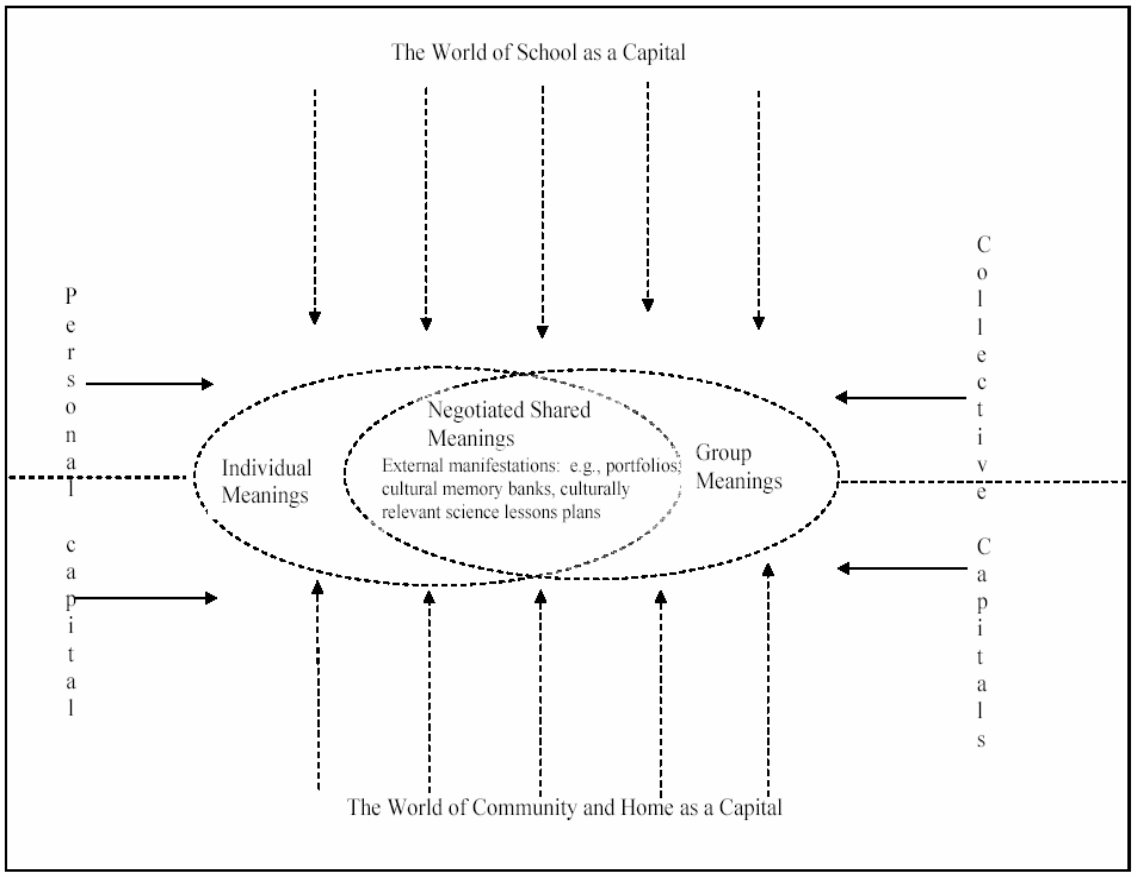

Figure 7.1. The Theory of Negotiated Meanings.

The socio-cultural world serves as a matrix embedding and influencing the negotiation process in a collaborative undertaking. In an educational setting, particularly in preservice science teacher preparation, the worlds of school and of home and community are important contextual factors influencing what and how students learn and make sense of their new experiences. Most often, students tend to struggle in bridging these two worlds, which are sometimes conflicting. The Theory of Negotiated Meanings recognizes this bifurcation tendency. However, I am more interested in the

influence of these two worlds on the negotiation of meanings in a collaborative context. In particular, I am interested in viewing these two worlds as capitals for negotiation. Successful negotiation of meanings—from personal, shared, and group dimensions—takes place when these two worlds are not treated as separate entity but as capitals for the meaning making process.

Negotiation of Individual Personal Meanings

I consider the socio-cultural world pregnant with learning potentials. Most often, an individual is confronted with learning potentials as a result of his/her interactions with the external world, to include but not limited to the world of school and the world of home and the community. I consider these two worlds as sites for knowledge (re)production and transmission. Most often, there are differences in ways knowledge is produced and transmitted in these two worlds—with the former more formal while the latter more informal. An individual learner, most especially a student, is constantly exposed to an internal process of negotiation in trying to make sense of his/her experience, sometimes conflicting, with respect to these two external worlds.

How does the internal negotiation of meanings take place? First of all, an individual must be confronted with a learning situation, e.g., discrepant events in informal settings, formal instructional tasks. In trying to make sense of a learning situation, the learner draws upon his/her personal capital—a reservoir of an integrated prior knowledge, a stockpile of one's experience learned in school, at home, and/or in the community. The stockpile of personal experience serves as an embedding matrix containing socket-like structures to connect and support new connections. These

"sockets" are numerous, with a gazillion of ways for possible connections, depending on the meanings they attach to the learner.

I would like to emphasize the idea of multiple possibilities for connections to take place between the new knowledge and the prior knowledge in the negotiation of personal meanings. For me, this assumption is very important in a meaningful construction of social reality at an individual level. Like the prior knowledge matrix of a person, the learning situation or potential can be viewed from different perspectives, also with multiple points for connection with an individual's stockpile of personal experience. Due to the plurality of connections between the prior knowledge and new experience, the outcomes of individual negotiated meanings are neither fixed nor immovable entities in the matrix of personal experience. Rather, they could be plugged and unplugged in multiple ways to produce multiple products. This suggests multiple ways of knowing and representation of a learning potential at an individual level.

In a community immersion site, for example, a learning potential such as the village people's cultural practice of ginamos making can be (re)configured and (re)constructed in several ways in order to produce multiple products such as poems, fictionalized stories, narrative accounts, visual displays—to name a few—because of the varied possibilities for connections in a learning context. When an individual is capable of constructing, reconstructing, and/or deconstructing the various plugging points between the stockpile of experience and new knowledge—and in the process create whole new and yet plausible ideas and perspectives—then I believe that such person has attained the highest level of negotiated personal meanings. Such a person is open to change and is willing to accommodate multiple truths and possibilities—thus offering

myriad possibilities for knowledge production and representation. I see the relationship between negotiated personal meaning and creativity—but that's another story.

Relationship between the personal capital and the socio-cultural capital. *I would like to make a distinction between personal capital and socio-cultural capital. Personal capital may have several meanings in literature but I would like to define it as the sum total of one's personal experience such as—to name a few—prior knowledge, upbringing, personality, appearance, values, etc. This capital is possessed by an individual by virtue of his/her genes, life experience, training, and education. On the other hand, I would like to call the socio-cultural capital as learning potentials in the external world of an individual, which may potentially become part of personal capital. In the schematic representation (Figure 7.1), I specifically identify the world of school and the world of home and community as potential sources of socio-cultural capital. These external worlds offer learning potentials that could enrich one's personal capital.*

Having expressed my distinction between personal capital and socio-cultural capital, I would like to emphasize the possibility for socio-cultural capital to become part of personal capital. For example, the school has been identified in literature as a social capital (Warren, 2005). However, I would like to look at this capital from a personal perspective: The school possesses intellectual, social, and cultural capitals that an individual can draw upon to enrich his/her personal capital. Specifically, the school has funds of knowledge that could potentially become part of an individual capital through formal education.

In the same manner, the home and the community is a rich learning potential. Like the school, the community and its network of families, is a site of informal

knowledge production and transmission, its validity affirmed by intergenerational utility. Gonzales, Moll, and Amanti (2005) call this idea as community funds of knowledge, an important resource in education. From a negotiated personal meaning perspective, I would like to look at the community funds of knowledge as capital, a resource for an individual to enrich his/her personal understanding of the external world. Community funds of knowledge are learning potentials that could become part of one's personal capital through a process of negotiation that occurs within an individual. However, the negotiation of personal meaning is incomplete in and of itself to describe learning in a collaborative context. The second dimension of negotiation attempts to explain learning at the realm of both individual and group experience, hence the term negotiated shared meanings.

Negotiation of Shared Meanings

Technically referred to as the negotiated individual-group shared meaning, the negotiation of shared meanings occupies a central position in the Theory of Negotiated Meanings because it bridges the constructs of negotiated personal meaning and negotiated group meaning. Alternatively, I may also call it individual shared meaning to delineate it from the meanings that an individual keeps within himself/herself (personal) and the meanings that are communicated to the group (shared). The negotiated shared meaning could be visually represented as an intersection of individual and group meanings; it shares elements of both negotiation types. However, it also offers unique characteristics that set it apart from negotiated personal and group meanings.

While negotiation of personal meanings is centered on an individual construction of a meaningful reality, and the negotiation of group meaning on a group construction of

a common meaningful reality, the negotiated shared meaning is focused on an individual meaningful construction with respect to members of the group. The negotiation of shared meaning attempts to explain how learning takes place when an individual shares a common meaningful experience with members of the group. It must be recalled that in the negotiation of personal meaning, an individual is engrossed with making sense of the external world with respect to his personal capital. On the other hand, the negotiation of group meaning is centered on tasks and outcomes—people de-centered, so to speak—where the central locus is shifting depending on influences within and outside of the group.

The whole notion of negotiated shared meaning seeks to explain how an individual meaning could potentially become part of the group meaning and vice versa through sharing of experiences. I would like to emphasize the term "share," instead of "transfer" to describe the reciprocal nature and non-losing outcome of the negotiation process. In the negotiation of shared meaning, nobody loses; nothing was given or taken away. By contrast, all stakeholders involved in the negotiation process are enriched: A person sharing a personal experience gains by having the chance to (re)construct his/her meaning. There is also a possibility of creating a new or enhanced personal meaning as a result of insights and understandings that could possibly be learned from other members of the group. In the same manner, the members of the group gain from the experience by providing exposure to multiple contexts and prospects for meaning construction and generation of products.

Zone of Negotiation of Shared Meaning. *As an individual attempts to bridge the worlds of school and community, he/she constructs meanings based on prior knowledge*

and stockpiles of experience. However, the interpretation of meaning is not purely personal. In a collaborative context, such as one involving group-generated cultural memory banks and collaborative action ethnography, meanings are negotiated within the inquiring and learning community. The boundary between the personal and group construction is fluid and shifting. In the process of meaning construction, an individual member is influenced by the group and vice versa. There is some sort of overlap between the individual meaning and group meaning constructions. I describe this overlap as the "zone of negotiation." This zone of negotiation is an internal space where passage and exchange of ideas takes place between an individual and the group. In this zone, an individual negotiates meaning that might eventually become part of the group's shared meaning and vice versa.

The boundaries surrounding the zone of negotiation could be described as a porous layer that allows the passage of learning potentials—an adaptation of Roth's (2006) and Tobin and Roth's (2005) ideas in cogenerative dialogues. The socio-cultural capital remains as a learning potential unless it passes through this porous layer. The individual and group capitals, as well as socio-cultural capitals from the external world, move in and out through this porous layer surrounding the zone of negotiation. Successful transfer of socio-cultural capitals from the worlds of school and community through this porous layer results in an increased personal and group capitals. The porous layer allows the passage of capitals between an individual and the group. A successful exchange of capitals is a requisite for meaningful construction of learning potentials. Learning takes place when personal and group capitals are negotiated and shared in a collaborative context.

In addition to the porous layer separating an individual from a group meaning, the boundary of the zone surrounding the shared meaning is shifting: an individual pushes his/her influence to the group and vice-versa. The strength of an individual or group influence in the negotiation of shared meaning is dependent on several factors such as—to name a few—plausibility of the personal meaning, willingness of the group members to accommodate individual meanings, and the power structure that operates within the group. These factors exert pressures at the boundary of negotiated shared meanings. Once meaning is negotiated, a new capital is added to the shared meanings resulting in an increased shared capital between an individual and the group. This condition allows for further expansion of the zone of negotiation resulting in a larger shared space between individual and group meanings. This description is also consistent with my idea that nobody loses anything in the negotiation process. Knowledge is shared and further multiplied—an outcome that is a lot better than a personal meaning construction alone. If properly utilized, the negotiation of meaning in a collaborative context offers an unlimited potential for learning.

I would like to emphasize the simultaneous process of capital exchange in the negotiation of shared meanings that comes from several learning tributaries, namely: (a) individual personal capital, (b) group capital, and (c) socio-cultural capital. I believe that an authentic negotiation of shared of meaning allows a simultaneous interplay of these three capitals in order to generate meaningful understandings that are unique from personal meaning or group meaning alone. I would like also to believe that the negotiated shared meanings could generate unique products that are different from the two types of meaning constructions—an "enhanced" product that combines personal

"touch" and group influence. This "enhanced" product is different from the individually-generated and group-generated products. For example, a memory bank that has gone through the crucible of focus group discussion and critique is different from a memory bank that is constructed alone and a memory bank that is generated by the group. This example simply illustrates the idea that the negotiated shared meaning is a separate construct, producing unique products delineating personal meaning from group meaning.

How does the simultaneous process of exchange of personal, group, and socio-cultural capitals in the negotiation of shared meaning take place? Let me begin my explanation from the socio-cultural world, full of learning potentials for personal and group capital formation. In a collaborative context, the members of the group share a common experience (e.g., a cultural practice in an immersion site). This experience is a learning potential common to all members of the group that might possibly enrich both individual and group capitals. However, the meaningful construction of the learning potential is different in each individual because of the myriad possibilities of connections that could be made in every matrix of individual prior knowledge and experience.

In a collaborative context, as individuals tries to make sense of a common group experience, they create multiple connections with the learning potential in the socio-cultural world, again by virtue of varied configurations in personal meanings. A successful entry of socio-cultural capital into the personal capital of an individual may be utilized in the negotiation of a shared meaning in a collaborative undertaking. However, let me point out that a successful integration of socio-cultural capital is not a requisite in the negotiation of shared meaning. There are cases where an individual does not exhibit full integration of socio-cultural capital with internal personal capital when

he/she goes to the negotiation table. The connection is still blurred and a meaningful construction is not clear. Does this hinder the negotiation of shared meaning? I want to believe that the process of negotiation of shared meanings—particularly when members of the group share their meaningful constructions—may serve as avenue for crystallization and further construction of meaningful reality as a result of successful exchange of personal capitals. The tools of negotiation such as focus group-discussions, cogenerative dialogues, open forums, critiquing, and feed back sessions may allow an individual to connect loose ends and crystallize blurred connections. In other words, the negotiation of shared meanings may strengthen and support an individual construction of a meaningful reality because of reinforcements received from group members who had similar experience.

Negotiation of Group Meanings

While the negotiation of group meaning is centered on an individual trying to make sense of his/her external world, the negotiation of group meaning seeks to find a middle ground position to represent the collective meaning of individual members of the group. This middle ground position, the result of a negotiation process, is arbitrary and shifting, depending on what individuals bring into the negotiating table. Ideally at the center of all individual meanings, the location of the middle ground position to represent the collective meaning is largely determined by socio-cultural factors within and outside the group. In a practical sense, the location of the negotiated group meaning is not at the center of overlapping individual meanings. Power structures operating within and external influences outside the group may result to in shift in central location of a group meaning.

The negotiated group meaning is not centered on persons, but on group tasks and products. The process of negotiation is directed towards the resolution of individual differences and conflicts. It also involves the utilization of individual personal capitals to produce group outcomes representing the collective contribution of individual members. Group outcomes and products are external manifestations of negotiated group meanings—they are results of a negotiation process among members of the group. The negotiation process and products are important critical elements of negotiated group meanings.

Individual and Group Capital in the Negotiation of Group Meaning. *When a group of people come together for a collaborative undertaking, they bring along with them individual capitals that could potentially enrich the common pot of collective group capitals. I define collective group capital as the sum total of all individual capitals, shared and unshared, that members may bring into the group. If fully utilized, the collective group capital is a powerful resource in education—it offers myriad possibilities in producing group outcomes. Like "funds," the group capital can be drawn upon to generate collective group products.*

The collective group capital, however, is an idealistic representation of the wealth of experience that every member of the group possesses. In practical realty, its potential in education is not fully harnessed and utilized: Individual capitals remain as personal possessions. They are not fully offered into the altar of negotiation. Most often, these capitals are hidden within an individual for personal utility and not shared with the group because of several reasons, including but not limited to lack of opportunities for

negotiation, poor negotiation process, fear of censure, lack of trust, and apathetic attitude.

Process of Negotiation of Group Meaning. *Moving towards the middle ground position for collective understanding of a meaningful reality requires a negotiation process that promotes robust cross-communication among members of the group. The success of the negotiation process largely determines what can be drawn from the individual capital and how it might be utilized in the generation of negotiated group products. Negotiation tools are needed to facilitate the transfer of individual capitals into the common pot of a group collective experience. Unless communicated, expressed, and shared in an externally comprehensible medium with the group, the personal capital remains as an individual possession.*

Again, I acknowledge the influence of socio-cultural factors, within and outside the group, in the process of moving towards the central position of the negotiated group meaning. The socio-cultural factors may influence the dynamics of negotiation process, the location of middle ground collective group meaning, and the development of negotiated products. Like a double-edged sword, socio-cultural factors may either facilitate or hamper the negotiation of group meaning.

I especially would like to point out the role of power structures in determining the outcomes of the negotiation process. I recognize the existence of power differentials among members of the group. "Dominant" individuals tend to pull the group meaning closer to their meaningful reality, leaving subservient individuals self-contained in their own personal meaning. The resultant group meaning is lopsided, with subservient individuals forced to embrace group meanings and products that are far from their

meaningful reality. Members of the group, I suggest, must be sensitive and aware of these power differentials if they intend to generate an authentic and high level of negotiated group meaning.

Outcomes of Negotiated Group Meaning. *As mentioned earlier, the process of negotiation produces group meanings representing the collective capital that could be utilized in the negotiation of group-generated products. In a collaborative context, the negotiated product represents a physical manifestation of a collective meaningful reality of individual members of the group. By virtue of the myriad possibilities for integration of individual capitals, the potential for group production is unlimited. However, due to the limits in the nature and process of negotiation, the group products are but limited representations of collective group capital. Should individual personal capital be fully utilized in group production, the collective capitals can be constructed, reconstructed, and/or deconstructed in more ways than one. This means that the collective capital could be represented in multiple ways.*

I would like to discuss my idea of multiplicity and succession in the representation of collective group capital. Multiplicity and succession, in my opinion, are important indicators of a successful process of negotiation at individual, shared, and group levels. Multiple representation of collective group capital suggests a configuration of meaningful reality that can be ordered, reordered and/or constructed, reconstructed, and deconstructed in several ways to create multiple products. For example, a collective community immersion experience of palupad, a fishing technique in a fishing village, can be represented as multiple genres of group products such as narrative accounts, fictionalized stories, essays, and others. These multiple representations could be ordered,

organized, and/or represented in several ways in the portfolio or museum displays. This leads me to another type of representation of group meaning--succession.

The succession in representation of collective capitals suggests the relative position and use of negotiated group products. In other words, the product of negotiation can be transformed into another product. A negotiated group product could serve as a springboard for another genre of group production. I would like to call the middle product as an interim product to suggest its relative position in the order of outcome productions. And I call the extended outcome as a "successive product" to connote the succession of negotiated group production in a collaborative undertaking.

An interim product is by itself the representation of a collective group capital. However, it could still be transformed into another useful product. For example, a group-generated memory bank on ginamos making could serve as an important resource in the development of culturally relevant science lesson plans. In this example, the cultural memory bank is the interim product that mediates the successive product, which is the culturally relevant science lesson plan. I prefer to use the term "successive," in lieu of end product, to suggest the continuous process of succession in the negotiation of group products. The lesson plan could be transformed further into other products. Again, the possibilities are endless if the combined individual capitals are fully used in negotiated group production.

Community and Negotiated Group Meaning. *In my opinion, the process and outcome of negotiation is the foundational block of community and community formation. I would like to believe that the negotiated group meaning and the process of negotiation should be at the heart of all community-building endeavors. The process of community*

building must be continuously empowered by the negotiation of group meaning in order to inform shared understandings and decisions. Community as a process connotes constant participation and action, a never ending cycle of informed decisions within a community. The outcomes of the negotiation process further crystallize the community-building endeavor as they represent the collective, visible spirit of the group.

As a caveat, I would like to emphasize that "shared" understanding, and not "similar" understanding, should be the goal of the negotiation of group meaning. Similar understanding connotes a homogeneous end product of negotiation. This goal, I believe, is contrary to the spirit of community, where celebration of diversity and differences is vital to its survival. On the other hand, shared understanding as a goal suggests no terminal limit. The process never ends as there is a continuous cycle of process, informed decision, and product generation. The negotiation process within the community should never end as it keeps on moving and shifting in search of group meaning. The moment the negotiation process stops—as a result of homogeneity in group meaning—the spirit of community dies along with it.

Concluding Remarks on the Theory

I hope I did not create an impression that the three dimensions of negotiation in a collaborative context are distinct and separate. That was not my intention when I categorized my discussion around these topics. I would like to emphasize that all of these three dimensions of negotiation of meanings occur simultaneously in a collaborative meaning making process and production: In a collaborative experience, an individual negotiates a learning potential from the socio-cultural world with respect to his/her prior knowledge and experience, thereby adding to his/her stock of personal capital. He/She

then shares this personal meaning with members of the group and vice versa, thereby creating a negotiated shared meaning that is more enhanced than the personal meaning alone. Finally, when individual personal meanings are utilized in the production of group meaning, the negotiation process generates a group capital that can be utilized in the generation of negotiated products. I would like to believe that all these simultaneous processes of negotiation influence and empower each other in a reinforcing cycle in a collaborative undertaking.

Framework for Community-based Science Teacher Education

I want to believe that another important theoretical contribution of this study is the development of a Framework for Community-based Science Teacher Education (FCBSTE). This framework is a result of the integration of theoretical and practical ideas on community with respect to my research findings, experiences, and insights learned in bridging communities and preservice science teacher preparation through a collaborative ethnography of community immersion. This framework is also borne out of my frustrating experience of conducting a literature review on community-based science teacher education (CBSTE)—I had a zero "hit" on the topic using the major search engines. However, when I used "community" as a sole search term, I was surprised by the vast amount of literature available in the field, with multiple and sometimes contradictory definitions coming from varied theoretical orientations and disciplines. In addition, I found that "community" has been loosely used in science teacher education literature, with a variety of terminologies such as community of practice, learning community, community as inquiry, community of place, community of mind, and others.

This framework is my personal attempt to clear up the messy and sometimes confusing use of the term community in science teacher education literature. I intend to offer a more inclusive, encompassing, and holistic framework for community-based science teacher education—one that accommodates both traditional and alternative conceptions on, of, and about community. This framework, I believe, offers a clear demarcation surrounding community-based science teacher education, delineating it from other competing constructs and providing a clearer definition and explication of the term. I hope this framework will also guide teacher education practitioners and policy makers in planning, designing, and implementing community-based science teacher education research, curricula, and extension programs.

Since the theoretical, research, and practical base of this framework was amply discussed in Chapter 2, I would like to be straightforward in my discussion: I believe that an authentic community-based science teacher preparation must be co-informed by (1) the notion of community, and (2) the context by which the "community" is formed. Notions of community are theoretical ideas that guide researchers, curriculum planners, and/or extension workers in their task of creating/building a community in science teacher preparation. In addition to the notion of community, the context by which community formation takes place must be taken into consideration, if one has to operate under the banner of community-based science teacher education. I refer to this context as "community hotspot" because it serves as a rich breeding ground for community formation and building. The community hotspot and the notion(s) of community are two-pronged pillars of community-based science teacher education framework. The

framework could not exist if one of these pillars is taken away. Figure 7.2 provides an overview of the framework.

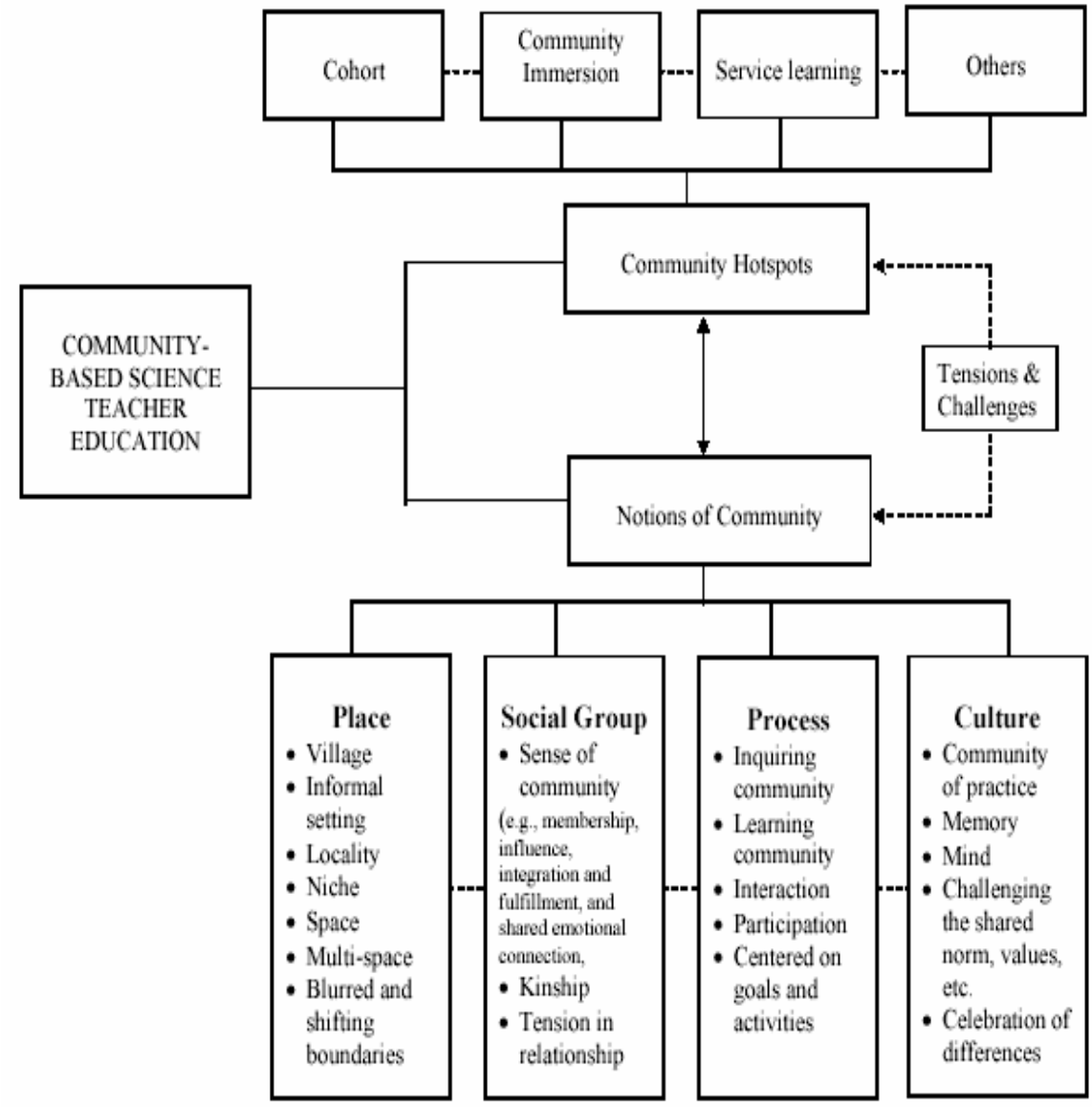

Figure 7.2. Framework for community-based science teacher education.

Notions of Community

The notions of community and their utility in science teacher education were richly discussed in previous chapters, particularly in Chapter 2. Thus, I want to be brief and concise in my discussion about notions of community. From various theoretical orientations and multi-disciplines, I grouped conceptions of community for the framework into four major categories, namely: (a) community as a place, (b) community as a social group, (c) community as a process, and (d) community as a culture. I contend that anyone involved in research, extension, or curricular endeavors, operating under the umbrella of community-based science teacher education, must draw from one or a combination of these theoretical ideas to inform his/her practice. The notion of community-based science teacher preparation would never be complete without the theoretical ideas of community to support the practice.

Community as a place. *I also integrated in the framework both traditional and alternative conceptions to accommodate the wide range and emerging experience of community in the twenty-first century. For example, my research findings—e.g., the discrepancy in research participants' notions and experience of community—were integrated in each category of notions of community in the framework. In particular, I was informed by Agrawal and Gibson's (1999) notion of community as a place, which includes conceptions of community as village, as an informal setting, as a niche, or as any other physical space. However, I also included in the notion of community as a place the idea of a multi-space where boundaries are blurred and shifting as well as the idea of a non-physical space such as emotional space.*

Community as a social group. *The community as a group of people represents another cluster of theoretical ideas surrounding the notion of community. Under this category, the community as a social group is characterized by a deep sense of community wherein kinship, membership, influence, integration, and shared emotional connection operate to foster close relationship among community members (McMillan & Chavis, 1996). However, this sense of community is but one dimension of community as a group of people. In many circumstances, a community exists despite tensions and misunderstandings among its members. Acknowledgement of tensions in relationships among groups of people, in addition to the traditional sense-of-belonging lens, in my opinion, provides a more realistic picture of what it means when people live together as a community.*

Community as a process. *My category of community as a process is inspired by Hester's (2004) notion of processive community. In community as a process, the interaction and participation in co-operative activity is the heart of community-building endeavors. The relationship is centered on tasks and goals; and by doing the tasks to achieve the goals, a community is built. The community as a process is the central element in popular notions of community such as inquiring and learning communities. I contend that all collaborative undertakings must be informed by the notion of community as a process.*

Community as a culture. *When people form a community, they create an unseen bond, a collective spirit that sets them apart from other groups of people. Strengthened by a shared space, common interest, and collective meaning, the community is governed by certain rules, norms, values, and traditions—to name a few—that guide the way*

members of the group behave, relate, and operate (community of practice). The notion of community as a culture refers to the configuration of all collective meanings and experiences of all community members. These meanings are shared and unshared, visible and invisible, and may be externally manifested in community traditions, practices, and material products. In some cases, community culture may be hidden from the eyes but felt within by an individual—a community of memory and of mind, so to speak (Sergiovanni, 1994).

Community Hotspots

What is the context by which notions of community are utilized in community-based science teacher education? Answers to this question comprise the second but equally important component of the Framework for Community-based Science Teacher Education. However, I do not discount the possibility of many answers to the question I pose. In my review of literature, for example, I found three teacher education contexts popularly used as a breeding ground for community formation and building, namely, (a) cohort-based science teacher preparation, (b) professional development schools, and (c) community-based field and early field experiences to include community immersion and service learning. I prefer to call these contexts as "community hotspots" because of their popularity in science teacher education research literature as breeding grounds for community formation. Again, I would like to reiterate that there could be more contexts for community formation to take place in science teacher preparation beyond situations described in succeeding sections.

Cohort-based science teacher preparation. *I find the cohort-based structure in science teacher preparation as a rich context for prospective science teachers to practice*

collaboration and experience the sense of community. I consider Sapon-Shevin and Chandler-Olcott's (2001) definition of cohort relevant to its role as a breeding ground for community formation—they define cohort as "a group of students who move through their teacher education program together, sharing coursework and developing a sense of community and support" (p. 351). In other words, a cohort provides an organizational structure and support mechanism for prospective science teachers to walk together and learn from each other in an atmosphere of trust and cooperation, to practice group skills, and to experience sense of community. Several research studies that I reviewed (e.g., Akerson, Morrison, McDuffie, 2006; Crawford, 2007; Ohana, 2004) support the efficacy of cohorts in promoting collaboration and formation of learning communities in teacher and science teacher preparation.

Professional development schools. *I agree with Darling-Hammond (2006) in her view of professional development schools (PDS) as a powerful site for collaboration and community building. I also find Mule's (2006) conceptualization of PDS relevant to the role it plays in the community of practice: PDS is often situated in schools where various stakeholders (e.g., university, school district, professional association) are engaged in collaborative relationships to reform teacher and teacher preparation practices through experience and research. This idea is consistent with the vision of Holmes Group (1995) of building a collaborative relationship between schools and teacher training institutions to inform practices in preservice teacher education, provide continuing professional development for inservice teachers, and improve achievement of students in local or district schools. In several studies I reviewed, PDS was found to be an effective context for collaborative relationships to take place, for formation of learning communities, and*

for learning within the community of practice (Eick, Ware, and Williams, 2003; Reynolds, Ross, and Rakow, 2002; Scharmann, 2007; Windschitl, 2002))

Community-based field experience and service learning. *I find several forms of community-based field and early field experience in science teacher education, including but not limited to community immersion, learning in informal settings, enactment of projects in out-of-school settings, content learning through field investigations, and community-based service learning. These contexts, I believe, are powerful sites in forging community relationships among stakeholders in field experience endeavors. In my study for example, I integrated service learning in community immersion, a form of early field experience for prospective science teachers. I found the context and the outcome of my research consistent with the spirit and framework of community-based science teacher preparation.*

Utility of CBSTE Framework

I envision the framework for CBSTE as a very simple tool to guide science teacher education practitioners and policy makers in the design and implementation of their teacher education research, curricula, and extension programs. In the design of CBSTE research, for example, a teacher education researcher simply needs to ask these simple questions: What notion(s) of community is/are used in this research? What is the context by which community is used in this study? Answers to these two simple questions may help clarify the researcher's position—that is, if he/she operates under the banner of community-based science teacher education research.

Another way of locating community-based science teacher education research is by starting off with pre-identified hotspots for community formation (e.g., cohort-based

science teacher preparation, community-based field and early field experience to include community immersion, service learning, and professional development schools). I believe that studies conducted in any of these contexts, combined with notions of community to frame the inquiry, are by themselves concrete and authentic examples of community-based science teacher education research.

I would like to believe that this study—the collaborative action ethnography of community immersion—is a research exemplar exhaustively utilizing the framework for community-based science teacher education in the design and implementation of the research. We utilized three community contexts/hotspots in the study—cohort-based teacher preparation, community-based early field experience, and service learning. The study was also informed by different notions of community such as community as a place (i.e., the fishing village for an immersion site), community as a social group (i.e., group membership and influence through cohort groupings), community as a process (i.e., participation in an inquiring and learning community), and community as a culture (i.e., introduction of prospective science teachers to research as a community of practice in preservice teacher preparation and immersion in local village people's beliefs, knowledge, practices, norms, etc.). In my opinion, our collaborative action ethnography is a perfect example of a study that operated under the Framework of Community-based Science Teacher Education.

Implications of the Study

Now that I am close to finishing the last chapter of this dissertation, allow me to rephrase the questions I originally posted at the beginning of this chapter: What might this study offer into the altar of science teacher education scholarship? How might the

theoretical contributions of this study expand the boundary of knowledge in teacher and science teacher education? What methodological contributions might this study offer in the theory and practice of qualitative research? And how might this study inform the practice of community-based science teacher preparation? I would like to organize the answers to these questions in three major sections, namely: (a) Implications for Educational Theory, (b) Implications for Research Methodology and Methods, and (c) Implications for Science Teacher Education Practice.

Implications for Educational Theory

I would like to organize the discussion of the implications of this study for educational theory into two categories. The first category is a discussion of the theoretical implications of the "Theory of Negotiated Meanings." The second category is a discussion of implications of specific findings of the study in relation to educational theory.

Implications of the Theory of Negotiated Meanings.

While most educational theories attempt to explain learning in an individual personal level, I want to believe that the "Theory of Negotiated Meanings" can explain learning as a process of negotiation of individual, shared, and group meanings in a collaborative context. I also want to believe that this theory is powerful because it offers a more holistic and encompassing perspective of learning in a collaborative context. The theory has also the power to explain the micro- and macro-levels of collaboration to include specific group tasks such as focus-group discussion, action planning, and portfolio making and huge group tasks such as participation in collaborative action ethnography.

I want to further believe that this theory can be extended and applied to explain any collaborative undertakings, big tasks or small tasks alike. In science education for example, the theory could potentially be used to examine learning as a negotiated process in group-laboratory settings, in group-field settings, and in the generation and enhancement of individual and group outputs. It could also be used as a theoretical framework for researchers to examine the negotiation process in collaborative research approaches such as participatory action research, public ethnography, collaborative action ethnography, etc. and in teaching such as co-planning, co-teaching, and team teaching. I believe that the application of this theory is as unlimited as the number of collaborative undertakings that may take place inside and outside science classrooms.

I also see the potential of this theory to explain situations within and outside education to include such topics as conflict resolution, participatory management, community action, etc. All of these phenomena simply require an understanding of how individuals in a group construct their personal meaning, how these meanings are shared/communicated to members of the group to generate group meanings, what hinders the transfer of personal capitals into the group capital, and how individual and group capitals maybe utilized to generate group outcomes.

I see missing pieces in the theory that need to be explored in future research. For example, questions such as: What factors might hinder/prevent the passage of individual capital into group capital? I hinted at the role of power differentials and structures in the process of negotiation—the details of their influence in the dynamics of group negotiation must be studied further. I also hinted at the interplay of creativity and negotiated

meanings, particularly in the generation of personal, shared, and group products. A detailed study of this relationship should be explored in future research.

Implications from research findings. *The findings of the study revealed a discrepancy between participants' notions and experience of community, and imply the need for a more encompassing and inclusive framework for community-based science teacher preparation. This specific finding was one of the basic requirements for the development of the Framework for Community-based Science Teacher Education. The implications of this framework in science teacher education practice are further discussed in the succeeding section.*

The findings provide insight into the evolution of research participants' complex belief systems with respect to the purposes, values, and goals of community immersion. This is an affirmation of the value of real life contexts as triggers for belief change—as well as perspective change and value transformation. This finding suggests the need for preservice science teachers to have continuous exposures to true-to-life circumstances through community-based field and early field experiences, which might provide them contexts to confront problematic and tension-filled situations—a true dialogue of life, so to speak.

Experience in the community, outside the four-walls of a university classroom, must be integrated in all science teacher preparation programs. In particular, there is a need to infuse service learning in science teacher education curriculum by virtue of its potential for students to confront and see life in its real context and connect community learning with formal instruction learned in the university setting. However, in view of paradigmic conflicts experienced by the research team in the integration of three service

learning paradigms in one community immersion setting, I suggest that the social justice service learning should be explored singularly during community immersion. The findings regarding roadblocks to successful implementation of the social justice service in the learning site may serve as a reference point to inform students' courses of action. In addition, further study must be conducted on how to translate and/or extend social justice learning experiences into pedagogical classroom practices in preservice teacher and science teacher education (i.e., creating a democratic learning environment, addressing diversity in the classroom).

The use of community-centered and culturally relevant pedagogy in the preparation of prospective science teachers resulted in findings that add to the never-ending debate on the place of local/indigenous knowledge in Euro-centric science and science education. The integration of local knowledge in the science curriculum through development of culturally relevant science lesson plans is not a new practice. However, the research team's conscious effort to "return back" to the village their funds of knowledge through museum displays and teaching of culturally relevant science lessons might offer a model of community-based science teacher preparation that runs counter to the oft-repeated critique of knowledge "mining" from community funds of knowledge. However, for future research, I further suggest extending the practice of community immersion not only by "giving back" to the community their enhanced funds of knowledge, but also by advocating for the community to protect local knowledge through its robust documentation and dissemination of local knowledge in an ethical manner. In addition, for future research, there is a need for community immersion participants to

attend to linguistic issues in the community particularly in the development of cultural memory banks.

The inclusion of research tools to complement the traditional evaluation system—particularly the use of portfolio as both a process and product of group negotiation—to assess learning through community immersion might also offer an assessment model that provides a more authentic, comprehensive, and humanistic system of assessing student learning. Further research must be conducted on how research data can best complement the traditional assessment tools for deeper understanding of student learning in a collaborative context.

For the past six years, community immersion had been conducted in rural villages in the Philippines. Findings from community immersion research have been informative and useful in extending the theory and practice of community-based science and science teacher education. However, how community immersion might look like if conducted in an urban setting? How might community immersion be adapted/adopted in settings and contexts outside the Philippines? Future research is needed to answer these questions.

Implications for Research Methodology and Methods

Defined as "research alongside," collaborative action ethnography (Erickson, 2006) provides opportunities for research participants and researchers to act as co-equals in the knowledge generation, production, and representation. This methodology is an alternative to the traditional top-bottom and bottom-up approaches in research methods. I want to believe that this study presented a concrete example of Erickson's notion of collaborative action ethnography. I also want to believe that this is the first adaptation of collaborative action ethnography in science education.

This study offers a unique way of doing research utilizing negotiation and collaboration as the heart of knowledge (re)production in collaborative action ethnography. True to its nature, collaborative action ethnography does not negate power differential among multiple actors in the research process. By contrast, it highlights the differences in power structures that influence the way research was designed and implemented. However, I must agree that collaborative action ethnography offers a breadth and depth of knowledge and knowledge production unparalleled with other traditional qualitative research approaches—more heads are better than one, so to speak.

As a caveat, collaborative action ethnography could generate a deluge of data that might prove challenging in data analysis. Speaking from my personal experience, I felt overwhelmed by tons of data collected throughout the research process. It was a long, lonely, rugged, and bumpy journey of sense making process, with many instances of being confused, lost, and found. For the most part, data analysis ceased to become collaborative when I was physically separated from my research team—with myself back in the United States and my co-researchers remaining in the Philippines. Although the internet may facilitate cross-continental communications, nothing compares to the actual face to face negotiation of meanings derived from the data with collaborators.

The use of collaborative action ethnography also opens up ethical and legal issues more complex than any other research methodologies. For example, I am always confronted by questions such as: Who owns the narratives drawn from the study? How might benefits be divided and shared—a difficult issue to resolve due to unequal contributions in collaborative action ethnography? Where does my voice as author end and begin in the representation of data? How might authorships be shared when this runs

counter to issues of confidentiality in qualitative research? These questions are difficult to resolve, but are worth exploring in collaborative action ethnography.

This study utilized multiple layers of data analysis using the dialectic of narrative analysis and analysis of narratives. The outcomes of specific individual and group narratives suggested different ways of looking at a common social experience. Furthermore, when the narratives were subjected to another level of analysis using the paradigmic reasoning and inductive analytic procedures of grounded theory, the research themes offered another snapshot of a common social reality, unique from those found in specific individual and group narratives. What does this imply? I want to believe that the use of different analytic procedures may result in a variety of outcomes that compliment each other in providing a more comprehensive picture of a social reality. I would like to attribute the richness of my research findings to the variety of analytic procedures used to make sense of a common experience of community immersion.

Implications for Science Teacher Education Practice

Implications of FCSTE. *I would like to discuss in this section the implications of the Framework for Community-based Science Teacher Education (FCSCTE) and its rich potential to impact practice in science teacher preparation. The framework is simple, but may serve as a powerful tool for analysis of community-based science teacher education practice. It may also serve as an organizing tool to make better sense of a messy set of literature on community and science teacher preparation.*

The value of the FCBSTE lies in its ability to accommodate varied and alternative notions of community as well as multiple contexts for community formation and building. I even see its potential for growth by adding new categories into the two-pronged

dimension of CBSTE—notions of community and community hotspots. I am not sure if this framework has predictive validity. After all it is not designed to predict, but to guide practice.

How does this framework, a product of this study, impact science teacher education practice? In addition to its utility in the planning and implementation of research, FCBSTE may be utilized in the design of community-based science teacher preparation curricular programs. For the curriculum to operate under the banner of community-based science teacher education, I suggest that it must informed by theoretical ideas surrounding notions of community. In addition, the context for community formation must be integrated in the curriculum by the inclusions of teacher education practices such as cohort-structure, community-based field and early field experiences such as service learning and community immersion, and professional development schools. The resultant science teacher education program may be labeled as "community-based," with the possibility of including more community contexts.

How does the framework influence specific instruction in science teacher education? The framework can be used in a very simple way. First of all, the science teacher educator must be guided by a theoretical idea of community to inform his goal of infusing community in his/her instruction. Second, he/she must design specific contexts for instruction where community formation and building may take place. It could be a small group discussion after a laboratory activity. It may be a collaborative project conducted in a field site. I see many possible ways of integrating the framework in specific school instructional settings to infuse "community" as the nexus of preservice science teacher preparation.

Concluding Statement

My dear wife and children, I am not sure how far you can understand the ideas I presented in this letter. How I wish I could write in a simple language. However, I cannot avoid technical jargon, sometimes. Nevertheless, I hope one day, when you, my children, grow up and gain a good education, you might be able to read this piece of work and judge for yourself if my ideas made some sense. Anyway, I am leaving this humble piece of work to the hands of the future. May the good Lord bless me, honor my labor, and grant rewards to all the efforts I have invested in this dissertation.

With much love,

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APPENDIX A

Table A. 1. Community Immersion Action Plan

Day	Time	Purpose	Activity	Person	Resource
1	P.M. 2:00 8:00	To settle down and formalize our arrival in Baybay To discuss preliminary problems encountered, significant learning experiences, and plans for the next day	Arrival, Opening Program, Settling down in quarter Exploration of the community Focus group discussion	All student groups, Program: Research Team headed by Leslie Members of the research team (MRT)	Sound system with microphone, Cleaning materials Tapes and voice recorder
2	A.M. 4:00 8:00 P.M. 1:00 8:00	To develop skills in qualitative observation and writing. To familiarize the barangay and its cultural practices relevant to science teaching and learning To identify preliminary informants and conduct initial interviews on a cultural practice To discuss learning experiences, problems encountered, and plans for the next To develop a well-focused questions for the cultural memory bank	Qualitative observation and journal writing using the time-activity log Community mapping Interaction with the village people Qualitative interviewing Focus group discussion Discussion on memory banking	Student pairs: Ben & Ken; Leslie & Chennie; Ben & Candy; Ynes & Carrie; Trixie & Ann Facilitator: Vicente MRT	Journal notebooks, ball pen, tape recorder

Table A.1 (Continuation)

Day	Time	Purpose	Activity	Person	Resource
3	A.M 8:00 P.M. 1:00 8:00 10:00	To conduct a well-focused interview on the identified cultural practices. To share learning experiences with other student groups assigned to explore the community's arts, crafts, and livelihood. To discuss significant learning experiences, encountered problems, and plans of action for the next day.	Interviews Focus group discussion Focus group discussion	Student pairs MRT with other student group Research team	Tape recorder and journals
4	A.M. 8:00 10:00 P.M. 1:00 11:00	To transcribe interview data & develop preliminary cultural memory banks To share experiences with student groups assigned to document the marginalized people and the oral history and historical landmarks of the community To document cultural practices through artifact and specimen displays for the museum and portfolio To discuss significant learning experiences, encountered problems, and plans of action for the next day	Transcription of interviews & Sharing of cultural memory banks Focus Group discussion Preparation of artifacts and specimens & setting up of displays for the museum Focus group discussions	Research team Research team with other class groups All class members Research team	Collection bottles and specimen boxes Tape recorder Collected artifacts and specimen

Table A.1 (continued)

Day	Time	Purpose	Activity	Person	Resource
5	A.M. 6:00 P.M. 3:00	To prepare for the opening of the museum and closing program. To formally turn over the museum to the barangay and officially close our community stay in Baybay	Preparation of displays Formal turn over of museum to the barangay officials Closing program	All members of the class Community immersion participants; barangay officials and people	Paints, cartolina, colored papers, artifacts, specimen bottles, etc. Sound system

APPENDIX B

Table A.2. Plan for Household Chores

Day	Task	Person
1	Cleaners Marketers & Cooks Dishwashers	Ynes and Chennie None Diane & Candy
2	Cleaners Marketers & Cooks Dishwashers	Dianne & Candy Mario & Ben Trixie, Tomas, & Leslie
3	Cleaners Marketers & Cooks Dishwashers	Tomas & Trixie Ben & Carrie Leslie & Mario
4	Cleaners Marketers & Cooks Dishwashers	Ben & Carrie Ben & Trixie Leslie & Mario
5	Cleaners Marketers & Cooks Dishwashers	Leslie & Mario Ynes & Dianne Ben & Trixie

APPENDIX C

Table A.3. Five-day Group Menu

Day	Menu*			Budget
	Breakfast	Lunch	Dinner	
1	Bring food from holidays leftover			0 Php
2	Egg with hotdog	Puchero	Boneless milkfish	820 Php
3	Egg with sardinas	Laswa & tabagak	Adobo	350 Php
4	Miswa & sardinas	Monggo with pork	Ginataan nga tilapia	350 Php
5	Pancit canton & tinapay	Beef steak	none	300 Php
Total				1820 Php

APPENDIX D

Table A.4. Community Funds of Knowledge Assignment

Pair	Student	Topic
1	Tomas Mario	Palupad, pagtu-ob, ginamos making, panahid, pamukot, pananggot (fish-/shrimp-related cultural practices)
2	Leslie Chennie	Pangisda, study of different kinds of fish particularly the liwit and barera
3	Trixe Dianne	Panudlak, sab-og mongo, dapog, tanom, panggarab (farming practices)
4	Ynes Carrie	Panginhas, panguma (farming practices)
5	Ben Candy	Pamulong kahoy-kahoy, hanghilot (healing practices)

APPENDIX E

Table A.5. Criteria for Portfolio Assessment

The table of contents section of the portfolio…. *Is divided into segment/ chapters/unit;* Shows specific topics and page numbers; *Shows systematic organization of contents;* Has face value or pleasing appearance.
The goal and objectives section of the portfolio…. *Is related to the course objective;* Captures learning potentials before, during, and after the community stay; *Also includes learning associated to the assigned theme;* Shows evidence of collaborative effort in setting them.
The description of the team section of the portfolio…. *Contains group descriptions;* Shows descriptions of individual members; *Relates individual descriptions to personal backgrounds and the community where they live;* Contains descriptions of how the team was formed; *Also contains descriptions of tensions and struggles in forming the group;* Shows evidence of teamwork in making this section.
The learning experience (pre-immersion) section of the portfolio…… *Shows evidences of learning under each specific activities:* *a. course orientation,* b. class activities and discussion, *c. group presentation/report* d. student seminar - qualitative interviewing, - *qualitative observation,* - action planning, - *journal writing,* - portfolio making, *e. community visit(s);* *a.*

Table A.5 (continuation)

Shows evidence of planning of day to day activities for the community stay in relation to *a. household chores,* b. learning in the community, *c. service to the community;* Shows evidence of learning using *a. personal and/or group, narratives or stories,* *b.* pictures, *c. quotations,* *d.* journal entries, *e. alternative modes of presentation such poems, paintings, sketches, drawings, songs, essays, etc.;* Shows evidence of organization; *Has face value or pleasing appearance*
This learning experience (community stay) section of the portfolio…. *Contains proof(s) of accomplished day to day activities;* Shows evidence(s) of teamwork; *Shows evidence of learning from/in* *a. community mapping,* b. interview(s), *c. observation(s),* d. interaction with - residents/host family, - barangay officials, *e. doing household chores,* f. doing community project; *Shows evidence of knowledge learned from* *a. informants,* b. elders, *c. peers/classmate;* Shows evidence of individual learning translated to group learning. *Shows varied mode of presentation such as* *a. personal and/or group, narratives or stories* *b.* pictures, *c. quotations,* *d.* journal entries, *e. alternative mode of presentation such poems, paintings, sketch, drawing, songs, essays, etc.;* Shows evidence of organization; *Has face value or pleasing appearance.*

Table A.5. (continuation)

The learning experiences (post-community stay) section of the portfolio shows…. *Evidence of group collaboration in the* *a. making of portfolio;* b. preparation of group exhibits/museum displays *Evidence of* *a. transcribed interview(s)* b. qualitative observation(s) *Evidence of learning from* *a. portfolio making* b. exhibit/museum display & preparation *c. transcribed interviews* *Shows varied mode of presentation such as* *a. personal and/or group, narratives or stories* *b.* pictures, *c. quotations,* *d.* journal entries, *e. alternative mode of presentation such poems, paintings, sketch, drawing, songs, essays, etc.;* Shows evidence of organization; *Has face value or pleasing appearance.*
This evaluation section of the portfolio….. Shows evidence of evaluation of learning experiences from each member of the team; Shows a summary of group evaluation of learning experiences.
The summary and conclusion section of the portfolio…. *Contains a thematic summary of learning based on the* *a. course objective* b. objective of the portfolio *Relates learning to…* a. *science/science* education/major field b. future work as a teacher *c. community life/experience.*

APPENDIX F

Appendix A.6. Preliminary Rubric for Community Immersion Portfolio Assessment

Part/Section	Point	**A** (Outstanding)	1.0 E*	1.25 S*	1.5 P*	**B** (Satisfactory)	1.75 E	2.0 S	2.25 P	**C** (Poor)	2.5 E	2.75 S	3.0 P
I. Introduction	5	**The introduction of portfolio……** *Introduces the portfolio and its rationale;* Sets the mood and provides an overview of its contents; *Cites relevant literature on community/community immersion;* Connects the portfolio to the course; *Shows coherence/organization of ideas*				The introduction satisfies 3-4 out of the 5 criteria.				The introduction satisfies 1-2 out of 5 criteria			
II. Table of Contents	5	**The table of contents….** *Is divided into segment/ chapters/unit;* Shows specific topics and page numbers; *Shows systematic organization of contents;* Has face value or pleasing appearance.				The table of contents satisfies 3 out of 4 criteria.				The table of contents satisfies 1-2 out of 4 criteria.			
III. Goals and Objectives	5	**The goal and objectives….** *Are related to the course objective;* Capture learning potentials before, during, and after the community stay; *Also include learning associated to the assigned theme;* Show evidence of collaborative effort in setting them.				The goals and objectives satisfy 3 out of 4 criteria.				The goals and objectives satisfy 1-2 out of 4 criteria.			

* E= excellent, S= satisfactory, P= poor

Table A.6 (continuation)

Part/Section	Point	**A** (Outstanding)	1.0	1.25	1.5	**B** (Satisfactory)	1.75	2.0	2.25	**C** (Poor)	2.5	2.75	3.0
			E*	S*	P*		E	S	P		E	S	P
IV. Description of the Team	5	**The team….** *Contains group descriptions;* Shows descriptions of individual members; *Relates individual descriptions to personal backgrounds and the community where they live;* Contains descriptions of how the team was formed; *Also contains descriptions of tensions and struggles in forming the group;* Shows evidence of teamwork in making this section.				Description of the team contains 4-5 out of 6 criteria.				Description of the team contains 1-3 out of 6 criteria.			
V. Learning Experience													
A. Pre-immersion	20	**This section……** *Shows evidences of learning under each specific activities:* *a. course orientation,* b. class activities and discussion, *c. group presentation/report* d. student seminar (e.g., qualitative interviewing, *qualitative observation,* action planning, *journal writing,* portfolio making, *e. community visit(s);*				The pre-immersion learning experiences contain 15-18 out of 20 criteria.				The pre-immersion learning experiences contain 14 or less out of 20 criteria.			

Table A.6. (continuation)

Part/Section	Point	**A** (Outstanding)	1.0 E*	1.25 S*	1.5 P*	**B** (Satisfactory)	1.75 E	2.0 S	2.25 P	**C** (Poor)	2.5 E	2.75 S	3.0 P
B. Community Stay	20	**This section….** *Contains proof(s) of accomplished day to day activities;* Shows evidence(s) of teamwork; *Shows evidence of learning from/in* *a. community mapping,* b. interview(s), *c. observation(s),* d. interaction with - residents/host family, - barangay officials, *e. doing household chores,* f. doing community project; *Shows evidence of knowledge learned from* *a. informants,* b. elders, *c. peers/classmate;* Shows evidence of individual learning translated to group learning. *Shows varied mode of presentation such as* *a. personal and/or group, narratives or stories* *b.* pictures, *c. quotations,* *d.* journal entries,				The community stay learning experiences contain 15-18 out of 20 criteria.				The community stay learning experiences contain 14 or less out of 20 criteria.			

Table A.6. (continuation)

Part/Section	Point	**A** (Outstanding)	1.0 E	1.25 S	1.5 P	**B** (Satisfactory)	1.75 E	2.0 S	2.25 P	**C** (Poor)	2.5 E	2.75 S	3.0 P
		e. alternative mode of presentation such poems, paintings, sketch, drawing, songs, essays, etc.; Shows evidence of organization; *Has face value or pleasing appearance.*											
C. Post-community stay	20	**This section shows….** *Evidence of group collaboration in the* *a. making of portfolio;* b. preparation of group exhibits/museum displays *Evidence of* *a. transcribed interview(s)* b. qualitative observation(s) *Evidence of learning from* *a. portfolio making* b. exhibit/museum display & preparation *c. transcribed interviews* *Shows varied mode of presentation such as* *a. personal and/or group, narratives or stories* *b.* pictures, *c. quotations,* *d.* journal entries,				The post-immersion learning experiences contain 10-13 out of 14 criteria.				The post-immersion learning experiences contain 9 or less out of 14 criteria.			

Table A.6 (continuation)

Part/Section	Point	**A** (Outstanding)	1.0 E	1.25 S	1.5 P	**B** (Satisfactory)	1.75 E	2.0 S	2.25 P	**C** (Poor)	2.5 E	2.75 S	3.0 P
		e. alternative mode of presentation such poems, paintings, sketch, drawing, songs, essays, etc.; Shows evidence of organization; *Has face value or pleasing appearance.*											
VI. Evaluation	10	This section ….. Shows evidence of evaluation of learning experiences from each member of the team; Shows a summary of group evaluation of learning experiences.				One (1) to 2 members of the team failed to submit self-evaluation of portfolio.				Three (3) or more members of the team failed to submit self-evaluation of portfolio.			
VII. Summary and Conclusion	10	The summary and conclusion section…. *Contains a thematic summary of learning based on the* *a. course objective* b. objective of the portfolio *Relates learning to…* a. *science/science education/major field* b. future work as a teacher *c. community life/experience.*				The section meets 3-4 out of 5 criteria.				The section meets 3-4 out of 5 criteria.			
	Total = 100												

APPENDIX G

Table A.7. Final Rubric for the Assessment of Community Immersion Portfolio

Part/Section	Point	**A** (Outstanding)	B (Satisfactory	**C** (Poor)
I. Introduction	5	Shows a clear *rationale of the portfolio,* Provides a comprehensive overview of its contents; *Cites relevant literature to support ideas* Provides clear justifications of the portfolio as an assessment tool; *Shows coherence and organization of ideas to support arguments.*	Shows the *rationale of the portfolio,* Provides an overview of its contents; *Cites relevant literature to support ideas;* Provides justifications of the portfolio as an assessment tool; *Shows some coherence and organization of ideas to support arguments.*	Shows weak or no *rationale of the portfolio,* Provides a limited overview of its contents; *Does not cite literature to support ideas;* Does not provide justifications of the portfolio as an assessment tool; *Does not show coherence and organization of ideas to support arguments.*
II. Table of Contents	5	*Shows clear delineations of ideas by dividing them into segments/ chapters/units;* Shows a complete list of topics and page numbers; *Shows systematic and well-arranged organization of contents;* Exhibits a very pleasing appearance.	*Shows delineation of ideas by dividing them into segments/ chapters/units;* Shows list of topics and page numbers; *Shows some degree of organization in its contents;* Exhibits a pleasing appearance.	*Shows unclear delineations of ideas as evidenced by limited headings for segments/ chapters/ units;* Shows a glaring incompleteness in the list of topics and page numbers; *Does not show evidence of organization in contents;* Exhibits a poor appearance.

Table A.7 (continuation)

Part/Section	Point	**A** (Outstanding)	B (Satisfactory	**C** (Poor)
III. Goals and Objectives	5	*Shows a direct relationship to the course objectives;* Captures in detail the learning potentials before, during, and after the community stay; *Also includes appropriate learning objectives associated to the assigned theme;* Shows compelling evidences of collaborative effort in developing the objectives.	*Shows some relationship to the course objectives;* Captures some learning potentials before, during, and after the community stay; *Also includes some learning objectives associated to the assigned theme;* Shows some evidences of collaborative effort in developing the objectives.	*Shows lack of relationship to the course objectives;* Captures a very limited detail of learning potentials before, during, and after the community stay; *Shows a very limited learning objectives associated to the assigned theme;* Shows no evidence of collaborative effort in developing the objectives.
IV. Description of the Team	5	*Contains comprehensive descriptions of the group;* Shows in-depth descriptions of individual members; *Provides relevant and detailed descriptions of personal backgrounds and community of origin;* Contains detailed descriptions of how the team was formed; *Contains reasonable descriptions of tensions and struggles in forming the group;* Shows compelling evidence of teamwork in making this section.	*Contains certain descriptions of the group;* Shows descriptions of individual members; *Provides some descriptions of personal backgrounds and community of origin of members;* Contains descriptions of how the team was formed; *Contains limited descriptions of tensions and struggles in forming the group;* Shows some evidence of teamwork in making this section.	*Contains very limited descriptions about the group;* Shows very limited descriptions of individual members; *Provides an irrelevant and limited descriptions of personal backgrounds and community of origin;* Does not contain description of how the team was formed; *Does not provide any descriptions of struggles in the formation of group;* Shows a very limited evidence of teamwork in making this section.

Table A.7 (continuation)

Part/Section	Point	**A** (Outstanding)	B (Satisfactory	**C** (Poor)
V. Learning Experience A. Pre-immersion	20	*Shows a plausible, complete, and clear evidences of learning under each specific activities:* *a. course orientation,* b. class activities and discussion, *c. group presentation/report* d. student seminar - qualitative interviewing, - *qualitative observation,* - action planning, - *journal writing,* - portfolio making, *e. community visit(s);* Shows reasonable and plausible evidence in planning of day to day activities for the community stay in relation to *a. household chores,* b. learning in the community, *c. service to the community;* Shows clear and detailed evidence of plans to connect the community immersion experience with the major field of study;	*Shows some degree of plausibility, completeness, and clarity of learning evidences for specific activities:* *a. course orientation,* *b.* class activities and discussion, *c. group presentation/report* *d.* student seminar - qualitative interviewing, - *qualitative observation,* - action planning, - *journal writing,* - portfolio making, *e. community visit(s);* Shows certain evidences in the planning of day to day activities for the community stay in relation to *a. household chores,* b. learning in the community, *c. service to the community;* Shows certain evidences of plans to connect the community immersion experience with the major field of study;	*Shows incomplete or very limited evidences of learning under each specific activities:* *a. course orientation,* *b.* class activities and discussion, *c. group presentation/report* *d.* student seminar e. qualitative interviewing, *f. qualitative observation,* g. action planning, *h. journal writing,* i. portfolio making, *e. community visit(s);* Shows no or very limited evidence in planning of day to day activities for the community stay in relation to *a. household chores,* b. learning in the community, *c. service to the community;* Shows no or very limited evidence of plans to connect the community immersion experience with the major field of study;

Table A. 7 (continuation)

Part/Section	Point	**A** (Outstanding)	B (Satisfactory	**C** (Poor)
		Shows detailed and plausible evidences of learning using a. personal and/or group, narratives or stories, *b. pictures,* c. quotations, *d. journal entries,* e. alternative mode of presentation such poems, paintings, sketch, drawing, songs, essays, etc.; *Shows high degree of organization in the presentation of learning;* Shows a very pleasing face value in the presentation of evidences.	*Shows acceptable evidences of learning using* a. personal and/or group, narratives or stories, *b. pictures,* c. quotations, *d. journal entries,* e. alternative mode of presentation such poems, paintings, sketch, drawing, songs, essays, etc.; *Shows elements of organization in the presentation of learning;* Shows an acceptable face value in the presentation of evidences.	*Shows no or very limited evidences of learning using* a. personal and/or group, narratives or stories, *b. pictures,* c. quotations, *d. journal entries,* e. alternative mode of presentation such poems, paintings, sketch, drawing, songs, essays, etc.; *Shows a very limited organization in the presentation of learning;* Shows an ugly appearance in the presentation of evidences.
B. Community Stay	20	*Contains detailed evidences of day to day accomplishment of activities;* Shows plausible evidences of teamwork; *Shows a detailed description of evidence of learning from/in* *a. community mapping,* b. interview(s), *c. observation(s),* d. interaction with 1. residents/host family, 2. barangay officials, *e. doing household chores,* f. doing community project;	*Contains some but limited evidences of day to day accomplishment of activities;* Shows certain evidences of teamwork; *Shows acceptable description of evidence of learning from/in* *a. community mapping,* *b.* interview(s), *c. observation(s),* d. interaction with 1. residents/host family, 2. barangay officials, *e. doing household chores,* f. doing community project;	*Contains no or very limited descriptions of day to day accomplishment of activities;* Shows little/ no evidences of teamwork; *Shows a very limited description of evidence of learning from/in* *a. community mapping,* b. interview(s), *c. observation(s),* d. interaction with 1. residents/host family, 2. barangay officials, *e. doing household chores,* *f. doing community project;*

Table A.7 (continuation)

Part/Section	Point	**A** (Outstanding)	B (Satisfactory	**C** (Poor)
		Shows detailed descriptions of learning from *a. informants,* b. elders, *c. peers/classmate,* *d. supervising faculty;* *Describes a detailed, complete, and clear evidences of attempts to connect community immersion experience with the major field;* Shows well-documented evidences of an individual learning translated into group learning. *Shows varied mode of presentation such as* *a. personal and/or group, narratives or stories* *b.* pictures, *c. quotations,* *d.* journal entries, *e. alternative mode of presentation such poems, paintings, sketch, drawing, songs, essays, etc.;* Shows strong evidence of organization; *Has very pleasing appearance.*	*Shows descriptions of learning from* *a. informants,* *b.* elders, *c. peers/classmate,* *d. supervising faculty;* *Describes an attempt to connect community immersion experience with the major field;* Shows evidences of an individual learning translated into group learning. *Shows limited mode of and depth in presenting learning experiences* *a. personal and/or group, narratives or stories* *b.* pictures, *c. quotations,* *d.* journal entries, *e. alternative mode of presentation such poems, paintings, sketch, drawing, songs, essays, etc.;* Shows evidences of organization; *Has pleasing appearance*	*Shows detailed descriptions of learning from* *a. informants,* *b.* elders, *c. peers/classmate,* *supervising faculty;* *Does not provide attempts to connect community immersion experience with the major field;* Shows very limited evidences of individual learning translated into group learning. *Shows very limited mode of and lack depth in presenting learning experiences* a. *personal and/or group, narratives or stories* b. pictures, *c. quotations,* d. journal entries, *e. alternative mode of presentation such poems, paintings, sketch, drawing, songs, essays, etc.;* Shows little evidence of organization; *Has poor appearance*

Table A.7 (continuation)

Part/Section	Point	**A** (Outstanding)	B (Satisfactory	**C** (Poor)
C. Post-community stay	20	Shows clear, sufficient, and excellent quality of evidences to support individual and group learning in the a. making of portfolio; *b. preparation of group exhibits/museum displays;* Shows evidences of sound and in-depth content learning in the transformation of interview and observation data into cultural memory banks and culturally relevant science lesson plans; *Exhibits sound and in-depth chemistry content learning as a result of community immersion experience*; Shows well-articulated and sufficient evidences of learning particularly in the implementation of service learning projects; *Shows excellent quality and variety in the mode of presentations of learning evidences, e.g. personal and/or group narratives or stories; pictures; quotations; journal entries; and alternative mode of presentation such poems, paintings, sketch, drawing, songs, essays, etc.;* Shows a well-systematized organization of documents; Has a very pleasing appearance.	Shows adequate and good quality of evidences to support individual and group learning in the a. making of portfolio; *b. preparation of group exhibits/museum displays;* Shows evidences of sound content learning in the transformation of interview and observation data into cultural memory banks and culturally relevant science lesson plans; *Exhibits sound but limited chemistry content learning as a result of community immersion experience*; Shows evidences of learning particularly in the implementation of service learning projects; *Shows a good quality but limited mode of presentations of learning evidences, e.g. personal and/or group narratives or stories; pictures; quotations; journal entries; and alternative mode of presentation such poems, paintings, sketch, drawing, songs, essays, etc.;* Shows good organization of support documents Has a pleasing appearance.	Shows limited and poor quality of evidences to support individual and group learning in the a. making of portfolio; *b. preparation of group exhibits/museum displays;* Shows evidences of sound and in-depth content learning in the transformation of interview and observation data into cultural memory banks and culturally relevant science lesson plans; *Exhibits lack in understanding of chemistry content learning as a result of community immersion experience*; Shows limited evidences of learning particularly in the implementation of service learning projects; *Shows poor quality and very limited variety in the mode of presentations of learning evidences, e.g. personal and/or group narratives or stories; pictures; quotations; journal entries; and alternative mode of presentation such poems, paintings, sketch, drawing, songs, essays, etc.;* Shows poor organization of support documents; Has poor appearance.

Table A.7 (continuation)

Part/Section	Point	**A** (Outstanding)	B (Satisfactory)	**C** (Poor)
VI. Evaluation/ Assessment	10	Shows complete, well-articulated, and honest evaluation of community immersion learning experiences; Shows a complete and well-organized summary of individual and group evaluation/assessment of learning.	Shows a limited but honest evaluation of community immersion learning experiences; Shows a summary of individual and group evaluation/assessment of learning. .	Shows very limited and poorly articulated evaluation of community immersion learning experiences; Shows an incomplete individual and group evaluation/assessment of learning.
VII. Summary and Conclusion	10	*Contains a well-thought and well-organized thematic summary of community immersion learning in relation to the* *a. course objective* b. objective of the portfolio *Shows clear and plausible connections between community immersion learning experiences and the* a. major field b. future work as a science teacher *c. life as a member of a community.*	*Contains a thematic summary of learning based on the* *a. course objective* b. objective of the portfolio *Shows the connections between community immersion learning experiences and the* a. major field b. future work as a science teacher c. *life as a member of a community*	*Contains no or very limited descriptions of summary of community immersion learning in relation to the* *a. course objective* b. objective of the portfolio *Shows little or no connections between community immersion learning experiences and the* a. major field b. future work as a science teacher c. *life as a member of a community.*
	Total = 100			

APPENDIX H

A Dialogue of Life: Integrating Service Learning in a Community Immersion Model of Pre-service Science Teacher Preparation*

Vicente Handa, Deborah Tippins, Purita Bilbao, Lourdes Morano, Brittan Hallar, Kristen Miller, and Robert Bryan

Prospective elementary science teachers help farmers in weeding a rice field as part of service learning activities during their community immersion

Pre-service science teachers tend to live in two worlds— the world of home and community and the world of the university. A major critique in pre-service science teacher preparation is its neglect in connecting these two worlds, thus placing prospective science teachers in a conflicted situation. How might a relevant science teacher preparation respond to the call for these two worlds to know, respect, and celebrate each other while at the same time address the needs and issues in the community that prospective science teachers might serve in future?

Fryer and Newnham (2005) suggest community-based service learning as an avenue to make science teacher education more responsive to the needs of communities outside the university. Dumas (2002) defines community-based service learning as a form of experiential education designed to promote learning and development by engaging prospective teachers in activities that address human and community needs. Through their participation in community-based service learning activities, prospective teachers learn science in true-to-life contexts and are better prepared to become lifelong learners and active participants in society by acquiring managerial, critical thinking, and group dynamics skills such as team work and cooperation.

In our work in the Philippines, we envisioned a community-based service learning experience in pre-service science teacher preparation as an avenue for preparing unique prospective teachers who are mindful of connections between the science they learn in the university and its contextualized dimension and direct application in a local community setting. Through their participation in community-based service learning activities, we imagined prospective science teachers who would be able to become proactive members of a community—movers of change using the knowledge, tools, and processes of science in solving problems in real-life contexts and affecting change in communities they live or serve.

Dubbed as a dialogue of life, the integration of service learning in a community immersion model of pre-service science teacher preparation offers opportunities for multiple stakeholders—prospective science teachers, science teacher educators, and local village people—to build connections that inform and enrich each other's lives.

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Pre-service science teachers prepare mahogany seedlings for tree planting on erosion-prone areas of the community. Tree planting is one of their community-based service learning activities.

A Community Immersion Model of Pre-service Science Teacher Preparation

Current reform efforts in the Philippines are centered on the indigenization of science curriculum—one that is mindful of the community as an educational resource and of cultural practices as a source of knowledge and inspiration to inform science teaching and learning. Major efforts in Philippine higher education are focused on pre-service science teachers who are prepared to carry the torch of indigenization reforms in their prospective science classrooms. Thus, community immersion was originally mandated as a requirement in all pre-service teacher education curricula.

What is community immersion? Dubbed as a "dialogue of life," community immersion in pre-service science teacher education aims at providing a true-to-life and empowering opportunity for prospective science teachers (both elementary and secondary) to become active participants in community life through field and service learning experiences. It consists of a three unit-course with a field component wherein prospective science teachers live in a local community and immerse in the lifeworlds of rural village people—their social, cultural, economic, and many other realities become the matrix for embedding science learning and activities. The course is designed for prospective science teachers to become active participants in community life through science and science-like service learning activities that inform and enrich not only the students but the community and its people as well.

All third year undergraduate students—about 350 students—participate in community immersion. They are organized into cohorts of approximately 20 students according to their academic majors (i.e., general science, biology, chemistry, physics, math, social studies, elementary science and health) and placed in different rural communities. Each cohort focuses specifically on building links between their academic content learning and community experience. Learning on an individual basis is assessed through a combination of (a) a midterm examination, (b) journal reflections, and (c) conceptual understanding of science concepts as represented in the design of culturally relevant science lesson plans. Learning on a group basis is measured using scoring rubrics for group-generated portfolios, service learning projects in the immersion site, and exhibits and displays that students put up after they return to the university.

Elements of Community Immersion

Through our five-year experience at the (name of a university), in (name of a city) Philippines, we developed a model of community immersion in pre-service science teacher preparation with the following elements: formation of learning communities, trust building activities, multi-stake collaboration, rapid community assessment, action research, service learning *with* the community, memory banking, co-planning and co-teaching, reflection, portfolio assessment, and culminating exhibits and portfolio displays.

One important goal of our community immersion model is the formation of learning communities from within and across participants—pre-service science teachers, science teacher and teacher educators, village people, and other stakeholders in private and public agencies— through collaborative dialogues, intergenerational interactions, and group negotiations. As we prepare students for an actual community stay, we engage them in trust building activities designed to foster group cohesion. The prospective science teachers conduct preliminary community surveys prior to living in a community that inform the design of service learning projects they will implement later. The surveys enable the pre-service teachers to learn more about the community where they will stay during the field component of the course. Through the survey, they gather information such as the number of hectares planted with rice, the common health problems of pre-school children, or the major livelihood of community members.

Prospective chemistry teachers brainstorm ideas with their supervising faculty on possible service learning projects in the community after their preliminary visits and surveys.

One of the requirements of the course is a science-related service learning project that pre-service science teachers implement *with* rather than *for* the community people. Together with their supervisors, they also engage in participatory action research to inform the theory and practice of community-based science teacher preparation. They conduct action research on topics such as—to name a few— the fish preservation practices of the community, the water quality of community wells, the use of local dialect in science teaching and learning, or environmental impact assessment of the habitat for migratory birds such as the purple heron.

Pre-service science teachers are also involved in the documentation of "community funds of knowledge" (Gonzalez, Moll, and Amanti, 2005) through interviews and focus group discussions with community people. In particular, they utilize cultural "memory banking" (Nichols, Tippins, Morano, Bilbao, and Barcenal, 2005) as a tool to make sense of their experience and transform community practices into culturally relevant science lesson plans.

Originally an anthropological tool used to preserve indigenous plant varieties (Nazarea, 2001), student-generated cultural memory banks are used for locating relevant science at the intersection of community life and practices. Using their cultural memory banks as an organizing tool, prospective science teachers co-plan lessons with their supervising faculty and co-teach with peers and colleagues in a local school in the community.

Throughout their participation in community immersion, pre-service science teachers maintain a reflective journal where they individually process their experience in the light of their university-based science and education courses and personal experience. In addition to other formative assessment tools (e.g., participation in focus-group discussions, a midterm examination, reflection notebooks), prospective science teachers create exhibits and portfolio displays as a capstone event for their semester-long community immersion experience. Parents and children from rural communities are invited to the university to attend the opening of the week-long exhibit.

Community Immersion Contexts

Over the course of our five-year community immersion experience, fifteen rural *barangays* served as immersion sites for prospective elementary and secondary science teachers. The *barangay*, a basic territorial and political unit in the Philippines, is the cradle of one's sense of community, which is important to the Filipino way of life. A typical rural *barangay* in the Philippines is clannish, with most of the people related either by consanguinity or affinity. Unrelated individuals tend to form relationships through a system of rites such as baptism and marriage. Some of our immersion sites are rural agricultural *barangays* where most of the village people engage in farming and raising of livestock. Other immersion sites are coastal villages where most residents engage in both fishing and farming activities.

A group of prospective chemistry teachers record their observations of early morning activities of fishing village people in a coastal barangay, an immersion site.

Phases of Community Immersion

Community immersion is a semester-long experience organized in three major phases, namely: preparation, community stay, and summative assessment and celebration phase. The course is usually supervised by a science teacher educator in collaboration with scientists and other teacher educators.

In the preparation phase, prospective science teachers attend a class for about seven weeks to prepare themselves for the actual community stay. Pre-immersion coursework

focuses on understanding the community and the different theoretical frameworks underlying service learning activities, negotiating roles and expectations within their cohort groups, conducting preliminary visits to their assigned *barangays*, exploring community needs through surveys and rapid assessments, conceptualizing service learning projects based on preliminary visits and surveys, developing action plans and negotiating them with the community people, and developing assessment tools.

Prospective elementary science teachers make use of improvised and locally available materials in teaching rural barangay people how to make medicinal soap and ointment using the juice of guava leaves as an herbal ingredient.

Phase two is the actual community stay. A pre-service science teacher cohort lives with a host family in the community. In the absence of a host family, a *barangay* hall or a health clinic sometimes serves as a housing unit. A faculty member, usually a science teacher educator, typically lives with the pre-service teachers, although he or she may choose to travel to the site on a daily basis for supervisory purposes. During the community stay phase, pre-service science teachers engage in science-related service learning projects, conduct action research and sense making activities, negotiate or revise daily plans on the basis of continuous feedback and formative assessment, collect artifacts for portfolios and exhibit displays, and contextualize their understanding of science in the community through memory banking and the development of culturally relevant lesson plans. Over the past five years, examples of science-related service learning projects include the following: a community herbal garden, a science literacy program for daycare students, a seminar-workshop on soap making, tree-planting and erosion control projects, volunteer science teaching in local schools, medical and dental missions in collaboration with local health personnel, development of a mini community-based science museum, and organization of a community science night with activities such as constellation identification and planet and moon watching through portable telescopes. Detailed descriptions of these service learning projects are shown in Table 1.

Community immersion participants share their experience to the public through exhibits and portfolio displays

Phase three of the community immersion course involves synthesis activities, summative assessment, and celebrations of learning. In this phase, pre-service science teacher cohorts are involved in assembling and organizing their portfolios, conducting focus-group debriefing, fine-tuning their culturally relevant lesson plans, conducting demonstration teaching, and participating in summative assessment activities. The highlight of this phase is the celebration of the community immersion experience through exhibits and portfolio displays.

Table 1. *Summary of Science-Related Service Learning Projects of Pre-service Science Teachers*

Name of Project	Project Activities and their Science/Science Education Dimension
Community Herbal Garden	• Collect herbal plants and document cultural practices and stories associated with them. • Identify medicinal uses of herbal plants based on published literature and interviews. • Construct a communal herbal garden in a vacant lot near the community plaza • Label each plant as to their local name, English name, and scientific name. • Develop lesson plans on the identification, use, preservation, and processing of herbal plants for high school students. •
Science Literacy for Pre-k Children	• Clean the day care center and develop science-related instructional materials for use and display. • Gather pre-k children in the daycare center for science literacy lessons. • Integrate science concepts in games and activities. • Collaborate with daycare care teachers in the teaching science for pre-school children. • Develop a nutrition program for pre-school students.
Volunteer Teaching in Local School	• Survey community-based resources relevant to the teaching and learning of science. • Collaborate with peers and local school science teachers in the development of a community-based elementary science lesson plans. • Co-teach science lessons with peers.
Herbal Soap Making Workshop	• Survey locally available herbal plants for soap making. • Adapt herbal soap and ointment making protocols and conduct trial tests using juices from guava leaves and ripe papaya as herbal ingredients. • Collaborate with community people in the conduct of a day seminar-workshop for women on how to make herbal soap.
Volunteer Work in Rural Farms	• Survey farms in the community for service and learning opportunities. • Help rural farmers in the field—e.g., preparing, planting, and harvesting crops such as rice and corn. • Conduct an internship in the field by helping farmers in their work and at the same time learning from the farmers how to identify and manage weeds and pests using natural methods. • Collaborate with agriculture and community officials in the conduct of a local seminar on integrated pest and weed management for corn growers.
Tree Planting	• Identify barren roadsides and mudslide-prone areas in the community. • Coordinate with local environmental agencies in providing free mahogany seedlings. • Collaborate with local people in planting mahogany seedlings along feeder roads and mudslide-prone areas • Enlist community people in caring for endangered plants by conducting stewardship campaign. • Use principles of physics to construct a bridge in a section of the community prone to flooding.
Medical and Dental Missions	• Collaborate with local health units and officials for free medical and dental check-ups for *barangay* people. • Coordinate with the local government on the provision of free medicines and vitamins. • Conduct a de-worming campaign among local school children. • Demonstrate to school children proper teeth care. • Conduct dengue fever campaign to inform community of the life cycle of mosquitoes.
Community-based Museum	• Collaborate with science teacher educators on participatory research projects. • Document community funds of knowledge relevant to science teaching and learning through interviews, focus group discussions, and participant observation. • Collaborate with community people in putting up a mini-museum to house the cultural, historical, and ethno-scientific practices of the community.
Wells and Water Quality Testing	• Conduct water quality assessment in community wells. • Conduct information campaign on water quality and collaborate with local village people in the development of water purification protocols. • Develop lesson plans on water quality testing and purification for demonstration teaching in local elementary schools.

Where is Science in Community-based Service Learning?

Community-based service learning is a rich context for examining the science learning of prospective elementary and secondary school science teachers. The two narratives that follow were drawn from student interviews, focus group discussions, portfolios, and community immersion journals to provide an illustrative example of science learning as contextualized in the community-based service learning activities of prospective science teachers.

In the first narrative, the immersion site is a coastal *barangay* where residents are engaged in both fishing and farming activities. Prospective physics and chemistry teachers were engaged in the documentation of community funds of knowledge involving cultural practices relevant to science teaching and learning. The information they gathered eventually became part of documents and artifacts they left in their community-based service learning project, a mini-museum. One section of their museum highlights the fish and preservation techniques used by the people in the community. This first narrative focuses on how a prospective chemistry teacher furthered his knowledge of science in the practice of *ginamos* making in the community.

The Stinky Smell that Sells

Ginamos making is one striking shrimp preservation technique I learned from the village people. Saucy or paste-like in consistency, ginamos is a delicacy made of sun-dried, grounded, and fermented hipons (shrimp fries) that exude a repulsive odor for those who are unfamiliar with it. Most often very salty, and sometimes spicy, ginamos is dubbed as a poor man's viand as it is often eaten by rice farmers during the rainy season. It is also used as toppings on green mangoes and as a sauce in a popular vegetable-beef dish called kare-kare. As chemistry major, I was interested on the science behind the process of making ginamos. This curiosity brought me to three ginamos makers in the community. From my interviews, observations, and direct participation, I learned relevant science concepts in ginamos making. For example, I learned that a simple bamboo basket called bakag is used to separate a mixture of fish and shrimp. I found that makeshift bamboo tables in front of most houses along the shore are used for sun-drying of shrimps. In the process of drying, I realized the role of sunlight in killing pathogenic bacteria and in removing water from shrimps, which aid in their preservation. Shrimps are then salted and pounded using the wooden mortar and pestle. In the salting process, I remembered the concept of osmosis. Water is removed inside the shrimps' cells as a result of a higher concentration of salt outside of the cell. In pounding the shrimps into paste-like consistency, I remember the factors affecting the rates of reaction. Pounding increases the surface area of reaction between the salt and the shrimp, thus, facilitating the curing process. Ginamos are stored in glass jars for about two weeks before they are sold in the market. This two-week curing process kills pathogenic bacteria thus prolonging the shelf-life of ginamos. I learned that ginamos may last for a year without getting spoiled.

The second narrative was drawn from the journal and individual interview of a prospective elementary science teacher who lived in a farming community for her field experience. The immersion site is a rural agricultural community where rice, sugarcane, and corn are the main sources of income of most residents. One of the service learning activities in the *barangay* involved assisting the rice and corn farmers in preparing their fields for the harvest season. The narrative below illustrates how this prospective elementary science teacher learned science alongside a rural agricultural farmer.

More Than a Day in a Farm

> *As part of our community-based service learning activities, we helped local farmers in their rice and corn fields. As a person who has lived most of my life in the city, the experience was something new to me. Together with other members of the group, we helped Mang Nestor in weeding the rice field. I learned from him on how to identify weeds and how to uproot them without damaging the rice stalks. I also learned the different kinds of fertilizers and the right timing of their application in the field. Mang Nestor introduced me to the value of a "mud press"— an organic soil coming from decomposed waste products of sugarcane and rice stalks—in cutting fertilizer costs. He also practiced seed rotation, the use of different kinds of rice variety every year to increase his yield and to control pests. I learned that mongo, a leguminous plant, is used as an intercrop during summer because it increases yield and cuts fertilizer cost. I then realized how this concept connects to the nitrogen cycle I learned in the university. Leguminous plants have root nodules containing nitrogen fixing bacteria. These bacteria convert atmospheric nitrogen into usable nitrates, thus increasing rice production and lowering fertilizer costs. In addition to my exposure in the rice field, Mang Nestor brought us to his corn field. I learned the different kinds of insects. Some are corns' friends; others are foes. By looking at the damage on corn leaves, one can identify the kind of pest attacking the plant. An army worm for example may damage all of the leaves except the midrib and stalk. I also learned the use of biologically friendly organisms such as Trichogramma in managing pests in corn fields. My eight-hour field exposure in the farm was worth more than I expected. There were many new things I learned in the farm that I did not know in my science courses in the university. It seems like I stayed more than a day in the farm.*

The vignettes are representative samples of prospective science teachers' individual learning experiences. Science concepts are learned and applied in multiple settings and contexts through field exposure and service learning activities. The next section illustrates the examples of domain specific science content knowledge that students learned through their participation in community life and service learning projects.

Physics Learning

A group of physics students was assigned to a rural agricultural village for their immersion site. During the needs assessment phase and through informal discussions with local village people, students were able to identify the most pressing problem of the community. Potions of a rough and muddy feeder road connecting to the *barangay* were located in a depressed, flood-prone area. Residents could not cross to the other side of the village during the rainy season. Village leaders requested the help of physics majors in the construction of a wooden bridge over the flood-prone portion of the road. Using their knowledge in physics, students constructed models of wooden bridges using the same timber materials to be used for the actual bridge construction. They conducted several experiments to test the load capacity and strength of their models. Students presented their recommendation to the village people who volunteered in constructing the bridge. Through their service learning project, students were able to design an inquiry project and at the same time helped residents, who no longer face the danger of crossing the flood-prone road during rainy days.

Chemistry Learning

A group of prospective elementary science teachers lived in a rural mountainous village for their immersion site. During their preliminary visits, the pre-service teachers observed the prevalence of boils as a common skin disease among school children. They also learned a local knowledge and practice in the community of using concoctions from boiled guava leaves as a treatment for this skin disease. Mindful of this problem and the abundance of indigenous herbal plants in the area, one member of the cohort suggested teaching the village women how to make a soap and ointment using guava leaves as an herbal ingredient. This student used to work in a women's cooperative that produced and sold products such as herbal soaps, ointments, liniments, cough syrups, health supplements, etc. The cohort decided to conduct a seminar- workshop on herbal soap and ointment making as part of their service learning project. In preparation for the workshop, students conducted a literature search and pilot-tested and refined their protocols for soap and ointment making through a series of inquiry activities. Their workshop preparation allowed them to learn chemistry concepts and technical skills. For example, they learned how to calibrate plastic and glass containers as measuring tools in order to adapt to local realities in the immersion site. Through experiential awareness of the properties of matter such as NaOH, coconut oil, and wax, they took precautionary measures in the preparation of herbal soap and ointment, and communicated the same measures to workshop participants. They were able to operationally define exothermic reaction in the process of soap making and connected their lesson on phase changes using the melting of wax in ointment making as an example.

Biology Learning

A cohort of prospective science teachers conducted their community immersion in a rural fishing village. A group of students from this cohort wanted to know more about the fishermen's local knowledge of fish. Through interviews and focus group discussions, they asked village fishermen and elders about the local names of fish as well as their characteristics, habitat, breeding habit, methods and season of catching, and ways cooking and preserving. Through an intensive literature search, they developed a classification key that integrated both local and scientific knowledge. In addition, they developed a culturally relevant science lesson plan that included both local and scientific knowledge in the identification, characterization, and classification of commonly available local fish. As part of their service learning activities, the group designed a fish collection exhibit in the mini-museum project, wherein specimens were fixed in 10% formalin solution. Labels reflected both local and scientific names, methods of capture, names of collectors, and other ecological data.

Earth and environmental science learning

In another immersion site, a group of pre-service science teachers made use of the community river to conduct inquiry activities that included riparian assessment and water quality testing. From their investigations, they concluded that the river was unhealthy due to heavy loads of sediments in the water and the destruction of riparian zones. They also discovered erosion prone areas along the river; some areas of the river bank were barren, without trees. The group decided to conduct tree planting as part of their service learning project. They requested mahogany seedlings from the provincial environmental and natural resources office and conducted a massive tree planting activity with the help of local village people. As a consequence of their project, they were able to plant a total of 500 mahogany seedlings along the roads, riverbanks, and other erosion-prone areas.

Caveats on the Practice of Community Immersion

The conduct of community immersion as a context for community-centered and service-oriented pedagogy in pre-service science teacher preparation is not always a bed-of-roses experience for prospective science teachers and supervising faculty. We are constantly faced with the danger of treating community immersion as a "tourist" experience in contrast to its potential for authentic learning. We often received feedback from students describing an "uphill climb," most especially in viewing their community immersion experience from the lens of science and science education. The community offers many possibilities for learning that cut across diverse fields and contexts. This creates a constant struggle, not only for prospective science teachers but also for supervising faculty, in terms of where to focus in the experience. As we encourage the connection of community immersion with other teacher education preparation courses, we are always mindful of our clear intention of linking the experience with science content and pedagogy.

In order to avoid getting lost in a deluge of knowledge and learning opportunities that the community might offer, we always try to clarify our intentions at the beginning of the semester. Community immersion has always been an evolving practice. However, the link between community immersion and science content and pedagogy has been consistently emphasized. This had been the major criteria in assessing students' portfolio, reflective journals, service learning projects, and community immersion exhibits. We also looked at this connection when we examined student-generated cultural memory banks, a prelude to the development of culturally relevant science lesson plans. This is our way of transforming the community immersion experience into useful practices in pre-service science teacher education.

Conclusion: Linking with NSTA Standards

The community immersion model of pre-service science teacher preparation and the inclusion of science-related service learning activities offer a promising avenue for connecting university-based learning with real life contexts in the community. Based on our experience, science became a lived experience among community immersion participants. The community and its resources served as a real-life "laboratory" in making science relevant in the preparation of prospective science teachers. Rural village people have the wealth of knowledge and experience to inform and enrich the science teacher education curriculum. Through our practice of community immersion in science teacher preparation, we believe that we narrow the gap between these two compartmentalized worlds of community and family and of the university. We believe that a community immersion model of science teacher preparation offers a more connected and respected experience and celebrates relationships among its multiple stakeholders. The service learning dimension of community immersion enriched not only the community and its people but also the prospective teachers who gained so much from the experience. Through their community stay and service learning projects, prospective science teachers learned science in concrete and meaningful ways as embedded in the lifeworlds of the people in the community.

Application of Community Immersion in Other Science Teacher Preparation Contexts

In pre-service science teacher preparation, early field experience often reflects a "tourist approach" placement in schools that does not allow prospective science teachers to see how schools are situated in a community. After a school visit, prospective science teachers typically return to their dorms or apartments in the evening without developing an authentic understanding of their students' lifeworlds outside the school. We find this context the weakest link in pre-service science teacher preparation.

While prospective science teachers in the United States may not be able to live in rural communities on an extended basis, we recommend that community-immersion-like experiences be integrated in pre-service science teacher education curriculum. For example, prospective science teachers may conduct surveys and needs assessment in rural areas or participate in service learning activities and projects. They may also conduct mini-ethnographic studies of rural community life. Most importantly, service learning must be an integral part of pre-service science teacher preparation. It may be integrated in professional

education, science methods courses, or research/outreach projects wherein students get credit for their participation. We believe that this is important in bringing to students the consciousness for service in rural settings. Such exposure might offer solutions to problems of science teacher recruitment in rural areas.

NSTA Standards for Science Teacher Preparation

Standards 7: Science in the Community

Teachers of science relate their discipline to their local and regional communities, involving stakeholders and using the individual, institutional, and natural resources of the community in their teaching. They actively engage students in science-related studies or activities related to locally important issues. To show that they are prepared to relate science to the community, teachers of science must demonstrate that they:

a. Identify ways to relate science to the community, involve stakeholders, and use community resources to promote the learning of science.
b. Involve students successfully in activities that relate science to resources and stakeholders in the community or to the resolution of issues important to the community.

References:

Dumas, C. (2002). Community-based service learning: Does it have a role in management education? *International Journal of Value-Based Management, 15*, 249-264.

Fryer, M., & Newnham, J. (2005). Ways of responding to community issues: An overview and invitation. *UBC Learning Exchange*, 1-6. Retrieved July 17, 2007, from httphttp://www.learningexchange.ubc.ca/__shared/assets/waysofresponding20072167.pdf

Gonzalez, N., Moll, L., & Amanti, C. (Eds.) (2005). *Funds of knowledge: Theorizing practices in households, communities, and classrooms*. Mahwah, NJ: Lawrence Erlbaum Associates.

Nazaria, V. (2001). *Cultural memory and biodiversity.* Tucson, AR: University of Arizona Press.

Nichols, S., Tippins, D., Morano, L., Bilbao, P., & Barcenal, T. (2005). Creating a community-based science education research: Narratives from a Filipino barangay. In G. Spindler (Ed.), *Innovation in educational ethnography: Theory, Methods, and Results.* New York: Lawrence Erlbaum.

APPENDIX I

C U R R I C U L U M V I T A E

VICENTE C. HANDA

Updated: April 24, 2008

I. ACADEMIC HISTORY

Name and Contact Information

VICENTE CALLAO HANDA

United States Contact Information
212 Aderhold Hall
Department of Mathematics and Science Education
The University of Georgia
Athens, GA 30602
Phone: 7065422108
E-mail: vcqhanda@uga.edu

Philippine Contact Information
Teachers Center, West Visayas State University
La Paz, Iloilo City, 5000 Philippines
Phone: (011) (63) (33) 320 0870 to 78 loc. 223
Fax: (+63) 33 3200879
E-mail: vcqhanda@gmail.com, vicente_handa@yahoo.com

Education

Ph. D. in Science Education
Interdisciplinary Qualitative Studies Graduate Certificate
The University of Georgia
Dissertation: *Bridging communities and preservice science teacher education through community immersion: A collaborative action ethnography*

M.A. Ed. in Chemistry Education, 2000
University of the Philippines, Quezon City, Philippines
Thesis: *Influence of practical problem solving tasks on meaningful learning and retention in college chemistry*
Certificate Program in High School Earth and Environmental Science Education

M.A. in Educational Management, 1995
Aklan State University, Aklan, Philippines
Thesis: *Evaluation of the Regional Graduate Studies Consortium Program, Passi Trade School Center*

Bachelor of Secondary Education, Major in General Science, 1991
West Visayas State University, Iloilo City, Philippines
Cum laude and Nimia S. Lopez awardee for the Most Outstanding Student Teacher

Academic Positions/Employment History

2008-present	Associate Professor I, Department of Educational Foundations, College of Education and Department of Physical Sciences, College of Arts and Sciences, West Visayas State University
2004- 2007	Graduate Assistant, Department of Mathematics and Science Education, University of Georgia
2000-2007	Assistant Professor 2 , West Visayas State University, Philippines
2000 (Jun-Aug)	Chemistry Lecturer, Philippines Science High School, Iloilo City, Philippines
1995-2000	Instructor, West Visayas State University, Philippines
1992-1995	High School Biology, Chemistry and Physics Teacher, Passi Trade School, Iloilo, Philippines
1991-1992	Elementary Science Teacher, Assumption School of Iloilo, Philippines

Administrative Designations

2003-2004	Chair, Department of Educational Foundations, College of Education, West Visayas State University, Iloilo City, Philippines
2000-2003	College Secretary, College of Education, West Visayas State University
2000-2004	Planning Coordinator, College of Education, West Visayas State University
2000-2004	Core Faculty, High School Earth and Environmental Science Education Section, Regional Science Teaching Center, West Visayas State University

II. RESIDENT INSTRUCTION AND CONTINUING EDUCATION

Courses Assisted/Supervised at the University of Georgia

ESCI 6200 Science, Technology, and Society (under Dr. Norman Thomson)

ESCI 6230 Environmental Science Education (under Dr. Norman Thomson)

ESCI 6420 Science for Early Childhood Education (under Dr. Deborah Tippins)

ESCI 7460 Secondary Science Education School-based Internship (with Dr. John Steve Oliver)

Courses Taught at West Visayas State University, Philippines (Undergraduate Level)

Chem 101 General and Inorganic Chemistry

Educ 104 Educational Measurement and Evaluation

Educ 106 Introduction to Educational Research

Educ 109 Community Immersion

Educ 110 Administration and Supervision

Nat. Sci 101 Physical Science with Earth Science

Ped 112 Teaching Strategies III (Science, Mathematics, and Social Studies)

Ped 125 Teaching General Science in Secondary

Ped 132 Physical Science for Elementary Science Teachers

Phy Sci 117 Earth and Space Science

Sci. Ed. 108 Environmental Education

Subjects Taught Outside WVSU

Sci & Tec III High School Chemistry, Passi Trade School, Passi City , Philippines

Sci & Tec II High School Biology, Passi trade School

Sci & Tec 1V High School Physics, Passi Trade School

Sci 1V & VI Elementary Science and Health, Assumption School of Iloilo, Philippines

Other Professional Instructional Services

Reviewer/Lecturer, Review classes to prepare graduates for the Professional Licensure Examination for Teachers, West Visayas State University, Philippines. Subject Areas taught: Earth and Environmental Science, General Chemistry, & Physical Science. (Summer 2000-2004)

Lecturer/Trainer, Professional Development Program for Elementary Science Teachers (Project Title: *Rescue Initiatives in Science Education*), Regional Science Teaching Center, West Visayas State University, Philippines. (Summer 2204, 2003, 1999)

Lecturer/Trainer, Professional Development Program for High School Earth and Environmental Science (Project Title: *Secondary Education Development and Improvement Project*), Regional Science Teaching Center, West Visayas State University, Philippines. (Summer 2000)

Lecturer/Trainer, Professional Development Program for High School Earth and Environmental Science Teachers (Project Title: *Science and Mathematics Education Manpower Development Program*), Regional Science Teaching Center, West Visayas State University, Philippines. (Summer 1998)

Advising (Undergraduate Students)

Served as adviser in approximately 25 undergraduate thesis, a requirement for graduation in an undergraduate degree program at the West Visayas State University, Iloilo City, Philippines

III. SCHOLARLY ACTIVITIES

A. Publications

* Peer Reviewed
+ Invited

1. Books

+Almeda, R., Andora, H., Bilbao, P., Cabag, R., Delfin, P., Handa, V., et al. (2002) *Community immersion: A dialogue of life*. Iloilo City, Philippines: West Visayas State University Press.

+Hara, Y., Ichikawa, M., Miyake, Y., Yoda, S., Yamanashi, N., & Mogi, N., Handa. V. et al., (2003). *A letter from nature: Enthusiasts for Science.* Iloilo City, Philippines: West Visayas State University.

2. Journal Articles

* Handa, V., Tippins, D., Bilbao, P., Morano, L., Hallar, B., Miller, K., Bryan, R. (2008, in press). A dialogue of life: Integrating service learning in a community immersion model of pre-service science teacher preparation. *Journal of College Science Teaching*.

* Larodir, A., Tippins, D., Handa, V., & Morano, L. (2007). Rock showdown: Learning science through service with the community. *Science Scope, 30*(7), 32-37.

* Gangoso, N., Espigar, I., Barcenal, T., Handa, V., Montano, H., Morano, L., Bilbao, P., Tippins, D. (2006). Elementary science: Some linguistic considerations. *WVSU Journal of Research* (pp. 91-107), Iloilo City, West Visayas State University Press.

3. Conference Proceedings

* Handa, V. Tippins, D., & Thomson, N. (2008). *Crafting a community-centered and culturally relevant pedagogy in preservice science teacher preparation: A collaborative action ethnography.* Proceedings of the annual conference of the National Association for Research in Science Teaching, Baltimore, Maryland.

* Handa, V., Tippins, D., & Thomson ,N. (2007). *A case study of community immersion as a context for creating a community-based science teacher preparation.* Proceedings of the annual conference of the National Association for Research in Science Teaching, New Orleans, Louisiana.

* Handa, V. (2006). *Influence of practical problem solving tasks on meaningful learning and retention in college chemistry*. Proceedings of the annual conference of the National Association for Research in Science Teaching, San Francisco, California.

B. Published Creative Works

1. Essay

+Handa, V. (2004). Dreams may come true: In memory of Consolacion Callao Handa, *Silak, 27* (2), 9-13.

2. Poems

*Handa, V. (January 1999). Hamog. *Homelife, 45*(1).

*Handa, V. (October 1997). A tour around boracay. *Homelife,43*(10).

*Handa, V. (June 1996). Sari-sari store. *Homelife, 42*(6).

*Handa, V. (April, 1997). Of rocks, stones, sand, and men. *Homelife,42*(4).

*Handa, V. (February 1996). Young mahogany. *Homelife 42*(2).

*Handa, V. (December 1995). Lampin. *Homelife, 41*(12).

*Handa, V. (October 1995). To the molecules of gas trapped in a Coca-cola bottle. *Homelife, 41*(10).

C. Grants

1. Research/Extension Projects

Program Leader (2003-2004), *Astronomy Enhancement Program in Region VI*, an extension program funded by the University Extension and Development Center, West Visayas State University, Iloilo City, Philippines. (P150,000)

Study Leader (2002-2003), *Development and Validation of Instructional Videos for Skywatch Sessions*, a research study funded by the Office of Research, West Visayas State University (P.I.: Dr. Irene Abaygar- P70,000)

Member of the Research Team (2003-2005), Fulbright Partnership Grant: *Towards a Transformative Vision of Science Teacher Education for the 21st Century: The genesis of Cross-cultural Science Education Inquiry Community Across West Visayas State University, Western Mindanao State University, and University of Georgia* funded by the U.S. Department of State (Principal Investigator: Dr. Deborah Tippins- $109,000)

Project Leader (2004), *Five Year Program Monitoring and Evaluation of Project RISE in Elementary Science, 1999-2004*, a research program funded by the University Research and Development Center, WVSU.

D. Recognition and Outstanding Achievement

1. Competitive Scholarships/Fellowships

Finalist, 2007 Spencer Dissertation Fellowship (within top 50 in over 450 applications received from over 150 institutions in the U.S.), Spencer Foundation. IL, U.S.A.

Dissertation Fellowship, University of Georgia, Athens, Georgia. Sponsor: UGA Graduate School (2007-2008)

2006 *NARST Ethics and Equity Scholarship*, a travel grant for the annual conference of the National Association of Research in Science Teaching, April 3-6, San Francisco, California.

Fulbright Scholarship, University of Georgia, Athens, Georgia, U. S.A. Program Sponsor: U.S. Department of State (2004-present)

CHED-Center of Excellence for Teacher Education Scholarship), University of the Philippines, Diliman, Quezon City, Philippines. Sponsor: Commission on Higher Education (1997-2000).

Iloilo City Government Scholarship, College of Education, West Visayas State University. Sponsor: City Government of Iloilo (1987-1991)

Passi Sugar Central- Jalasig Scholarship (1983-1987)

2. Academic Awards/Citations

Cited as 2006 *University of Georgia's Amazing Student*

Katibayan ng Kagalingan (Certificate of Excellence) as a University Scholar, MAEd in Chemistry Education, University of the Philippines on October 20, 1999.

Cum Laude, Bachelor of Secondary Education, West Visayas State University, Iloilo City, April 1991.

Nimia S. Lopez Awards for Most Outstanding Student Teacher, West Visayas State University, April 1991.

Salutatorian and Model Student of the Year, Batch 1987, Iloilo City National High School, Iloilo City, Philippines

Valedictorian, Class 1983, Sto.Tomas Elementary School, Passi, Iloilo

E. Professional Awards/Citations

Plaque of Recognition, the *Eddie Griffin Memorial Awards for an Outstanding Position Paper submitted by a Graduate Student*, Annual Conference of the Southeaster Association for Science Teacher Education, Macon, Georgia, October 7, 2006; Title of the Paper: , *New roles, responsibilities, and connections in a community-based preservice science teacher education.*

Service Award for 10 years of continuous and satisfactory service to the West Visayas State University, November 29, 2005.

Plaque of Recognition, *Outstanding Contribution and Service* to the Southeastern Association for Science Teacher Education (SASTE), Athens, Georgia, October 15, 2005.

Plaque of Recognition, *University Researcher*, West Visayas State University, March 28, 2005.

Certificate of Recognition, *Project RISE Trainer* (Rescue Initiatives in Science Education) given by the Department of Science and Technology (DOST) and the Department of Education, May 8, 2004.

Certificate of Recognition, *Project RISE Trainer* (Rescue Initiatives in Science Education) given by the DOST and the Department of Education, May 23, 2003.

Certificate of Recognition, *SEDIP Trainer* (Secondary Education Development and Improvement Project) given by the DOST and the Department of Education, Culture, and Sports, Philippines, June 10, 2000.

Certificate of Recognition, *Project RISE Trainer* (Rescue Initiatives in Science Education) given by the Department of Education, Culture, and Sports and the DOST, Philippines, May 15, 1999.

Certificate of Recognition, *SMEMDP Trainer* (Science and Mathematics Education Development Program) given by Department of Education, Culture, and Sports, Philippines, May 29, 1998.

Citation for *Services Rendered to the University* as Adviser of Education Student Council, College of Education, April 1998.

F. Convention Paper (from 2004 to present only)

1. International and National

Handa, V., & Tippins, D. (2008, April). *Crafting a community-centered and culturally relevant pedagogy in preservice science teacher education: A collaborative action ethnography.* Paper presented at the International Conference of the National Association for Research in Science Teaching, Baltimore, Maryland.

Handa, V., Montano, H., O'Dell, S., & Tippins, D. (March, 2008).*Using multiple data sources in understanding students' learning in a community immersion model of pre-service science teacher preparation*. Paper submitted for presentation at the International Conference of the National Association for Science Teachers, Boston, Massachusetts.

Handa, V., & Tippins D. (2008, February). *Theory informing practice and vice versa: Towards a framework for community-based preservice science teacher education.* Paper presented at the International Conference of Asian Science Education, Kaohsiung, Taiwan.

Handa, V. Tippins, D., Thomson, N., Bilbao, P., Montano, H., Morano, L., Colocar, K.M., Juanites, S., Lacorte, R., Morales, A., Valenzuela, & M.E. (2008, February). *Negotiation of meanings through community immersion: Responding to the call of relevancy in science teacher preparation*. Paper presented at the International Research Conference, West Visayas State University, Iloilo City, Philippines.

Tippins, D., Handa, v. (2008, January). *Answering the call for relevance in science teacher education.* Paper to be presented at International Conference of the Association for Science Teacher Education, St. Louis, Missouri.

Handa, V. (2007, November). *Integrating social justice service learning in community-based science teacher preparation: A dialogue of life*. Paper presented at the International Conference of the National Association for Multicultural Education, Baltimore, Maryland.

Handa. V. (2007, April). *Bridging communities and pre-service science teacher preparation: An action ethnography of community immersion*. Paper presented as part of a symposium at the International Conference of the National Association for Research in Science Teaching, New Orleans, Louisiana.

Handa, V., Tippins, D., & Thomson, N. (2007, April). *A case study of community immersion as a context for creating a community-based pre-service science teacher preparation curriculum.* Paper accepted for presentation at the International Conference of the National Association for Research in Science Teaching, New Orleans, Louisiana.

Tippins, D., Handa, V., Bilbao, P., & Morano, L. (2007, January). *Conceptualizing service learning within a community immersion model of science teacher preparation.* Paper presented at the International Conference of the Association for Science Teacher Education, Clearwater Beach, Florida.

Tippins, D., & Handa, V. (2006, April). *Creating a community-centered science teacher preparation in the Philippines: A dialogue of life.* Paper presented at the International Conference of the National Science Teachers Association, Anaheim, California

Handa, V. (2006, April). *Influence of practical problem solving tasks on meaningful learning and retention in college chemistry*. Paper presented at the International Conference of the National Association of Research in Science Teaching (NARST), San Francisco, California.

Tippins, D., Thomson, N., & Handa, V. (2006, January). *Inventing a practice of community in science teacher preparation.* Paper presented at the International Conference of the Association of Science Teacher Educators conference, Portland, Oregon.

Tippins, D., Morano, L., Handa, V., & Bilbao, P. (2005, November). *Beyond culturally relevant pedagogy: Memory banking as an anthropological tool for creating a community-based science education.* Paper presented at the International Conference of the National Association for Multicultural Education (NAME), Atlanta, Georgia.

2. Regional, State, and Local

Handa, V. (2008). *Bridging communities and preservice science teacher education through community immersion: A collaborative action ethnography*. Poster to be presented at the Third Annual Graduate Student Research Conference, College of Education, University of Georgia, Athens, Georgia.

Handa, V., Tippins, D., Thomson, N., & Cajigal, A. (April, 2008). *Bridging communities and preservice science teacher preparation through community immersion: Narratives from a Philippine barangay*. Poster presented at the University of Georgia Educational Forum for Globalization on Culture, Research, and Teaching, Athens, Georgia.

Handa, V (2007, October). *Individual and social construction of meanings: Potentials of poetry in science teacher preparation*. Paper accepted for presentation at the Annual Conference of the Southeastern Association for Science Teacher Education, Valdosta University, Georgia.

Handa, V. & Tippins, D. (2007, October). *Negotiating relevancy in pre-service science teacher preparation through cultural memory banking*. Paper accepted for presentation at the Annual Conference of the Southeastern Association for Science Teacher Education, Valdosta University, Georgia.

Tippins, D., Handa, V., & Thomson, N. (October 2007). *Beyond collaboration: Community as the nexus of Preservice Science Teacher Preparation*. Position paper submitted for presentation at the Annual Conference of the Southeastern Association for Science Teacher Education, Valdosta, Georgia.

Tippins, D., Handa, V., Thomson, N., Cajigal, A., Bilbao, P., Morano, L., & Montano, H. (2007, October). *The community immersion model of preservice science teacher preparation.* Paper accepted for presentation at the Annual Conference of the Southeastern Association for Science Teacher Education, Valdosta University, Georgia.

Handa, V. (2006, October). *Community-based pre-service science teacher preparation: New roles, New responsibilities, and new connections in science education.* Position paper presented at the plenary session of the Annual Conference of the Southeastern Association for Science Teacher Education, Mercer University, Macon, Georgia.

Handa, V., Tippins, D., Thomson, N., Morano, L., & Bilbao, P. (2006, October). *Supervising community immersion of prospective elementary science teachers: A case of two teacher educators.* Paper presented at the Annual Conference of the Southeastern Association for Science Teacher Education, Mercer University, Macon, Georgia.

Handa, V. (2006, October). *Investigating practical problem solving tasks as a context for meaningful learning in college chemistry.* Paper presented at the Annual Conference of Southeastern Association for Science Teacher Education, Mercer University, Macon, Georgia.

Handa, V., Butler, M., & Tippins, D. (2006, February). *An ethnographic case study of community immersion experience in science teacher education preparation.* Paper presented at the Annual Conference of Southeastern Association for Educational Studies, University of Tennessee, Knoxville, Tennessee.

Handa, V. (2005, November). *The Philippine barangay as a classroom: A story of collaboration through community immersion among preservice science educators*. Paper presented at the Annual Conference of the National Science Teacher Association (NSTA), Chicago, Illinois.

Tippins, D. & Handa, V. (2005, October). *Inventing our own practice of community in science teacher education.* Poster presented at the Annual Conference of the Southeastern Association for Science Teacher Education (SASTE), Athens, GA.

Handa, V. (2005, April). *The Ausubelian psychology of meaningful learning: Conceptual Change through practical problem solving tasks.* Poster presented at the College of Education Graduate Student Conference, University of Georgia, Athens, Georgia.

Handa, V. (2005, February). *Community Immersion: A showcase of university-community collaboration in the preparation of preservice science teachers in the Philippines*. Paper presented at the Fifth Annual Georgia Graduate Student Interdisciplinary Conference, Athens, Georgia.

Tippins, D., Handa, V., Barcenal, T., Bilbao, P., Espigar, E., Gangoso, N., Montano, H., Morano, L., Prizas, M., & Nichols, S. (2005, January). *Towards a community-based model of science learning in science teacher preparation: A Dialogue of life.* Paper presented at the International Conference of the Association of Science Teachers and Educators, Colorado Springs, CO.

Tippins, D., Morano, L., Gangoso, N., & Handa, V. (2004, October). *Community immersion in elementary science: A dialogue of life.* Paper presented at the Annual Conference of the Southeastern Association for the Education of Teachers in Science, Gainesville, Florida.

Handa, V. (2004, October). *Colaboration, dialogue, and empowerment through community immersion: The barangay experience among preservice science educators in the Philippines.* Paper presented the Annual Conference of the Southeastern Association for the Education of Teachers in Science, Gainesville, FL.

Gangoso, N., Espigar, I., Barcenal, T., Bilbao, P., Handa, V., Montano, H., Morano, L., & Prizas, M. (2004, October). *Elementary science teaching: Some lingistics consideration.* Paper presented the Annual Conference of the Southeastern Association for the Education of Teachers in Science, Gainesville, FL.

G. Invited Speech, Lecture, Workshop

Handa, V.(2006, November). *Survival tips in graduate school.* Invited speech at the Graduate School Symposium, West Visayas State University, Iloilo City, Philippines.

Handa, V. (2004, April). *From dreams to reality: The long winding road to success*. Inspirational speech delivered before the graduating class of Alimono Elementary School, Passi City, Iloilo.

Handa, V. (2003, April). *Plants as natural indicators of acids and bases*. Workshop presented at the Annual Convention of Association of Elementary Science Teachers and Educators of the Philippines, West Visayas State University, Iloilo City.

Handa, V. (2002, December). *Cultural considerations in community immersion*. Paper presented at the Regional Seminar Workshop on Community Immersion for Teacher Education, Center for Professional Development and Continuing Education, West Visayas State University.

Handa, V. (2001, October). *Exemplary teachers in science education.* Lecture presented at a Division Seminar Workshop on Model Teachers: Lessons from Across the Globe, District of Carles, Iloilo.

Handa, V. (2001, June). *Career prospects in science education*. Lecture presented at the Career Orientation Program, Philippine Science High School for Western Visayas, Iloilo City.

Handa, V. (2001, March 31). *Quo vadis, graduates?: What it takes to succeed in the academe and life.* Inspirational speech delivered at the Commencement Exercises of Sto. Tomas National High School, Passi City, Iloilo.

Handa, V. (2000, October).*Strategies in teaching environmental education*. Workshop conducted at the Regional Seminar-Workshop in Environmental Education Training for Tertiary Schools, West Visayas State University, Iloilo City.

Handa, V. (October, 2000). *Updates in Environmental Education*. Lecture presented at the School Learning Action Cell (Theme: Environmental Conservation), Manduarriao National High School, Iloilo City.

Handa, V. (2000, September). *Practical magic in teaching elementary chemistry*. Workshop presented at the Regional Conference, SHARE-A-THON: Innovative Strategies fro Elementary Science Teachers, West Visayas State University, Iloilo City.

Handa, V. (2000, September). *Practical problem solving tasks and meaningful learning in chemistry.* Paper presented at the Science Research Forum, West Visayas State University, Iloilo City.

Handa, V. (1997, November). *Integrating internet resources in science education*. Workshop conducted at a Department Echo Seminar on the Introduction of Computer Technologies and Its Application to Physics Education, WVSU, Iloilo City.

Handa, V. (1996, November). *Use of creative visualization and future problem solving strategies in teaching environmental education*. Workshop presented at a Division Seminar on Learning for a Sustainable Environmental

Education trough Environmental Education, Pavia National High School, Pavia, Iloilo, November 17, 1996.

Handa, V. (1996, September). *Use of creative visualization and future problem solving strategies in teaching environmental education.* Workshop presented at a Division Seminar on Learning for a Sustainable Environmental Education trough Environmental Education, Antique Vocational School, Bugasong, Antique, September 15, 1996.

Handa, V. (1996, September). *Use of creative visualization and future problem solving strategies in teaching environmental education.* Workshop presented at a Division Seminar on Learning for a Sustainable Environmental Education trough Environmental Education, Antique National School, Antique, September 14, 1996.

H. Membership in Professional/Community Organizations (Past 7 Years)

Phi Kappa Phi Honor Society

Phi Lambda Theta International Honor Society and Professional Association in Education

National Association for Research in Science Teaching

National Science Teachers Association

Southeastern Association for Science Teacher Education

National Association for Multicultural Education

Association of Elementary Science and Teacher Educators of the Philippines (Member, Board of Director, 2001-2003; Auditor, 2003-2005)

Philippine Association of Campus Student Advisers

Filipino-American Association of Northeast Georgia

University of Georgia Student Alumni Association

University of the Philippines Alumni Association

I. Eligibility and Professional Examinations Passed

Professional Teacher License, Professional Regulations Commission, Philippines since June 1997.

Passed the Professional Board Examinations for Teachers given by the National Board for Teachers on November 10, 1991 in Iloilo City, Philippines.

Passed the Civil Service Professional Board Examination & the Civil Service Sub-Professional Examination

Granted the Civil Service Automatic Eligibility (PD 907) by virtue of being a Cum Laude graduate

IV. SERVICE

A. Service to Schools, Districts, and Community

Resource Speaker, School Level Science Camp, Passi National High School, Passi, Iloilo, November 28, 2003.

Resource Person/Facilitator, Stargazing Activity, University of the Philippines High School in Iloilo, February 20, 2003.

Judge, Science and Math Technology Fair 2003, Philippine Science High School, February 12, 2003.

Resource Speaker, On Telescope Orientation, Planets, and Constellations, Western Visayas College of Science and Technology Science Club Month Celebration, September 28, 2001.

Resource Speaker, Career Orientation Program, Philippine Science High School for Western Visayas, June 22, 2001.

Resource Speaker, Regional Seminar Workshop on "Contextualizing Elementary Science Curriculum as a Response to RBEC," Association of Elementary Science Teachers and Educators of the Philippines, April 25-26, 2003.

Facilitator-Speaker, Youth Environmental Camp, United States Peace Corps, February 7, 2003.

Resource Speaker, Stargazing, Science Cam 2K2: Science Enthusiasts: Preserving the Environment through Science and Technology, Iloilo National High School Special Science Class, February 22, 2002.

Speaker-Facilitator, Stargazing during the Mathematics and Science Moth Celebration, Dumangas National High School, September 20, 2001.

Lecturer, Skywath Activity, Lemery Poletechnic College, Northern Iloilo Polytechnic State College, Lemery Campus, September 14, 2001

Resource Person-Facilitator, Nigh Skywatching, SPED-School for Exceptional Children, Iloilo City, March 16, 2001.

Invited Speaker, Stargazing and Constellation Identification, Montes Elementary School, Iloilo City, Philippines, March 9, 2001.

Resource Person-Facilitator, Skywatching, Gov. Macuja National Comprehensive High School, Hamtic Antique, March 7, 2001.

Facilitator-Speaker, Stargazing, Tigbauan National High School, Tigbauan, Iloilo, March 2, 2001.

Resource Person- Facilitator, Stargazing, Iloilo Division Science Camp, Mina National High School, Mina, Iloilo, February 9, 2001.

Resource Speaker, Constellation identification, Science Night, Duenas National Comprehensive High Schoo, Duenas, Iloilo, February 8, 2001.

Facilitator-Lecturer, Skywatching, Nabitasan National High School, February 7, 2001.

Lecturer- Facilitator, Stargazing, Night Sky Watching, Science Night, Binaliuan National High School, Tigbauan, Iloilo, February 5, 2001

Speaker, Mother Science Club Science Camp, Sta. Barbara National Comprehensive High School, Sta. Barbara, Iloilo, January 13, 2001.

Speaker-Facilitator, Stargazing/Night skywatching, Cabudian Elementary School, Duenas. Iloilo, November 13, 2000.

Resource Speaker, "Strategies in Teaching for Environmental Education," A Regional Seminar-Workshop in Environmental Education Training for Tertiary Schools, West Visayas State University, Iloilo City, October 26-27, 2000.

Resource Speaker, School Learning Action Cell with the Theme: Environmental Conservation, Manduarriao National High School, Iloilo City, October 6, 2000.

Resource Speaker-Facilitator, Science Camp, Dumangas Polytechnic College, Dumangas, Iloilo, October 5, 2000.

B. Service to West Visayas State University

Member, Teacher Education Cluster Committee, National Research Conference on "Responding to the Challenges of collaboration in Research in Academe," February 5-7, 2003.

Member, Election Committee, WVSU Alumni Homecoming, West Visayas State University, January 18, 2003.

Regional Runner –up Coach, General Information and International Affairs, 22nd National Super Quiz Bee, November 22, 2001.

Adviser, "Ang Istorya sang Bantog nga mga Siyentista," A Play on the Life History of Famous Scientists, Department of Physical Sciences, West Visayas State University, September 18, 2002.

Adviser (2000-2004), Science Teaching Major Association, West Visayas State University, Iloilo City.

Adviser (2000-2001), Education Student Council, College of Education, West Visayas State University, Iloilo City.

Member, Organizing Committee, Two-Day Semianr Workshop on Updates in Physics and Physics Education, Iloilo Girl Scout Auditorium, February 28-March 1, 1997.

C. Service to Professional Organizations

Board Member (2001-2003), Auditor (2003-2005) Association of Elementary Science and Teacher Educators of the Philippines (Board of Director, Auditor).

Member of the Organizing Committee, 2005 Annual Conference of the Southeastern Association for Science Teacher Education, Athens, Georgia.

Proposal Reviewer, International Conference of the National Association for Research in Science Teaching, Baltimore, Maryland, March X-X, 2008.

Proposal Reviewer, International Conference of the Association for Science Teacher Education, St. Louis, Missouri, January x-xx, 2008.

Proposal Reviewer, International Conference of the National Association for Multicultural Education, Baltimore, Maryland, October 31-November 4, 2007.

Proposal Reviewer, International Conference of the National Association for Multicultural Education, Atlanta, Georgia, November X-xx, 2006.

Proposal Reviewer, Annual Conference of the Southeastern Association for Science Teacher Education, Athens, Georgia, October x-x, 2005.

V. REFERENCES

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E-mail: president@wvsu.edu.ph