Designing Sustainable Mentoring Programs: Examining The Role Of Social Community In The Stem College Student Experience

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DESIGNING SUSTAINABLE MENTORING PROGRAMS: EXAMINING THE ROLE
OF SOCIAL COMMUNITY IN THE STEM COLLEGE STUDENT EXPERIENCE

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Submitted to the Faculty
of
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Joi-Lynn Mondisa

In Partial Fulfillment of the
Requirements for the Degree
of
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ABSTRACT

Mondisa, Joi-Lynn. M.S.I.E., Purdue University, December 2014. Designing Sustainable Mentoring Programs: Examining the Role of Social Community in the STEM College Student Experience. Major Professor: Sara McComb.

In order to begin to understand how to design programs that promote community development and produce beneficial outcomes for community members, we must first define the elements and functions of such a community. In this thesis, I define social community as an environment where like-minded individuals engage in dynamic, multidirectional interactions that facilitate social support. Using a human-integrated systems approach, I propose a social community model for STEM minority mentoring programs to understand how a community’s design plays a role in the learning and enrichment of its members. The social community model is comprised of three main components: program elements, social support, and participant outcomes. Social community elements may produce multiple beneficial participant outcomes, yet it is possible that different demographic groups within a social community may experience varying levels of the benefits associated with participant outcomes. Therefore, I test how dimensions of the proposed model vary across different groups within a program by examining the social community elements of the University of Illinois at Urbana-Champaign’s Merit Scholars Workshop Program. Study findings indicate that non-
Whites experienced less connectedness than Whites, male participants tended to become more resilient after leaving the program, and graduate/non-students and current participants rated higher in engaging in communities of practice. Using these insights, I provide recommendations for designing programs that have the most opportunities for enhanced member experiences. For example, programs should be designed to nurture relationships between current and past program participants possibly through creating mentoring networks or blogs. Also, programs should consider implementing mechanisms that assist participants with finding someone to fulfill their primary support person role as well as activities that encourage participation from participants’ spouses/significant others, friends, advisors, and professors.
CHAPTER 1. THE CASE FOR SOCIAL COMMUNITY

1.1 Introduction

Imagine understanding how to design programs that can enable college students to learn the value of engaging in a community responsibly while also supporting students’ academic success and leading to lifelong enrichment. In order to begin to understand how to design programs that promote community development and produce beneficial outcomes for community members, we must first define the elements and functions of such a community. In this thesis, I define social community and propose a social community model for understanding how a community’s design plays a role in the learning and enrichment of its members such as a community of college students. I also test dimensions of the proposed model by examining the social community elements of a college mentoring program to provide insights based on theory and data. Using these insights, I provide recommendations for designing programs that have the most opportunities for enhanced member experiences.

Most research to date about systems such as mentoring programs that cater to the needs of minority undergraduates in science, technology, engineering, and mathematics (STEM) neglects in-depth examination of the interactions among humans. Recent researchers have examined objective outcomes that represent college students’ successes
such as graduation rates, etc. (Clewell, 2006; National Center for Science and Engineering Statistics, 2013; Olson & Riordan, 2012) while others have described mentoring, and peer and faculty support (Adams, 1992; Brittian, Sy, & Stokes, 2009; Nora & Crisp, 2007; Pascarella & Terenzini, 1991). However, there is a gap in research about how human elements (e.g. relationships, interactions) affect the development of community especially in environments like mentoring programs (Lankau & Scandura, 2002; Tajfel, 1982; Vaux & Harrison, 1985).

Consequently, studies are needed identifying human elements that form a social community especially in relation to minority undergraduate communities (Cheng, 2004; Elkins, Forrester, & Noël-Elkins, 2011; Jay & D'Augelli, 1991; Stolle-McAllister, Sto. Domingo, & Carrillo, 2011). Researchers have examined why seemingly similar programs and communities have different results and/or differences attributable to a social community’s program elements (Rodger & Tremblay, 2003; Wanberg, Kammeyer-Mueller, & Marchese, 2006). This study extends this line of inquiry by focusing on the human elements of programs to provide information that can help people design more effective mentoring programs.

In order to understand members’ experiences and a program’s design, it is critical to comprehend the human elements of members’ interactions that contribute to the creation of a social community and the manifestation of beneficial outcomes for community members. Nevertheless, no mechanism describes how humans progress from joining in a social community to becoming active participants benefiting from membership. To explain a potential mechanism for this process, this thesis introduces the
concept of social community and examines social community elements, functions, and potential outcomes for community members.

1.2 What is Social Community?

A social community is an environment where like-minded individuals engage in dynamic, multidirectional interactions that facilitate social support (Mondisa & McComb, 2014). A social community can exist in learning communities, mentoring programs, and several other types of college environments (Elkins et al., 2011; Russomanno et al., 2010; Wenger, 2000). Program values, access to resources, and organized activities are elements of mentoring programs that assist in creating an environment conducive to member interaction. However, the dynamic, multidirectional interactions in which members engage are the essential human elements that are key to the creation of social community especially in a mentoring program. Continual interactions and engagement among social community members may facilitate social support among members as well, which may lead to beneficial programmatic and participant outcomes (Bradley, Postlethwaite, Klotz, Hamdani, & Brown, 2012; Smith, 1995, 2000).

1.3 Why Social Community is Important?

Social community is important because it explains human behavior within an environment, and may provide insights about improving engagement and designing better programs. Social community addresses the aforementioned gap in literature in that it details how human interactions affect and nurture the development of community within environments. In comparison to other types of human-system interfaces, the dynamics of a social community are solely based on the interactions among its members. Specifically,
the success of a social community is based on the members’ willingness to engage in the community.

Understanding member engagement in a social community may assist in the process of designing mentoring programs and organizational communities that foster interactions and development of members. Human interactions between persons in a social community can produce positive outcomes for members. Understanding how to foster this transformation can be formidable, but worth the effort because it can be used to educate others on how to design these communities in various forums.

1.4 Using a Human-Integrated Systems Approach to Understanding Social Community

A human-integrated systems approach is used to examine the design of a minority mentoring program to explain how social community is created. A human-integrated systems approach entails identifying a problem within a system that has humans in it, presenting an approach to solving the problem such as a method or model that explains how the system operates, and evaluating results from the implementation of a proposed solution that focuses on how the system affects people within it (Lehto & Landry, 2012; Martin Corbett, 1990). Using this approach, I identified a need to understand how the interactions among humans in a system (a minority mentoring program) and system elements (program features that assist in driving interactions) foster social community. To address this problem, I propose a model for social community and I test my proposed model using a survey to assess social community dimensions of a specific minority mentoring program. These results may provide insights into how mechanisms can be manipulated to affect members’ outcomes as well as how to better design programs.
Results from using this approach may be useful in designing more effective programs and understanding how to use program elements to foster the creation of a social community to replicate social community in other contexts. Understanding how members of a social community interact informally may inform us about how to design a program or environment to include elements that allow for interactions like these to occur. For example, knowing details about how members engage informally at coffee shops or hosting formal study hours in lounge areas can assist in designing a program with elements that are conducive to encouraging interaction. Also, understanding what program mechanisms foster engagement provides us with an opportunity to replicate and translate social community elements to various environments and contexts. For example, to nurture a social community in a business environment requires that employees know and share a company’s values in the same way members of a social community must know and agree with their program’s values. In contrast, using this approach may identify unrealized areas of opportunity for improving a program’s social community and potential mechanisms or initiatives that may enhance in a program’s infrastructure.

1.5 Overview

This research study introduces and defines social community and examines the social community of a specific mentoring program. The purpose of this research is to articulate what is social community, propose a social community model, and test the dimensions of the model. The goal of this research is to provide insights and recommendations for designing programs that promote the development of social communities.
In Chapter Two, I provide information about minority mentoring programs in which the context of this study is embedded. In Chapter Three, I propose social community as a mechanism that may contribute to the success of undergraduate students in STEM programs especially those in a minority mentoring program. In Chapter Four, I present a quantitative research study that examines the social community of the Merit Scholars Workshop Program at the University of Illinois at Urbana-Champaign. Finally, in Chapter Five, I conclude with a summarized overview of social community as related to my conceptual contributions and research findings and discuss some potential areas that may benefit from understanding the role of social community.
CHAPTER 2. A STEM MINORITY MENTORING PROGRAM THAT FOSTERS SOCIAL COMMUNITY

The purpose of this chapter is to provide a background on minority mentoring programs, specifically the Merit Scholars Workshop (MSW) Program at the University of Illinois at Urbana-Champaign (UIUC). In this chapter, I discuss some general minority mentoring programs and how the MSW Program originated and evolved. Understanding the MSW Program and its social community may be pertinent to addressing some issues in higher education.

Multiple educational initiatives have been proposed and implemented with the objective of tapping into the talent of underrepresented populations to increase the number of scientists and engineers to fulfill future STEM jobs (National Center for Science and Engineering Statistics, 2013; National Science Board, 2012; Olson & Riordan, 2012). In response to some of these initiatives, various mentoring programs that focus on helping minorities succeed in STEM majors have been established at higher education institutions (Jones & Were, 2008; Maton, Domingo, Stolle-McAllister, Zimmerman, & Hrabowski III, 2009; Russomanno et al., 2010). Some of these minority mentoring programs have been well documented in mentoring and higher education literature (Carter, Mandell, & Maton, 2009; Duncan & Dick, 2000; Maton, Hrabowski III, & Schmitt, 2000; Russomanno et al., 2010). One example is the Meyerhoff Scholars Program at the University of Maryland Baltimore County established in 1988.
Initially, the Meyerhoff Scholars Program was geared towards assisting African-American male undergraduates who were dedicated to pursuing STEM PhDs by providing them with financial aid assistance, tutoring, study groups, faculty counseling, etc. (Maton et al., 2000; Meyerhoff Scholars Program Program History, 2012). In time, the program opened its admissions to African-American women and today it accepts applications from anyone interested in participating in the program (Meyerhoff Scholars Program Program History, 2012). During the same year that the Meyerhoff Scholars Program was established, the Merit Scholars Workshop (MSW) Program, based on the dissertation research of Dr. Philip Uri Treisman, was implemented at the University of Illinois at Urbana-Champaign (UIUC) (Murphy, Stafford, & McCreary, 1998; Treisman, 1992). In order to situate this research about social community within a specific mentoring program, I detail the origins and evolution of the Emerging Scholars Program, and the development of the Merit Scholars Workshop Program at the University of Illinois at Urbana-Champaign (UIUC).

2.1 The Evolution of the Emerging Scholars Program

As a doctoral student at the University of California at Berkeley, Phillip Michael “Uri” Treisman, a calculus teaching assistant, wanted to know why his Asian students were outperforming his African-American students in his mathematics class. Treisman gained an awareness of the high failing rate of Black students in freshman calculus while he was in the process of developing a mathematics training program for teaching assistants (Treisman, 1985). He questioned 20 Black and 20 Chinese students about their study habits, office hour usage, and exam prep styles in an attempt to identify potential
performance impact indicators. For eighteen months, Treisman observed the two groups of students at their homes and in school to learn about how they learned.

One finding was that unlike their Chinese counterparts, Black students rarely studied with classmates. In addition, for a four-unit math course, Chinese students studied more hours for tasks (14 hours) compared to Black students (8 hours). Also, Chinese study group students asked each other a range of questions and critiqued each others’ work and studied two hours alone for every group hour together. When a Chinese student learned a correction for a group problem, he shared it with the group and they no longer used the incorrect language associated with the problem. In contrast, Black students generally worked alone and had a sense of self-reliance based on their high school experience. In addition, Black students were generally discouraged from seeking help from minority support programs due to the low achievement stigma associated with these types of programs (Treisman, 1985). Black students were less likely to seek help from counselors, advisors, or teaching assistants as well as (Treisman, 1985). General results of Treisman’s study showed that some Black students whether from predominantly Black, or predominantly White high schools struggled in academic courses. Black students who stayed or were able to academically stay, switched to majors to ensure they would still attain a degree (Treisman, 1985).

In an attempt to change the outcomes of Black students in his calculus course, Treisman began a pilot project study in 1976 in collaboration with the Professional Development Program (PDP). The program took Black students from the PDP’s high school program and worked with them on freshman calculus at the college during the summers. As a staff member of the PDP program, Treisman, worked with the various
group of students using worksheet problems that integrated impossible problems. Treisman assisted students with academic and non-academic issues (financial aid, housing, etc.) and maintained daily contact with students. The program continued through the spring of 1978 with many failures and eventually successes in helping a small group of students build their ability to seek out help with their mathematical weaknesses. This led Treisman to the hypothesis that developing a “challenging honors program” using his workshop methods might enhance the academic success rate of Black students compared to “the traditional remedial approaches to aiding minority students” (Treisman, 1985, p. 28). Thus, Treisman developed a workshop program based on these methods.

Treisman’s workshop program, the PDP Mathematics Workshop, began in the fall of 1978 and featured two part-time staff and forty-two students. The program’s format consisted of students meeting three to four days a week for two hours and participation was voluntary as the students received no course credit for their attendance. At the workshop’s completion, “more than half of the students received B- or better grades” and one student failed a calculus class (Treisman, 1985, p. 29). The workshop numbers doubled in 1979, and the program received a three-year federal grant in summer 1980. In the Fall of 1979, 80 freshman mathematics and chemistry students were enrolled and by Fall 1982, the numbers of students grew to 300 freshmen and sophomores in more than 30 classes across eight departments (Treisman, 1985).

Over time, with the termination of the grant and changes in the administrative organization and program scope, the program evolved into multiple separate programs across the Berkeley campus operating under the name of the Emerging Scholars Program. However, the basic foundational elements of the PDP Workshop remain the same.
Primarily, the program retained its (1) “focus on helping minority students to excel, rather than to merely avoid failure”, (2) “emphasis on collaborative learning and the use of small-group teaching methods”, and (3) “faculty sponsorship” (Treisman, 1985, pp. 30-31).

2.1.1 Workshop format

The general format of the workshop program starts with students being recruited in late May from the college’s incoming freshmen list. The workshop’s participation goal was to be predominantly black and Hispanic and have a balance between men and women. Some workshop recruitment issues encountered were difficulty convincing students of the program’s benefits, schedule restrictions incurred due to the workshop hour requirements, and “reluctance of many minority students to seek help from campus support services” (Treisman, 1985, pp. 31-32). Through an orientation and interview process, workshop students initiate their studies cognizant that they are enrolled in an honors program that has a history of helping students similar to themselves. The program staff’s expectations are that students: (1) excel in their schoolwork, (2) participate in their campus and community actively, and (3) be responsible for their success and the success of their peers (Treisman, 1985, p. 40).

During the workshop, students discuss problems on a worksheet composed by the workshop leader/teacher assistant (TA) in pairs or clusters. The workshop leader/TA circulates to listen in on conversations, occasionally address the group or individuals, and/or pose questions about problems. Workshop leaders/TAs are in a position to see what is going on with students before issues become crises because they see the students two or three times weekly.
One of the benefits of the workshop include supporting student transition into college life, allowing students to work within a peer community providing guidance from a skilled teacher (Treisman, 1985, p. 47). Students study together outside of workshop as well which assists in blending their academic and social lives and forming friendships. Treisman reported that one shortcoming of the workshops is that students may become dependent on workshop and workshop mates so much that they can’t succeed on their own after leaving the Workshop. Another disadvantage is that students may become dependent on this model and are not able to function as successfully in programs that lack a similar infrastructure (Allen, Eby, & Lentz, 2006a; Allen, Eby, O’Brien, & Lentz, 2008).

2.2 The University of Illinois at Urbana-Champaign’s Merit Scholars Workshop Program

The Merit Scholars Workshop Calculus Program at UIUC started informally in 1988. A classroom with tables and chairs was designated for the workshop participants in addition to elective credits for participation (Murphy et al., 1998, p. 383). The UIUC program officially started in 1989 with only a math section. A chemistry section was added in 1993, and biology sections were added in 2004 (J. McNeilly, personal communication, January 16, 2014). Initially, the MSW Program only invited students from their target populations such as African Americans, Latinos, and students from small rural areas who met the program’s required ACT and high school class rank criteria and were declared STEM majors (Merit Immersion for Students and Teachers (MIST) workshop, personal communication, August 1, 2012). Starting in Fall 2007, the program was expanded to also invite ALL undeclared students who met the ACT and
high school class rank criteria adding a new population of non-minority, large high school, and undeclared students to the population makeup (J. McNeilly, personal communication, February 26, 2014).

The MSW Program’s goals are for students to (a) excel in their current mathematics and science courses; “(b) continue successfully in subsequent mathematics and science courses; and (c) persist in mathematics- and science-based majors” (Murphy et al., 1998, p. 381). Students are invited to participate in the program based on their academic potential and commitment to excellence with the intent to “develop a community of scholars among the Merit students” (M. I. f. S. a. T. M. University of Illinois at Urbana-Champaign, 2012). As participants, “the students in the program work together to solve difficult course problems, develop friendships based on common academic interests, and inspire each other to maintain a high level of commitment to excellence” (M. I. f. S. a. T. M. University of Illinois at Urbana-Champaign, 2012).

2.2.1 Workshop Format

The MSW Program participants attend the same lectures and perform the same homework assignments, labs, and exams as non-program members, but they attend different designated discussion sections. These discussion sections are 2-hour active learning workshops that encourage student interaction through resources that include reviewing lecture concepts (M. I. f. S. a. T. M. University of Illinois at Urbana-Champaign, 2012). An explanation of the workshops from the MSW program brochure states:

“These workshops provide ample opportunities for student-student interactions. In place of the traditional classroom, large tables form natural areas for discussions by students. The Merit facilitator provides a challenging worksheet or activity for
students and circulates around the classroom providing feedback to students as they work. Students are encouraged to solve problems by thinking aloud and interacting with other students. Different groups of students are encouraged to compare answers since few direct answers are immediately provided by the facilitator. This collaboration among students stimulates additional interactions and more thinking about course content. Workshop problems are based on the material covered in lecture but they are designed to stretch each student’s abilities to the fullest extent. The students spend most of the workshop time collaborating in groups and grappling with difficult ideas and problems. Active learning produces a thorough understanding of the concepts and an unusual level of creativity. Our students usually perform better in their courses versus their non-Merit counterparts” (M. I. f. S. a. T. M. University of Illinois at Urbana-Champaign, 2012).

In 1990, there were 57 students and 3 discussion sections for the MSW Program. In 2012, there were approximately 800 students in 50 sections and 300 students on the waiting list (MIST workshop, personal communication, August 1, 2012). Now, there are multiple Treisman-based Emerging Scholars Programs at various institutions across the U.S. such as the University of Wisconsin at Madison, University of Texas at Austin, Northwestern University, Wayne State University, and the University of Kentucky.

This thesis examines social community embedded in the context of minority STEM mentoring programs. Specifically, UIUC Merit Scholars Workshop Program members and alumni are surveyed to test the dimensions of the proposed social community model. In examining the social community elements of the program, I must also acknowledge that there are historical and educational connections that influence my research perspective.

2.3 Researcher Perceptivity and Bias

As a researcher, I am interested in examining the UIUC MSW Program in particular for several reasons. First, UIUC is a top producer of scientists and engineers (Geist, Chetuparambil, Hedetniemi, & Turner, 1996; Seely, 1993). Second, examining
the elements of a program, such as the MSW Program, that may contribute to the successful promotion of minority undergraduates can inform educational initiatives designed to tap into diverse talent pools. And finally, I am a former MSW Program participant and I have always been interested in the success of the program, but more importantly the human elements of the program that can deeply influence its participants.

My perception is most influenced by my own participation in the Merit Scholars Workshop Program from 1996-1998. I participated in both the calculus and chemistry MSW Programs. During my time in the program, I utilized tutoring provided by the teaching assistant and participated in informal study groups. These elements contributed to the development of community between me and my fellow MSW colleagues.
CHAPTER 3. SOCIAL COMMUNITY: A MECHANISM TO EXPLAIN THE SUCCESS OF STEM MINORITY MENTORING PROGRAMS

Mentoring offers many benefits to both mentors and protégés including providing emotional and psychological support, fostering advice for career and personal development, and/or influencing the self-efficacy of participants (Allen, Eby, & Lentz, 2006b; Eby, Allen, Evans, Ng, & DuBois, 2008). Given the potential benefits of the mentoring process, formal mentoring programs have been initiated to assist college students with their academic journeys. The purpose of this chapter is to examine social community as a mechanism that may explain why minority mentoring programs are successful.

In STEM higher education, mentoring programs have been established for undergraduate students from underrepresented populations such as the Meyerhoff Scholars Program and the Merit Scholars Workshop Program. The Meyerhoff Scholars Program is an undergraduate advising and mentoring scholarship program founded at the University of Maryland, Baltimore County in 1988. It initially targeted young African-American males and is now open to all populations. The primary focus of the program is providing participants support through activities such as a summer bridge program, tutoring, administrative involvement, family involvement, personal advising and counseling, and study groups (Maton & Hrabowski III, 2004).
Similarly, the Merit Scholars Workshop model employs mentoring and support elements for participants. Modeled on the Emerging Scholars Program dissertation work of Philip Uri Treisman (Treisman, 1985), the Merit Scholars Workshop Calculus Program at the University of Illinois at Urbana-Champaign started informally in 1988 and targeted African Americans, Hispanics and Latinos, and students from small high schools; over time the program has broadened beyond a calculus focus and is now open to all populations (Murphy et al., 1998). In addition to regular classes and office hours, the Merit Scholars Workshop Program participants spend four additional hours each week working in a collaborative learning group format on difficult problems in the areas of calculus, chemistry, integrative biology, and molecular and cellular biology under the guidance of teaching assistants.

The Meyerhoff Scholars Program and the Merit Scholars Workshop Program have gained recognition for their accomplishments and outcomes as demonstrated by the growth and replication of similar programs at other institutions (Carter et al., 2009; Conciatore, 1990; Stolle-McAllister et al., 2011). In evaluating programs such as these, educational researchers typically focus on programmatic outcomes (e.g., graduation rates) and program elements (e.g., program values) (Elkins et al., 2011; Leapard, 2001). The programmatic outcomes of minority mentoring programs that tend to be most reported are students’ grades and grade point averages as compared to nonminority students, and program attrition and graduation rates (Church, 2010; Lasser & Snelsire; Summers & Hrabowski, 2006).

The main program elements that comprise mentoring programs are: (1) program values, (2) access to faculty and peers, and (3) formal and informal group activities. First,
mentoring programs are structured based on specific program values and these values orchestrate how members interact with each other and work towards their goals. Program values can convey the importance of attaining a graduate education, collaborating with others to solve problems collectively, and/or conducting oneself in a professional and ethical manner (Carter et al., 2009; Maton et al., 2009; Treisman, 1985). One of the most important program values of the Meyerhoff Scholars Program is its intentional purpose to prepare students to pursue PhDs in STEM fields (Maton et al., 2009; Maton et al., 2000). Second, members of a mentoring program are provided with access to faculty and peers that allows them to interact and engage with like-minded others in academic and social situations. Finally, formal and informal group activities provide members with opportunities to engage with each other in various contexts. Formal and informal group activities such as tutoring, informal study groups, and small group TA sessions provide academic assistance and informal outlets through gathering and networking opportunities (Alexander, Burda, & Millar, 1997; Maton et al., 2000).

Program elements and programmatic outcomes are useful for describing the formal makeup and providing comparable statistical information about a mentoring program, but they do not provide insight into the experiences of participants when they engage in a mentoring program or how this process of engagement develops over time. Moreover, the social and communal elements of the development process participants undergo as a result of their program participation may be discounted. In order to understand why these programs are successful, research is needed examining how program activities affect participants and facilitate personal outcomes (e.g. life skills and community development). The paucity of research investigating the human side of the
minority mentoring program experience underscores the need to advance our understanding of the personal experiences participants have through their interactions and how these interactions help them to develop personally and professionally in both the short and long term.

I propose the development of social community in minority mentoring programs as a mechanism that may explain why minority mentoring programs are successful. Thus, I seek to: (1) define social community relative to minority mentoring programs, (2) examine how program elements facilitate social community, and (3) discuss participant outcomes beyond programmatic outcomes.

3.1 Social Community

A social community is an environment where like-minded individuals engage in dynamic, multidirectional interactions that facilitate social support. In Figure 3.1, I depict how mentoring program elements and social support coalesce within a social community to produce participant outcomes that may be beneficial to program members. More specifically, I forward the notion that members can transition from being simply participants in a program to actually creating a social community through their engagement. The rationale for participants engaging with each other may be explained by social exchange theory.

Social exchange theory states that human behavior, how decisions are made in social exchanges and interactions, as well as why people engage in behaviors for
Figure 3.1 Role of Social Community in STEM Minority Mentoring Programs in Higher Education
self-interests, are related to the costs and rewards associated with human interactions (Blau, 1964; Cropanzano & Mitchell, 2005; Emerson, 1976; Homans, 1958). To create a social community, social exchange may occur through multidirectional interactions among members because they are willing to pay the costs (e.g., their time and effort) to reap certain rewards (e.g., their desires to succeed academically and personally). Interactions may occur because multiple resources such as scheduled group activities and tutoring, are available and promote reciprocity in relationships and interactions. These activities and resources, enacted through interactions that consist of the exchange and use of social resources and the development of interpersonal relationships, are the backbone of the social community.

In the following sections, I examine each of these elements beginning with the human side of social community to demonstrate the role participants have in program and personal success. Then I discuss the social support that results from active participant engagement. Finally, I suggest several participant outcomes that may provide benefit beyond program completion and graduation in the form of skills and resource development.

3.2 The Human Side of Social Communities

Current research findings describe elements that may facilitate minority mentoring program success such as tutoring, counseling, and financial assistance (Carter et al., 2009; Colvin & Ashman, 2010; Tsui, 2007). Establishing and implementing these program elements, however, may not fully describe the process required to attain success. Therefore, I expand this view by introducing human elements that may contribute to program success, and more importantly, the short and long term success of program
members. Specifically, I examine the members’ contributions to and engagement in program activities, because such active involvement is the basis for a successful social community (Allen et al., 2006a) where a social community consists of like-minded individuals engaging in dynamic, multidirectional interactions.

3.2.1 Like-minded Individuals

The term “like-minded” is used purposefully to underscore the importance of group members sharing a similar mindset. Like-minded does not infer that members share the same ethnicity, socioeconomic status, or other demographic variables because these distinctions are not the mitigating factor in the success of the group (Gächter & Thöni, 2005; Johnson-Bailey & Cervero, 2002). Rather the shared mindset towards goals of like-minded individuals is the important distinction. Researchers indicate that when like-minded individuals share the same goals and values and work together, they tend to cooperate with each other based on their shared perceptions that they are working towards similar goals (Gächter & Thöni, 2005). Moreover, they collectively focus on overcoming shared obstacles that may result in benefit to all members (Pulley, 2000). These members are willing to contribute to the social community based on their intentions, rather than solely on their demographic likenesses.

Minority mentoring programs provide access to cohorts of like-minded individuals (Innes & et al., 1993; Jones & Were, 2008; Maton et al., 2000; Richards, 1978; Russomanno et al., 2010; Snead-McDaniel, 2010). In certain college environments, the opportunities to identify like-minded others may be limited and filled with obstacles. For example, it may be difficult for like-minded individuals to become acquainted with other like-minded individuals due to inaccessibility to those with different academic
backgrounds or a lack of opportunities to engage with others (Jones & Were, 2008). Thus, mentoring programs can serve as mechanisms for like-minded individuals to engage in a social community where program members can interact with students possessing similar interests, thereby mitigating the challenges of trying to become acquainted with students outside the cohort.

3.2.2 Dynamic, Multidirectional Interactions

Social community is created through dynamic, multidirectional interactions among peers and with faculty in both formal and informal settings. To facilitate these types of interactions, the Meyerhoff Scholars Program, for example, requires that students (1) live together in the same residence hall during the first year and on campus for their remaining years to foster a sense of peer-connectedness and (2) participate in regularly scheduled meetings with staff (Maton et al., 2000). In this way, the program provides multiple opportunities for academic and social interactions to occur among students and with faculty. These opportunities, however, do not create the social community; they merely set the stage for program members to engage in the social community.

Multidirectional interactions are interactions that occur among individuals and must be comprised of both what each individual brings to the interactions as well as what they take from the interactions. As such, participants must actively contribute to, and benefit from, group membership in order for interactions to be considered multidirectional. Thus, multidirectional interactions are related to social exchange theory in that there must be mutual back and forth exchanges among members, with the implications of costs and rewards for all parties involved, in order for members to stay
engaged in their relationships (Cropanzano & Mitchell, 2005; Emerson, 1976; Homans, 1958). In mentoring programs, participants engage in multidirectional interactions by, for example, explaining how to solve particular problems they understand and receiving help from other individuals in the group about problems they cannot solve (Murphy et al., 1998; Treisman, 1992).

In a social community, interactions are dynamic because they change based on situational contexts and which community members are interacting and engaging within the community at a given time. For example, how members interact in formal study groups may differ from how they interact in their informal peer study groups based on the environment they are in (a classroom or dormitory study lounge) and/or if they are supervised. Likewise, members elect to engage in dynamic contexts based on what they are trying to collectively accomplish such as preparing for exams as compared to going to see a movie. In addition, over time members may enter and leave the program changing the makeup of the social community. As the makeup of members and/or the contexts in which interactions occur change, so do the relationships among members (Chao, O'Leary-Kelly, Wolf, Klein, & Gardner, 1994; Kozlowski, Gully, Nason, & Smith, 1999; Ryan, 2000). As members engage in activities, they create and form a community; yet it is through their multidirectional and dynamic interactions that they foster and sustain a social community.

3.3 Social Support

Social support is comprised of supportive actions and behaviors, the availability of actual support, global evaluations of quality and availability, and social roles and relationships (Lakey & Cohen, 2000). For example, people may offer others social
support by making time to go and have coffee with them in order to discuss their academic or personal problems. Some other examples of social support may be when one student provides informal tutoring to another student who is struggling with a particular subject or attends a presentation that a student is making to offer moral support. By engaging in these types of supportive activities, students learn the value of active engagement in the social community and make lifelong friendships and professional connections. Hence, social community in minority mentoring programs is a foundation for the creation of social support and social support can be a catalyst for creating long-term participant outcomes.

3.3.1 Social Support within a Minority Mentoring Program

Social support is birthed from the interactions among members of a social community that lead to the development of relationships among community members as they continually assist, exchange, and work with each other. In a minority mentoring program, program elements, such as group activities and study groups, provide opportunities for this development. These continuous opportunities foster relationship building among individuals that evolves over time; the program participants may experience social support as a result of these relationships. Social exchange theory suggests that reciprocating relationships are to be expected (Blau, 1964; Burke, 1997) because as program participants experience social support from each other, they are incentivized to engage in more program elements.

3.3.2 Outcomes of Social Support

Minority mentoring program members may experience beneficial outcomes that are facilitated by social support (D'Augelli & Hershberger, 1993; Stolle-McAllister et al.,
2011). These outcomes have the potential to enrich the lives of social community members indefinitely. For example, social support facilitates programmatic outcomes such as retention in that community members receive the support they need to succeed and thus are more likely to stay in school and graduate. Similarly, social support facilitates participant outcomes such as teaching members how to responsibly engage in a community and to value their relationships with other members. Thus, social support provides both immediate benefits, in the form of, for example, the confidence and assistance needed to succeed when faced with challenges, and life lessons, such as the benefit of actively engaging in a community of like-minded others.

3.4 Participant Outcomes of Social Community Development

Engagement in social community, and its corresponding social support, may facilitate short and long-term benefits that persist far beyond participants’ time spent in a mentoring program such as mastering lifelong skills applicable in many areas of their lives, as well as an understanding of the effort and return associated with accumulating and sustaining social relationships. I focus specifically on three participant outcomes highlighted in the mentoring literature, namely the ability to be resilient, engagements in communities of practice, and building social capital (see Figure 3.1).

3.4.1 Resiliency

Resiliency can be defined as being successful “in school settings despite adversities, persisting in the face of obstacles, or bouncing back from hardship” (Strayhorn, 2012, p. 52). Social community members may learn to be resilient as they function within their community because they can try, fail, and learn within the comforts of their support network. This skill has both immediate and long-term benefit for the
program participant. Indeed, having the continual support of a social community may
groom members to be resilient when confronted with obstacles because members can use
their social resources and relationships to learn how to confront and deal with academic
and personal obstacles while relying on their community for advice, resources, and
support. For example, members may engage in conversations with other members about
how to navigate certain courses or ways to deal with social pressures. Research shows
that this type of socialization and social support networks may be supportive constructs
for providing African Americans with coping tools for dealing with stressful experiences
and also promoting resiliency (Brown, 2008).

In the long term, participants can recall how they survived under the personal and
academic pressures during their college years to have the confidence they need to face
adversity in their professional and personal lives after college. Also, they will understand
the value in seeking input from others as they identify, weigh, and select options that may
work best for them. Thus, knowing how to be resilient is an important skill for social
community members to hone because it may equip them with the skills necessary to cope
with stressful experiences and recover from times of challenge throughout their lives.

3.4.2 Engaging in Communities of Practice

Communities of practice are collections of like-minded individuals sharing
similar experiences and social resources as they interact with and support each other
(Eckert, 2006; Wenger, 2000). The social communities developed through minority
mentoring programs are an example of a community of practice. Through their
experiences in minority mentoring programs, participants learn the value of engaging in
communities of practice, as well as the benefits and responsibilities of membership.
As program participants transition from college into their professional lives, they may seek out new communities of practice. These communities may be informal, such as after-hours gatherings at bars or coffee shops, or formal, such as through churches or professional societies. They will enter into these communities ready to learn its social norms through the artifacts, languages, and tools that have evolved as the members develop a collective understanding of their community (Wenger, 2000). Their active participation in the minority mentoring program may expedite the time required to socialize into their new communities, through for instance, introductions provided by other alumni or expectations about what is required to fully engage in a community of practice.

The transition into new communities of practice may also enhance their appreciation for the minority mentoring program, which may result in an inclination to give back, or “pay it forward,” by providing mentoring, introductions, financial resources, and the like to support the current students. Whether the alumni of the minority mentoring program are joining new communities of practice or supporting their former social community, they are creating long-term relationships and building social capital that can be professionally and personally beneficial.

3.4.3 Building Social Capital

Social capital is the resources and benefits available to someone based on their relationships and networks (Bourdieu, 1986). In other words, social capital is the currency of social networks that can only be accrued and used when an individual engages actively in a community of practice. Social community members may accrue and/or use their social capital in situations such as exchanging information about an
academic or job opportunity or supporting a charitable cause. For minority students, building social networks can result in access to social capital at institutions (Museus, 2010), which can lead to future social network development and its corresponding social capital. In regards to networking and social capital, the “quality and quantity of connections that students of color make with both individuals and organizations on campus determine their likelihood of success” (Museus, 2010, p. 12).

Through membership in a social community during college, such as active involvement in a minority mentoring program, students have the opportunity to learn how social capital is accrued through responsible engagement. Responsible engagement in a social community means that members help others in their community without the expectation of receiving an immediate return. Instead, members develop social capital based on the mutually supportive relationships they have with each other that can be advantageous in future encounters. For example, if a social community member tutors another member in calculus, s/he may successfully seek assistance in physics from that same member or another at a future point in time. Consequently, social community members learn how to build social capital based on the evolution and mutual benefit of the relationships that they develop with other members.

Recognizing the effects of social capital and networks within social communities while in a minority mentoring program “can be useful in understanding how the intensity and extensity of students’ connections with various offices, programs, groups, and persons on their campuses can provide access to resources and partially shape those students’ experiences and outcomes” (Museus, 2010, p. 13). Moreover, the social capital accrued during their college years provides the members with a starting foundation, like
the first pennies in a child’s piggy bank that can be cultivated and support their long-term career and personal goals. Indeed, the more social capital members are able to accumulate with others in the various communities in which they actively participate, the more access they will have to a range of help and support that may be beneficial via the networks of other members.

3.5 Summary and Conclusions

Minority mentoring programs use program elements to provide an environment that nurtures the development of social community. In this environment, a social community is formed through the dynamic, multidirectional interactions among like-minded individuals. These interactions result in the development of relationships and foster social support among community members over time. In turn, social support facilitates the accomplishment of program elements and allows members opportunities to learn important life-long enriching skills such as the value of exchange through community engagement. Members also may achieve beneficial short and long-term outcomes such as learning how to be resilient, how to engage in communities of practice, and the value of social capital.

Research is needed to better understand the role of social community in formal minority mentoring programs because, as argued herein, social community may help explain the success, or failure, of various programs. Specifically, researchers need to examine (1) what is occurring in mentoring programs that produces social community, (2) what undergraduate participants say about their mentoring program experiences, and (3) how undergraduate participants feel about their mentoring program experiences. Quantitative and qualitative approaches to this research agenda may be useful to ensure
both broad representation of perspectives and a more robust view of the social community phenomena through the voices of the participants, respectively. Ultimately, the insights from this research may facilitate the development of any social community, through investments in, for example, program elements and support systems that optimize the welfare and performance of communities and their members.

In conclusion, examining and measuring the role of social community in minority mentoring programs may be beneficial in organizing and replicating productive social support systems in higher educational STEM mentoring programs, and beyond. More importantly, insights about what is needed to develop social community at the college level may positively affect students’ abilities to navigate their programs, graduate, and form the lifelong networking skills necessary to succeed professionally and personally.
CHAPTER 4. EXAMINING THE SOCIAL COMMUNITY OF THE MERIT SCHOLARS WORKSHOP PROGRAM AT THE UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

There are several possible theories and models that can be used to understand the functions of the social elements of a minority mentoring program such as the Merit Scholars Workshop Program. I use the social community model (Mondisa & McComb, 2014) as a framework to examine the UIUC Merit Scholars Workshop program community. First, I briefly revisit the definition of social community and its potential participant outcomes.

4.1 Social community

Social community is the dynamic, multidirectional interactions between like-minded individuals that facilitate social support and fosters the development of long-term participant outcomes (Mondisa & McComb, 2014). Program elements such as program values, having access to faculty and peers, and participation in formal and informal group activities all comprise an environment conducive to creating a social community, see Figure 3.1. These elements nurture the development of social support i.e. supportive actions and behaviors, the availability of actual support, global evaluations of quality and availability, and social roles and relationships (Lakey & Cohen, 2000). Within these
relationships, members’ interact with each other and exchange and assist each other using their social resources (Lee & Robbins, 2000; Vaux & Harrison, 1985). These relationships and the social support facilitated makeup the social community and can result in participants being more resilient, engaging in communities of practice, and building social capital.

A social community can be created in a mentoring program due to the interactions among community members that foster the development of relationships (Mondisa & McComb, 2014). Because of the structure and elements that comprise a mentoring program such as the UIUC Merit Scholars Workshop (MSW) Program, the breeding of social community within the program is very likely. Subsequently, this study uses a quantitative approach to examine the social community perceptions of the current and past program participants.

The MSW Program possesses social community elements that may produce multiple beneficial participant outcomes, yet it is possible that different demographic groups within the social community may experience varying levels of the benefits associated with participant outcomes. It is important to investigate how the impact of social community elements and participant outcomes vary among different groups within a program to ensure the most enhanced experiences for all members. Consequently, this research examines how the social community elements and participant outcomes of the UIUC MSW Program vary across different groups within the program, and what aspects may need further examination to determine how to increase the development of connectedness within the community and toward its participant outcomes. The study’s major research question is:
RQ1: How do social community elements vary across different groups within the UIUC Merit Scholars Workshop Program?

4.2 Methods

4.2.1 Data Collection

The data were collected using an online Qualtrics survey. This survey data collection method was chosen in order to maintain privacy of the participants and to provide prompt and easy feedback of the survey answers. This study was approved by the Institutional Review Board and the participant consent form is in Appendix A.

4.2.2 Recruitment and selection of participants

The study participants are current and past Merit Scholar Workshop Program participants. They were recruited by contacting the current UIUC Merit Scholars Workshop Director, Jennifer McNeilly. McNeilly and other MSW Program program coordinators sent out the link to the Qualtrics survey to their email lists of current and past Merit Scholar Workshop participants, approximately 2500 email addresses. Unfortunately, this list contained the university email accounts of past participants who may no longer check their university accounts. Thus, it is difficult to tell how many participants actually received the survey link.

4.2.3 Descriptive Statistics

A total of 180 responses were received. One of the data responses was discarded due to missing information thus the sample population is n=179. The ages of respondents ranged from 18-28 years old with a mean age of 20.2 (SD = 1.6). Of these responses 44% (n=78) were males and 56% (n=101) were female.
The sample population is comprised of 35% (n=63) current MSW participants and 65% (n=116) past MSW participants. Of that, 91% (n=163) are undergraduate students and 9% (n=16) are graduate students or indicated that academic status was non-applicable.

The sample population is comprised of respondents who participated in the MSW Program from 2008-2014, see Figure 4.1. The total program enrollment is approximately 800 students for each of these cohort years, respectively. This is based on the total enrollment of students in all Merit sections each year (both fall and spring semesters) minus a certain amount to account for the number of students who participate in multiple Merit sections and those who participate more than one semester (J. McNeilly, personal communication, October 28, 2014).

![Respondents' Academic Participation in the MSW Program by Year](image)

**Figure 4.1 Participant Status by Year**

The racial makeup of the study population is 63% White/Non-Hispanic, 9% Asian, 7% Black or African American, 10% Hispanic or Latino, and 12% people who selected multiple racial categories or American Indian or Alaska Native, Native Hawaiian or Pacific Islander. The study population’s racial makeup is similar to the racial makeup of UIUC’s student enrollments (University of Illinois at Urbana-Champaign, 2014).
demographic representation of the racial makeup of the study population by categories are provided in Tables 4.1 and 4.2. Given the large proportion of White/Non-Hispanic responses compared to all other groups, analyses were conducted with two groups: White/Non-Hispanic and Other which is equivalent to all of the remaining racial categories. The population is comprised of 97% United States citizens, and 3% are United States permanent residents or not United States citizens or permanent residents.

Table 4.1 Racial Makeup of the Study Population by Sex and Participant Status

<table>
<thead>
<tr>
<th></th>
<th>Current Participant</th>
<th>Past Participant</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td>Male</td>
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<tr>
<td>White</td>
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<td>21</td>
<td>40</td>
</tr>
<tr>
<td>Non-White</td>
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<td>17</td>
<td>40</td>
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<tr>
<td>Asian</td>
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<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Black or African American</td>
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<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Hispanic or Latino</td>
<td>6</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>Multiple racial categories or American Indian or Alaska Native, Native Hawaiian or Pacific Islander</td>
<td>3</td>
<td>4</td>
<td>6</td>
</tr>
</tbody>
</table>

Table 4.2 Racial Makeup of the Study Population by Sex and Academic Status

<table>
<thead>
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<th></th>
<th>Undergraduate</th>
<th>Graduate/Non-student</th>
<th>Total Participants</th>
</tr>
</thead>
<tbody>
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<td></td>
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<td>Female</td>
<td>Male</td>
</tr>
<tr>
<td>White</td>
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<td>50</td>
<td>4</td>
</tr>
<tr>
<td>Non-White</td>
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<td>39</td>
<td>0</td>
</tr>
<tr>
<td>Asian</td>
<td>4</td>
<td>11</td>
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<tr>
<td>Black or African American</td>
<td>3</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>Hispanic or Latino</td>
<td>10</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>Multiple racial categories or American Indian or Alaska Native, Native Hawaiian or Pacific Islander</td>
<td>9</td>
<td>11</td>
<td>0</td>
</tr>
</tbody>
</table>
4.2.4 Measures

The online survey instrument, from here on referred to as the Social Community (SC) survey, used was adapted from several existing scales. Research supports using survey items from existing scales that correlate to specific constructs to compose a survey (Deckop, Mangel, & Cirka, 1999). Survey items were selected from existing scales based on each item’s relevance to the construct being measured. For example, to measure the social community model elements of connectedness, resiliency, communities of practice, and social capital, each survey item selected directly correlates to the model’s definition of each respective construct. Also, the reasonability of the factor load ratings of these selected survey items was assessed and considered before selecting the item to be used in the SC survey. The full survey questionnaire is in Appendix B.

Nine items surveyed demographics and academic information (as shown below) such as gender, race, age, citizenship, academic status, participant status, academic years respondents participated in the MSW Program, the MSW workshop sections they participated in, and identifying the primary person they turn(ed) to for support when confronted with academic difficulties.

1. Please indicate:  
   ( ) Male  
   ( ) Female
2. Please indicate:  
   ( ) Undergraduate  
   ( ) Graduate
3. Please enter your age: [blank box]
4. What is your citizenship status?  
   ( ) United States citizen  
   ( ) United States permanent resident  
   ( ) Neither a United States citizen nor a permanent resident
5. Please select all races that apply to you:  
   ( ) American Indian or Alaska Native  
   ( ) Asian  
   ( ) Black or African American  
   ( ) Hispanic or Latino
6. Are you currently in the Merit Scholars Workshop Program?

( ) Yes, I am a current participant.
( ) No, I am a past participant.

7. What academic years have you participated in the Merit Scholars Workshop Program? (Please select all that apply):

8. In which Merit Scholars Workshop Program(s) do/did you participate? (Please select all that apply):

( ) Math
( ) Chemistry
( ) Integrative Biology
( ) Molecular & Cellular Biology

19. When you feel like you are having academic difficulties, who is the primary person that you are most likely to seek support from (please select only one):

( ) Classmate
( ) Roommate
( ) Parent
( ) Friend
( ) Professor
( ) Advisor/Counselor
( ) Spouse/Significant Other
( ) Other (please explain)__________
( ) No one

The remaining thirty survey items of the SC survey use a Likert scale ranging from strongly agree = 5 to strongly disagree = 1 and examine the constructs of connectedness, resiliency, communities of practice, and social capital.

4.2.4.1 Connectedness

Connectedness assesses how connected the participant feels to the Merit Scholars Program community. For connectedness, there were ten items (questions were adapted from the Classroom Community Scale (Rovai, 2002, p. 209)) as shown below:

9. I feel that students in the Merit Scholars Workshop Program care about each other.
10. I feel connected to others in the Merit Scholars Workshop Program.
11. I do not feel a spirit of community in the Merit Scholars Workshop Program.
12. I have found a sense of family as a Merit Scholars Workshop Program participant.
13. I feel isolated here at school.
14. I trust friends that I have in the Merit Scholars Workshop Program.
15. I feel that I can rely on others in the Merit Scholars Workshop Program.
16. I feel that members of the Merit Scholars Workshop Program depend on me.
17. I feel uncertain about others in the Merit Scholars Workshop Program.
18. I feel confident that others in the Merit Scholars Workshop Program will support me.
The items were modified from a focus on classroom communication into statements related to campus social community relations and connectedness to campus community such as “I feel/felt that students in the Merit Scholars Workshop Program care about each other.” Items 11, 13, and 17 were reverse-coded since these items corresponded to negation of community like “I do not feel a spirit of community in the Merit Scholars Workshop Program.”

4.2.4.2 Resiliency

Resiliency is defined as the ability to rebound or bounce back from hardships and to persist in the face of obstacles. Six items measure resiliency, adapted from the Connor-Davidson Resilience Scale (Campbell-Sills & Stein, 2007, p. 1025), as shown below:

23. I can deal with whatever comes.
24. I tend to bounce back after illness or hardship.
25. I can achieve goals despite obstacles.
26. I can stay focused under pressure.
27. I am not easily discouraged by failure.
28. I think of myself as a strong person.

4.2.4.3 Communities of Practice.

The communities of practice construct is defined by how participants engage in communities of practice, which are collections of like-minded individuals sharing similar experiences and social resources as they interact with and support each other. To measure communities of practice, the survey includes six items adapted from the Pre and Post Adventure Experience Community Involvement Questionnaire Exercise constructed by Norman Staunton in 2001 as shown below:

29. I have a leadership role in the Merit Scholars Workshop community
30. I have made new friends as a result of participation in the Merit Scholars Workshop Program.
31. I believe my Merit Scholars Workshop community is important.
32. I have mentored someone from my Merit Scholars Workshop community.
33. I have received recognition for my contributions to my Merit Scholars Workshop community.
34. Someone from my Merit Scholars Workshop community has mentored me.

4.2.4.4 Social Capital

Social capital is the currency accrued and used by members of a social network when they engage in a community of practice. The last five survey items are adapted from the High School Social Capital scale questions to measure social capital (Ellison, Steinfield, & Lampe, 2007) as shown below:

35. I'd be able to find out about events in another town from a Merit Scholars Workshop alum living there.
36. If I needed to, I could ask a Merit Scholars Workshop alum to do a small favor for me.
37. I'd be able to stay with a Merit Scholars Workshop alum if traveling to a different city.
38. I would be able to find information about a job or internship from a Merit Scholars Workshop alum.
39. It would be easy to find people to invite to a Merit Scholars Workshop reunion

4.2.5 Statistical Analysis Procedures

Exploratory factor analysis was conducted to ensure that respondents could differentiate among connectedness, resilience, communities of practice, and social capital. The following survey items were crossloaded: item 13, item 30, item 31, and item 34. A clean factor structure was obtained after removing these items. An acceptable Cronbach’s value for statistical purposes is $\alpha > 0.70$ (Cronbach, 1951). The internal consistencies of connectedness ($\alpha = 0.89$), resiliency ($\alpha = 0.86$), communities of practice ($\alpha = 0.76$), and social capital ($\alpha = 0.85$) were acceptable.

4.3 Results

4.3.1 ANOVA Statistics

ANOVA analyses, conducted in SAS, were used to compare the connectedness, resilience, communities of practice, and social capital of various groups. A full ANOVA table is in Appendix C. As aforementioned, my research question is how do social
community elements vary across different groups within the UIUC Merit Scholars Workshop Program? Specifically, I was interested in identifying differences attributable to sex, academic status, race, participant status and the relationship to their primary support person. Given that the data responses for connectedness, resiliency, communities of practice, and social capital have fairly similar distributions, I decided that using a comparison of the means would be a good statistical approach for analyzing the population.

4.3.1.1 Connectedness

In evaluating connectedness among respondents, a significant relationship exists between connectedness and race (p=0.0041). Specifically, the connectedness mean is higher for Whites (M=3.75) than non-Whites (M=3.47).

4.3.1.2 Resiliency

For resiliency, significant differences across academic status (p=0.0424) and participant status (p=0.0261) were found suggesting that whether participants are undergraduate (M=4.01) or graduate/non-students (M=4.33) or current (M=3.90) or past participants (M=4.11) impacts how resilient they are. Also for resiliency, the support person category is marginally significant (p=0.0619). Specifically, in the support person category, “Spouse, Significant Other” has the highest mean (M=4.50) and “Other, No one” has the lowest mean (M=3.77).

4.3.1.3 Communities of practice

A significant relationship exists between communities of practice and academic status (p=0.0281) and participant status (p=0.0002). Whether students are
undergraduates (M=2.49) or graduate/non-students (M=2.96) or current (M=2.84) or past participants (M=2.36) impacts their engagement in communities of practice. Also, for communities of practice, there is marginal significance for support person (p=0.0521) where “Spouse, Significant Other” has the highest mean (M=3.13) and “Parent” has the lowest mean (M=2.23).

4.3.1.4 Social capital

Significant relationships exist between social capital and academic status (p=0.0094) and support person (p=0.0035). Graduate students (M=2.83) report having significantly more social capital than undergraduates (M=2.28). For social capital and support person, there is a significant difference in the means of “Spouse, Significant Other” (M=2.88) and “Other, No one” (M=1.91).

4.4 Interaction effects

Interaction effect graphs depict differences in resiliency and engaging in communities of practice based on sex, academic status, and race. Overall, resiliency for the entire sample population is very high (M=4.04). However, male participants tend to become more resilient after leaving the program and female participants tend to stay at the same level of resiliency, see Figure 4.2.
Graduate male participants report increased engagement in communities of practice after leaving the program whereas graduate female participants stay at approximately the same rate of engagement in communities of practice, see Figure 4.3. Non-Whites with significant others as their primary support persons report significantly higher engagement in communities of practice, see Figure 4.4. However, it is important to note that a potential limitation of the data is that the n values are very small (Spouse/Significant Other/White, n=3 and Spouse/Significant Other/non-White, n=2). A t-test indicates that race and spouse/significant other are significantly related to communities of practice (t=0.0190).
Analyses indicated that there are three main interaction effects. For resiliency, there is a significant interaction between sex and participant status ($p=0.0087$). For communities of practice, there is a significant interaction between sex and academic status ($p=0.0152$) and race and support person ($p=0.0244$). Table 4.3 includes only
significant interactions whereas the results for all interaction effects can be found in Appendix D.

Table 4.3 Significant Interaction Effects

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<td>Communities of practice</td>
<td>Sex*Academic status</td>
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<td>Race*Support person</td>
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CHAPTER 5. DISCUSSION AND CONCLUSIONS

In this thesis, I have proposed that social community is a mechanism that may contribute to the success of STEM mentoring programs. In propositioning social community, I have provided a definition of what social community is as well as a model to explain social community elements. Using this model, I examined the UIUC Merit Scholars Workshop Program’s social community to investigate ways to design better mentoring programs and to uncover what we do not know about social community. Using a human-integrated systems approach, this research examines behavior and interactions in a social community and potential participant outcomes in order to identify elements that may need to be built into a program’s infrastructure to offer support to members. In this chapter, I will provide a brief overview of the contributions of this research.

5.1 Discussion

The most interesting findings that can help to design better programs and increase our understanding about the unknown challenges and opportunities of a social community are the need to: (1) define and propose a social community model, (2) find ways to translate the connectedness that Whites experience in a social community to non-Whites, (3) increase the resiliency of females and assist members who have no primary support person, and (4) build social capital and increase members’ engagement in
communities of practice through mechanisms that encourage interactions between current and past members.

5.1.1 Defining Social Community and Proposing a Model

In defining social community and proposing a model, this research establishes groundwork for investigating the importance of the role and effects of human elements in a community consisting of multidirectional interactions, specifically a mentoring program. In Chapter II, social community is defined as an environment where like-minded individuals engage in dynamic, multidirectional interactions that facilitate social support. In the social community model, mentoring program elements and social support coalesce within a social community to produce participant outcomes that may be beneficial to program members. Thus, it is possible that members can transition from being simply participants in a program to actually creating a social community through their engagement. Investigating social community as a mechanism that promotes success is important because it can explain how human interactions can lead to fostering a community that produces positive outcomes for its members. Creating a social community and its positive outcomes can be formidable. Yet, a good first step to understanding how a social community is created is to define what social community is to help educate others on how to design these communities in various forums.

5.1.2 Translating Connectedness

The significant relationship between connectedness and race suggests that it may be necessary to examine more closely how to design mentoring programs to increase connectedness in non-White groups. Study findings indicate that non-Whites in the social community experience less connectedness than Whites. Thus, there is an
opportunity to examine ways to translate connectedness feelings Whites experience to non-White groups. For example, future research may examine the experiences of Whites that make them feel connected within the social community and look at ways to translate those findings into new initiatives that may help non-Whites feel more connected.

5.1.3 Increasing Resiliency

In order to increase the resiliency that social community members feel, it is necessary to examine why certain groups within the social community feel more resilient, especially over time, and how having a primary support person may help members feel more resilient. Overall, the resiliency for the entire sample population is very high (M=4.04). However, male participants tend to become more resilient after leaving the program and female participants tend to stay at the same level of resiliency, see Figure 4.2. Examining what contributes to the increasing resiliency levels of males after they leave the program may provide insights that are translatable to increasing the resiliency of females.

It is important to also examine why resiliency for females are not increasing post program. This may stem from issues associated with minority populations such as experiencing an unwelcoming climate and/or difficulties integrating into communities (Gutiérrez y Muhs, Niemann, González, & Harris, 2012; Hill, Corbett, & St Rose, 2010; Snead-McDaniel, 2010). These issues may stunt the resilient qualities of females during their participation in the program and affect them in the long term as well. Future research should investigate why this might be occurring and address potential initiatives that can be designed into mentoring programs to help females increase their resiliency after leaving the program.
Also, examining what contributes to male graduate participants’ higher engagement levels after leaving the program may provide insights that are translatable to helping female graduates engage more in communities of practice. Specifically, if certain factors can be identified as contributing to why male graduates engage more, such as spousal support or feeling a stronger connection to others on campus due to being part of the majority, then ways to assist female graduates can be investigated. Thus, it may be possible that increased engagement in communities of practice correlates to the support that non-White members receive from their spouses and significant others.

In addition, support person ratings suggest that participants who do not have anyone as a support person may be less resilient. This finding indicates that mentoring programs may need to be designed to help participants identify a person that they can go to for support when dealing with academic difficulties. Programs may consider providing literature or seminars for people who are in the roles of support persons, such as parents, counselors, and professors regarding how to be supportive of participants. Furthermore, all academic advisors and professors may not provide the same level of support or advising. Subsequently, there should be further investigation into how the quality of the support person available to the member affects the member as well.

5.1.4 Encouraging Interactions

Whether participants are current or past participants or undergraduate or graduate members of the program, can affect their engagement in communities of practice. Graduate/non-students (M=2.96) and current participants (M=2.84) rated higher in engaging in communities of practice. Thus, mentoring programs may need to be designed such that they setup mechanisms that foster relationships between current and
past participants. For example, mentoring programs may consider sponsoring regular alumni events for current undergraduate and former graduate participants to socialize on campus in order to continue the growth of relationships and interactions between current and past participants. Also, programs may look at creating mentoring networks or blogs in which current and past participants can socialize in order to help members stay in contact with each other and possibly lead to producing new communities of practice.

Participants with social capital probably also have multiple social networks that are comprised of supportive people. In social networks, social capital is accrued and used by members as they engage in interactions with other members. So, it makes sense that there would be a significant relationship between having a primary support person and social capital because a support person may implicitly teach members the value of social capital. Implementation of social network mechanisms like networking events and job fairs may teach undergraduates about the value of social capital and how to build and use it across interdisciplinary and interpersonal networks wisely. Thus, mentoring programs should be designed to include activities that encourage participation from participants’ spouses/significant others as well as others such as friends, advisors, professors, etc.

5.2 Limitations and Future Research

The major limitations of this study are the small sample size and lack of racial and past participant diversity. Since there were only 179 valid responses, this research is similar to a pilot study that provides initial insights about how to better design programs to promote social community. The sample population was comprised of predominantly Whites (63%). For future research, having more racial diversity across respondents may provide better insights into the differences among racial groups within the UIUC MSW
social community. Moreover, even though 65% of responses were from graduates/non-students, it would be beneficial to survey graduates who are older alumni of the program. For example, surveying alumni who participated in the program from earlier academic years may provide richer data for creating a comparative analysis among groups and assessing long-term participant outcomes.

5.3 Conclusions

To design better programs that promote social community, it may be necessary to examine the infrastructure of mentoring programs to find ways to: (1) increase connectedness in non-White groups, (2) nurture relationships between current and past program participants, (3) create mentoring networks or blogs in which current and past participants can interact and engage, (4) assist participants with figuring out how to find someone to fulfill their primary support person role in order to increase their capability to be resilient, and (5) include activities that encourage participation from participants’ spouses/significant others as well as others such as friends, advisors, professors, etc.

Using a human-integrated systems approach to examine the support structure of a mentoring program like the MSW program, allows me to extend the view of what makes mentoring programs successful beyond graduation and attrition metrics. Specifically, using this approach provides insights into what is occurring in mentoring programs in terms of how human interactions influence the prosperity of members and how mentoring programs might be designed keeping humans in mind. Without using a human-integrated systems approach, it is easy to overlook elements that influence the fostering of social community such as the importance of informal interactions and engagement in activities and who provides support to community members. In thinking about the humans in a
social community, I identified the importance of increasing feelings of connectedness, the need for progressively nurturing relationships in the short and long term, and the need for identifying support persons and receiving support from others.

5.4 The Importance of Social Community Research: Extension and Generalizability

This research is beneficial because it provides a definition for social community as well as language and a model to talk about and examine the role of social community in STEM minority mentoring programs and potentially other contexts. A social community can exist where like-minded individuals are engaged in multidirectional interactions resulting in social support. Therefore, the concept of social community may be applicable to environments that embody these aspects such as organizations, businesses, and informal groups. For example, understanding how the program elements of a mentoring program foster social support can aid program designers in providing similar elements in their organization’s infrastructure to produce similar beneficial participant outcomes.

Social community research can also provide information about what is lacking in regards to interactions taking place within social communities. With this information, program elements and directors can learn how to better serve members of social communities by identifying areas of improvement and designing better programs that foster the creation of social communities. The tentacles of social community research can extend into various areas and forums to inform and influence the development and prosperity of programs and organizations where humans collectively interact and engage.
REFERENCES


Appendix A  Participant Consent Form

Email script to participants:

Hello,

I am a graduate student in the School of Industrial Engineering and my research advisor is Dr. Sara McComb. We are conducting a research study entitled “EXAMINING MERIT SCHOLARS WORKSHOP PARTICIPANTS’ PERCEPTIONS OF SOCIAL COMMUNITY” to better understand how social community is perceived by this population. This study involves the completion of an anonymous online survey.

This brief survey can be accessed by the link below and will take approximately 5-10 minutes to complete. Participation is completely voluntary and you must be 18 years or older to participate. Data from the survey will be compiled and reported in group form by the researchers. Surveys are anonymous and will not contain any personally identifiable information, therefore your confidentiality will be maintained.

If you have any questions about this study, you can contact:

Sara McComb  Joi-Lynn Mondisa
Industrial Engineering  Industrial Engineering
313 Grissom Hall  312 Grissom Hall
Purdue University  Purdue University
West Lafayette, IN 47907  West Lafayette, IN 47907
765-494-4029  jmondisa@purdue.edu
sara@purdue.edu

If you have concerns about the treatment of research participants, you can contact the Institutional Review Board at Purdue University by mail at Ernest C. Young Hall, Room 1032, 155 S. Grant St., West Lafayette, IN 47907-2114, by phone at (765) 494-5942 or via email address at irb@purdue.edu.

Thank you for considering participation in our study, we look forward to hearing from you.

[Insert Qualtrics survey link here]
Appendix B  Social Community (SC) Scale

Directions: Below you will see a series of statements concerning your experiences on campus. Read each statement carefully and select the option that best applies to you. There are no correct or incorrect responses. If you neither agree nor disagree with a statement or are uncertain, select Neutral. Do not spend too much time on any one statement, but give the response that seems to describe how you feel. Please respond to all items.

*Adapted from the Classroom Community Scale (Rovai 2002, pg. 209), the Michigan Organizational Assessment Questionnaire (MOAQ) (Cammann et. al. 1983, pg. 84), the Connor-Davidson Resilience Scale (Campbell-Sills & Stein, 2007, pg. 1025), Pre and Post Adventure Experience Community Involvement Questionnaire Exercise Constructed by Norman Staunton in 2001, and High School Social Capital (Ellison et. al, 2006).

1. Please indicate:
   ( ) Male          ( ) Female

2. Please indicate:
   ( ) Undergraduate ( ) Graduate

3. Please enter your age: [blank box]

4. What is your citizenship status?
   ( ) United States citizen
   ( ) United States permanent resident
   ( ) Neither a United States citizen nor a permanent resident

5. Please select all races that apply to you:
   ( ) American Indian or Alaska Native
   ( ) Asian
   ( ) Black or African American
   ( ) Hispanic or Latino
   ( ) Native Hawaiian or Pacific Islander
   ( ) White/Non-Hispanic

6. Are you currently in the Merit Scholars Workshop Program?
   ( ) Yes, I am a current participant.
   ( ) No, I am a past participant.

[IRB: The same set of questions for #7-#22, will be asked of participants who select “No, I am a past participant”, but these questions will be worded in past tense].
7. What academic years have you participated in the Merit Scholars Workshop Program? (Please select all that apply):

( ) 1993-1994  ( ) 2001-2002  ( ) 2009-2010

8. In which Merit Scholars Workshop Program(s) do/did you participate? (Please select all that apply):

( ) Math
( ) Chemistry
( ) Integrative Biology
( ) Molecular & Cellular Biology

9. I feel that students in the Merit Scholars Workshop Program care about each other.

5 4 3 2 1

10. I feel connected to others in the Merit Scholars Workshop Program.

5 4 3 2 1

11. I do not feel a spirit of community in the Merit Scholars Workshop Program.

1 2 3 4 5

12. I have found a sense of family as a Merit Scholars Workshop Program participant.

5 4 3 2 1

13. I feel isolated here at school.

1 2 3 4 5

14. I trust friends that I have in the Merit Scholars Workshop Program.

5 4 3 2 1
15. I feel that I can rely on others in the Merit Scholars Workshop Program.
   (5) (4) (3) (2) (1)

16. I feel that members of the Merit Scholars Workshop Program depend on me.
   (5) (4) (3) (2) (1)

17. I feel uncertain about others in the Merit Scholars Workshop Program.
   (1) (2) (3) (4) (5)

18. I feel confident that others in the Merit Scholars Workshop Program will support me.
   (5) (4) (3) (2) (1)

19. When you feel like you are having *academic* difficulties, who is the primary person that you are most likely to seek support from (please select only one):

   ( ) Classmate
   ( ) Roommate
   ( ) Parent
   ( ) Friend
   ( ) Professor
   ( ) Advisor/Counselor
   ( ) Spouse/Significant Other
   ( ) Other (please explain)____________
   ( ) No one

20. All and all, I am satisfied with my choice to attend UIUC.
   (5) (4) (3) (2) (1)

21. In general, I don’t like being at UIUC.
   (1) (2) (3) (4) (5)

22. I like going to school at UIUC.
   (5) (4) (3) (2) (1)

23. I can deal with whatever comes.
   (5) (4) (3) (2) (1)

24. I tend to bounce back after illness or hardship.
   (5) (4) (3) (2) (1)

25. I can achieve goals despite obstacles.
   (5) (4) (3) (2) (1)

26. I can stay focused under pressure.
   (5) (4) (3) (2) (1)

27. I am not easily discouraged by failure.
   (5) (4) (3) (2) (1)

28. I think of myself as a strong person.
   (5) (4) (3) (2) (1)
29. I have a leadership role in the Merit Scholars Workshop community.

(5) (4) (3) (2) (1)

30. I have made new friends as a result of participation in the Merit Scholars Workshop Program.

(5) (4) (3) (2) (1)

31. I believe my Merit Scholars Workshop community is important.

(5) (4) (3) (2) (1)

32. I have mentored someone from my Merit Scholars Workshop community.

(5) (4) (3) (2) (1)

33. I have received recognition for my contributions to my Merit Scholars Workshop community.

(5) (4) (3) (2) (1)

34. Someone from my Merit Scholars Workshop community has mentored me.

(5) (4) (3) (2) (1)

35. I’d be able to find out about events in another town from a Merit Scholars Workshop alum living there.

(5) (4) (3) (2) (1)

36. If I needed to, I could ask a Merit Scholars Workshop alum to do a small favor for me.

(5) (4) (3) (2) (1)

37. I'd be able to stay with a Merit Scholars Workshop alum if traveling to a different city.

(5) (4) (3) (2) (1)

38. I would be able to find information about a job or internship from a Merit Scholars Workshop alum.

(5) (4) (3) (2) (1)

39. It would be easy to find people to invite to a Merit Scholars Workshop reunion.

(5) (4) (3) (2) (1)
### Appendix C  ANOVA Results

Table C 4 Full ANOVA table

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<th>p</th>
<th>Mean (SD)</th>
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n=179
## Appendix D  Interaction Effects Results

### Table D 5 Tested Interaction Effects

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