

DISSERTATION

AN EXAMINATION OF THE VALUE OF COMMUNITY IN NATURAL RESOURCES
EDUCATION

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Tim Archie

Department of Human Dimensions of Natural Resources

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Doctoral Committee:

Advisor: Peter Newman

Jerry Vaske
Brett Bruyere
David Most

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ABSTRACT

AN EXAMINATION OF THE VALUE OF COMMUNITY IN NATURAL RESOURCES EDUCATION

The Warner College of Natural Resources (WCNR) at Colorado State University has purposefully implemented a range of program which emphasize social factors, such as sense of community, and are designed to increase the likelihood of student success. Typical measures of student success in WCNR (and higher education in general) have included student outcomes such as: retention, engagement, learning, and enhancing the overall student experience. However, little is known to what extent social factors such as sense of community have value in influencing student outcomes such as retention, learning, and students' overall experience. Therefore, the overall purpose of this dissertation was to examine the value of community in influencing student outcomes. This dissertation studied the role of community in influencing student outcomes in two types of academic programs (learning communities & fieldwork courses) and examined how students' level of social engagement within the WCNR community was related to their overall experience within the college. Chapter one outlines theories of student retention, experiential learning, and student engagement. Chapters two and three examined academic programs that have been shown to promote a sense of community: a residential first year learning community (chapter two) and fieldwork course (chapter three). In chapter four, the investigation of community was expanded beyond single programs and explored the extent to which students' social experience and participation in the WCNR community is related to their satisfaction with their overall experience within the college.

Chapter five provides summaries of these studies and implications, limitations, and suggestions for future research.

The first study examined sense of community in residential learning communities. Learning communities have been shown to effectively retain students and promote a sense of community, but it is unclear to what extent learning communities' effectiveness in retaining students can be attributed to sense of community. Therefore, the primary purpose of this study was to determine the value of the sense of community created by learning communities in influencing student persistence. The results of this study indicated that learning communities were effective in promoting a sense of community and students were generally not planning to leave the institution because their sense of community needs were not met.

The second study examined the value of experiential learning in a fieldwork course at Pingree Park. Prior work has shown that fieldwork courses are effective in producing knowledge and skills that are transferable beyond the course, and a sense of community, but it is unclear to what extent the effectiveness of fieldwork courses in producing these outcomes can be attributed to a sense of community. The findings of this study indicated that sense of community had value in influencing knowledge and subsequently confidence in knowledge and skills gained in a residentially based field course. Additionally, sense of community had a significantly weaker effect on these outcomes, likely due to the less immersive social interactions with peers and the quality of sense of community they experienced compared to residential field course participants.

The third and final study explored social engagement in the WCNR and the value of social engagement in influences student satisfaction. Social engagement was reflective of students' perceptions and level of participation of social components of the WCNR community. The findings of this study indicated that the more socially engaged a student is, the more

satisfied they were with their WCNR experience. Additionally, active and collaborative learning, which is incorporated in many WCNR programs, was shown to positively influence social engagement. These findings suggest that the programs designed which incorporate active and collaborative learning have value in influencing students' perceptions and level of participation in the WCNR community and subsequently their overall satisfaction with WCNR.

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CHAPTER I

Community in Higher Education

Introduction

There is general consensus that student outcomes such as retention, degree completion, and the quality of education in higher education needs to improve to meet the needs of the nation and world (Kuh et al., 2010). While these outcomes have long been a priority for many institutions, current legislative reform is likely to make these outcomes more potent. As of December 2013, the higher education act was in the process of being reauthorized by the US congress. Many of the potential reforms being discussed at this time were centered on making institutions more accountable for the number of students who complete degrees and the value of education it provides students (American Council on Education, 2013). Many institutions are already critically examining their existing programs designed to meet these outcomes to ensure their effectiveness (Kuh et al., 2010). However, differences in programs across campus suggests that going forward, institutions will likely rely upon smaller academic units which are responsible for implementing individual programs (such as colleges, schools or departments) to evaluate the effectiveness in producing favorable outcomes such as persistence, learning, and engagement.

The Warner College of Natural Resources (WCNR) has purposefully implemented a range of programs designed to increase the likelihood of student success. Measures of student success have included student outcomes such as: a sense of community, retaining students, promoting student engagement and learning, and enhancing the overall student experience. Examples of these programs include residential learning communities and fieldwork courses. Both of these types of programs are deeply rooted in theory and research from student

development, retention, engagement, and experiential learning and have shown strong linkages to a range of student outcomes including sense of community (Berger, 1997; Jacobs & Archie, 2008). However, it is largely unknown (both in natural resource education research and higher education research in general) to what extent sense of community is responsible for the effectiveness of these programs in producing other student outcomes. More specifically, the sense of community in WCNR is obvious; but the effects of this strong sense of community on other student outcomes are not obvious. Thus, the overarching purpose of this dissertation was to determine the value of community by examining the relationships between sense of community and three key indicators of student success: retention, learning, and satisfaction. Specifically, this dissertation examined the role of community in influencing student outcomes in two types of academic programs (learning communities & fieldwork courses) and examined how students' level of social engagement within the WCNR community was related to their overall experience within the college. Chapters two and three examined academic programs that have been shown to promote a sense of community: a residential first year learning community (chapter two) and fieldwork course (chapter 3). Learning communities have been shown to effectively retain students ((Baker & Pomerantz, 2000/2001; Hotchkiss, Johnson, 2000/2001; Moore, & Pitts, 2003; Tinto, 2000; Soldner, Lee, & Duby, 1999/2000) and promote a sense of community (Jafee et al., 2008), but it is unclear to what extent learning communities' effectiveness in retaining students can be attributed to sense of community. Similarly, fieldwork courses have been shown to be effective in producing knowledge and skills that are transferable beyond the course (), and a sense of community, but it is unclear to what extent the effectiveness of fieldwork courses in producing these outcomes can be attributed to a sense of community. In chapter four, the investigation of community was expanded beyond single programs and explored the extent to

which students' social experience and participation in the WCNR community is related to their satisfaction with their overall experience within the college.

There is limited literature on sense of community in higher education contexts. However, there is an extensive amount of literature focused more broadly on social factors related to sense of community in higher education. This chapter presents the theoretical framework of sense of community and a review of several complementary theories and relevant research related to social factors in higher education persistence, engagement, and experiential learning. While these theories describe differing phenomenon and processes, social interactions and relationships are identified as integral components in all.

Sense of Community

A "sense of community" is used informally and formally as a goal or outcome for programs and activities in higher education. The concept of "community" or "sense of community" has been used to describe the aspects of social settings that satisfy people's needs for connection and belonging (Solomon et al., 1997) and is closely aligned with the social factors that are integral components of the student retention, engagement, and experiential learning theories outlined later in this chapter.

Sense of community, or Psychological Sense of Community (PSOC) as it is known in the community psychology discipline, has been studied for decades. The roots of PSOC stem from the theory of human needs, the basic idea of which is that "outcomes are valued by an individual to the extent that they satisfy the physiological or psychological needs of the individual, or to the extent that they lead to other outcomes that satisfy such needs or are expected by the individual to do so" (Minor, 2006, p. 76). Nowell and Boyd contend that the needs based logic underlying the PSOC construct assumes that the community is a resource by which individual's

physiological and psychological needs are met (2010). They argue that since this concept is needs based, then the corresponding measures of PSOC reflect the level to which this need is met.

PSOC has been defined as “a feeling that members have of belonging, a feeling that members matter to one another and to the group, and a shared faith that members’ needs will be met through their commitment to be together” (McMilan & Chavis, 1986). The following four components of sense of community have been identified as central to this definition;

Membership: a feeling of belonging or of sharing a sense of personal relatedness.

Influence: a sense of mattering, of making a difference to a group and of the group mattering to its members.

Integration and fulfillment of needs: a feeling that member’s needs will be met by the resources received through their membership in the group.

Shared emotional connection: the commitment and belief that members have shared and will share history, common places, time together, and similar experiences.

Based on the aforementioned characteristics, sense of community has conceptual linkages to social aspects of student persistence, experiential learning, and student engagement theories discussed in the following sections.

Social Factors in Student Persistence

A large body of research has developed strong theory and insight to help understand persistence decisions of college students of all disciplines. Hundreds studies have been conducted and numerous programs have been implemented, yet student retention rates have remained relatively unchanged over the past few decades (Tinto, 2006). Despite the lack of improvement in retention rates, there is a much greater knowledge base as to how the persistence

process works. The student integration model is perhaps the most tested and widely accepted model of student retention (Tinto, 1993; Braxton, 2000). In the model, student background characteristics (often measured by gender, parental income & education, ethnicity, etc.) influence the degree to which an individual perceives themselves to be integrated into the social and academic structures at an institution. The degree to which an individual is integrated into the institution determines their departure decision. Tests of this theory have found support for the effect of background characteristics and social integration, but academic integration has shown to be an ineffective predictor of retention (Braxton, 2000; Kuh, 2006). As a result of these findings, the focus of retention research and practice has been to understand the role of social integration. Research related to the sources and influences of social integration and other social factors have been rather messy, largely because social integration is a vague construct and has thus been operationalized in many different ways (with no standardized or reliable measures of social integration) and in different scales (integration at the institution level, classroom level, college level) and contexts (classrooms, dormitories, peers, faculty). As such, there is still no consensus on what social integration is or how it should be measured. The only consensus there seems to be is that social factors are important; especially for first year students (Kuh, 2006). Additionally, it is known that social factors are important for students across all disciplines and is not unique to students studying natural resources related disciplines (Tinto, 2006; Kuh et al., 2006).

Experiential Learning

John Dewey (1916, 1966) was perhaps the first to emphasize the importance of social interaction in learning and has also been credited as the first to apply the community concept to education (Solomon et al., 1997). He argued that it was essential for schools function as

“democratic communities” allowing students to combine their individual skills and interests, and could experience the democratic process through collaborative activities, which help students to develop and become committed to common goals. Experiential learning theory does not simply advocate "learning by doing." Instead scholars have emphasized "learning by doing and learning from doing within a specific social context with a support group, or set, which helps members to engage in reflection upon their practices" (Jarvis, 2006, p. 154). This is especially evident in fieldwork in environmental disciplines which relies heavily on “hands on” small group work or active and collaborative work.

Student Engagement

Student engagement is one of the most dominant topics in higher education research and is a commonly used benchmark for institutions nationwide (Kuh, 2009). While engagement is a relatively new term, this concept is deeply rooted in decades of educational research. Various iterations of the idea of engagement have built upon each other to form the construct and term known today as engagement. In the 1970’s Robert Pace developed the College Student Experience Questionnaire based on what he described as “quality of effort”. Pace’s research showed that the more time and energy spent on educationally purposeful tasks, the more students gained from their studies and other college experiences (Pace, 1990). Astin’s (1984) theory of involvement explored “quality of effort” and how it relates to student achievement. Other researchers have addressed different dimensions of student effort and their relationships to student outcomes such as persistence. Tinto’s student integration model explored social and academic integration as they relate to persistence (1993). In this model, social and academic integration are influenced by a student’s effort to integrate into these aspects of the university (Tinto, 1986, 1993). Kuh’s conceptualization of engagement is used to “represent constructs

such as quality of effort and involvement in productive learning activities (2009). Kuh et al. created the National Study of Student Engagement (NSSE) and helped to popularize and established engagement as indicator of student and organizational performance. This conceptualization of engagement and its corresponding measure emphasize the intuition's role in facilitating educational purposeful activities. Student engagement is a more meaningful approach to evaluating an institution is to determine how well it fosters student learning rather than other metrics such as retention and grade point averages (Kuh, 2001, 2003). As a result, engagement is frequently part of higher education policy discussions, higher education research, and popular media (Kuh, 2009).

Kuh et al. have provided a valid and reliable framework and measurement for this multidimensional construct (2001). The engagement framework and its corresponding measure the National study of student engagement (NSSE) is widely used on an annual basis at most large universities. NSSE measures students' perceptions of engagement and educationally purposeful behaviors indicative of engagement at the institutional level and results are intended to be reported in the aggregate. These data are useful for administrators to evaluate the effectiveness of institutional policies, by comparing data from year to year and before and after specific policies are implemented. NSSE data can be analyzed in various segments to determine differences in perceptions of engagement based on student background characteristics (gender, high school GPA), colleges, majors, and class level. However, because the items are framed to measure engagement at the institution level, it is not necessarily valid to make meaningful comparisons by college or major, because the data will still be reflective of students experience within the institution and not in a particular academic unit such as college, department, or major. Questions are asked about their experiences overall, which may not be reflective of their

experience at a smaller scale such as college, department, or major. NSSE includes student outcome variables such as satisfaction, and is often linked to institutional data to compare engagement to student outcomes not directly measured by NSSE such as GPA and persistence (Kuh et al., 2006).

Theoretical Framework

Student engagement is a multi-dimensional concept; however its basic premise is relatively simple: the more a student is engaged in study, the more they learn. Similarly, the more students practice and get feedback on their writing, analyzing, or problem solving, the more adept they become. Continuing this logic, the more socially engaged (as a result of interactions with other students, faculty and staff) a student is, the more socially integrated into the college community a student will be. Several NSSE benchmarks are either reflective of the degree to which a student is socially engaged, or are posited to be influenced by the degree to which a student is socially engaged.

Active and Collaborative Learning

Active and collaborative learning approaches are contrary to the traditional (and possibly outdated) passive lecture format where faculty lecture and students contributions are limited. Active and collaborative learning approaches feature three elements that matter to student learning: involving students, increasing their time on task, and taking advantage of peer influence (Kuh, 2004). Science, engineering, technology, and mathematics (STEM) disciplines have used active and collaborative learning practices in the form of problem-based and inquiry-based learning (Allen and Duch 1998; Duch, Gron, and Allen 2001; Rutherford and Ahlgren 1991). Ebert-May and Brewer (1997) tested the effectiveness of active learning in place of the traditional lecture format in introductory biology courses and found that students learned more

effectively by participating in a cooperative group; enjoyed their social interactions; characterized the classroom environment as friendly, nonthreatening, fun, and dynamic; and reported a sense of belonging and camaraderie because they regularly interacted with peers and learned from each other. They also found that students reported a positive impact on their level of effort and their level of attention in class due to more frequent reporting to the class about their progress on assignments. These results indicated that active and collaborative learning had a positive effect on peer interaction which is an important component of social engagement, social involvement, and students' sense of community (Astin, 1993; Tinto, 1993; Jacobs & Archie, 2008).

Active and collaborative learning was shown to influence constructs in Tinto's student integration model (1993) including social integration, institutional commitment, and intent to return (Braxton et al., 2000). Active learning experiences were positively associated with increased frequency of student contacts with faculty members (because the class activities and assignments required it) and more positive views of the campus environment (probably mediated by getting to know classmates better through the collaborative exercises). It was likely that through these experiences, active learning exerts a positive influence on student integration and persistence (Braxton et al., 2000).

Level of Academic Challenge

Level of academic challenge is a measure of students' effort in educationally purposeful activities. Prior work has shown that as the level of academic challenge increases, so do student outcomes such as learning (Kuh, 2006). However, prior work has not tested the relationship between level of academic challenge and social engagement factors such as student faculty interaction and supportive campus environments. It is plausible that level of academic challenge

may be positively related to social engagement factors. For example, if a student finds coursework to be especially challenging, this may cause a student to seek help from faculty and peers thereby increasing levels of social engagement.

Student Faculty Interaction

Student and faculty interactions are another aspect of social engagement. This construct is concerned and its corresponding NSSE measure addresses the level to which students interact with faculty. Respondents are asked to report the frequency in which they engage in several types of interactions with faculty including discussing grades, discussing career plans, discussing ideas outside of class, getting feedback from faculty, and working with faculty on extra and/or co-curricular activities

Supportive Campus Environment

The rationale of this aspect of engagement is that campus environments that are supportive increase levels of satisfaction and the quality of relationships that students form in college. The measures used in this benchmark include ratings on how much a campus emphasizes: providing academic and non-academic support and the quality of relationships students develop with other students, faculty, and administrators. In a recent study this NSSE benchmark, support campus environment was found to be predictive of first year to second year retention (Gordon et al., 2008).

Despite a wealth of research on student engagement, several scholars have identified areas of further investigation. Axelson & Flick identified the need to determine “the precise relationships among the various types of engagement” (2010, p. 43). Additionally, little is known about differences in the relationships between engagement variables by potential moderators such as class level (Axelson & Flick, 2010), gender, major, and transfer status.

CHAPTER II

The Value of Sense of Community in Learning Communities

Introduction

Student retention and persistence have long been a priority for colleges and universities (Kuh et al., 2010; Tinto, 2006). In fact, one of the prominent features of the reauthorization of the Higher Education Act currently under consideration by the US House of Representatives is a renewed emphasis on student persistence and completion (American Council on Education, 2013). In response, institutions will need to become more accountable for these measures and subsequently so will the academic units which administer retention and persistence programs—including natural resources departments and colleges. Making improvements in retention and persistence will be challenging, as no single program or initiative can be expected to produce dramatic improvements in these areas. Thus, a logical first step in improving student retention and persistence is a critical examination of existing programs designed to achieve these outcomes.

The Warner College of Natural Resources (WCNR) at Colorado State University has purposefully implemented a variety of programs which emphasize social factors such as a sense of community to promote student success a variety of student outcomes including promoting a sense of community and increasing student persistence. One such program is a residential learning community called “live green”. Live green and several other residential freshman learning communities (RFLC) at Colorado State University boast higher retention rates (first year to second year) for students who participate in these programs compared to students who do not participate. Additionally, learning communities at this institution are credited with promoting a sense of community, although this outcome had not been formally measured within

learning communities at this institution prior to this study. It is largely assumed that the learning community environment promotes a sense of community which subsequently contributes to learning communities' effectiveness in retaining students, but this relationship has not been verified at this institution or in any empirical study. Therefore, the primary purpose of this study was to determine the value of the sense of community created by learning communities in influencing student persistence.

Theoretical Framework

Research has shown that students are most likely to leave during their first year of college, making social integration and peer interactions especially important early in the academic experience (Tinto, 1997). These findings have resulted in the creation of programs designed to retain first year students, including freshmen year learning communities. One of the more popular formats of learning communities are residential freshmen year learning communities (RFLC). A RFLC can be loosely defined as a blending of residential and academic experiences. Typically, 30-40 students share a dormitory floor and a common curriculum of one or more classes including major and general education courses.

Learning communities are designed using college student development and retention theory to socialize, integrate, and subsequently retain students (Williams, 2000). They are some of the most popular types of first year programs due in part to a wealth of research demonstrating strong relationships between learning community participation and a wide range of student outcomes including retention (Baker & Pomerantz, 2000/2001; Hotchkiss, Johnson, 2000/2001; Moore, & Pitts, 2003; Tinto, 2000; Soldner, Lee, & Duby, 1999/2000), student engagement (Zhao & Kuh, 2004), cognitive ability (Lindblad, 2000; Stefanou & Salisbury-Glennon, 2001; Walker, 2003) long term academic and social success (Ward & Commander, 2011), and sense of

community (Jafee et al., 2008). However, the authors of a recent study assessing learning community effectiveness explain that “it remains difficult to determine if the outcomes are truly a value added by the environment or if they are a result of the characteristics that the students bring into these environments” (Wawrzynski & Jessup-Anger, 2010, p. 201). In addition to the lack of clarity surrounding the issue of self-selection, there remains a gap in the literature that addresses the extent to which student outcomes associated with learning community participation, such as retention rates, can be attributed to social factors. It is well established in student development and retention literature that social factors (peer and faculty interactions, social involvement, and social integration) are highly related to persistence (Astin, 1993; Kuh et al., 2008; Tinto, 1993). Research on these topics has identified the peer group as the “single most powerful source of influence” on undergraduate students’ personal and academic development (Astin, 1993, p. 7).

Similarly, several studies utilizing Tinto’s student integration model (Tinto, 1993) have demonstrated the strong influence of social integration on student departure decisions (Berger, 1997; Braxton et al., 1997; Braxton 2000). Social integration represents the extent to which students identify themselves with the social environment, and is often measured in terms of interactions with peers and faculty. In Tinto’s (1993) student integration model, social integration is hypothesized to affect a mediating variable (institutional commitment) which subsequently influence departure decisions. This process has been empirically confirmed (Braxton et al., 1997); however, as indicated above, other research has shown a direct link between social integration and persistence (Berger, 1997, Braxton et al., 1997). These inconsistent results may be due in part to the vague nature of this construct, the differing ways in which social integration has often been operationalized, and the variety of factors that influence

social integration. Several higher education studies have implicitly or explicitly tested “sense of community” as a source of social integration and examined its influence on a range of outcomes (Berger, 1997; Jacobs & Archie, 2008; Jafee et al., 2008; Lounsbury & DeNuie, 1995; McCarthy et al., 1990; Pretty, 1990; Rovai & Jordan, 2004).

Sense of Community

Sense of community (SOC), or psychological sense of community as it is known in the community psychology discipline, stems from human needs theories, the basic idea of which is that “outcomes are valued by an individual to the extent that they satisfy the physiological or psychological needs of the individual, or to the extent that they lead to other outcomes that satisfy such needs or are expected by the individual to do so” (Minor, 2006, p. 76). Nowell and Boyd contend that the needs based logic underlying the SOC construct assumes that the community is a resource through which individual physiological and psychological needs are met (2010). They argue that since this concept is needs based, then the corresponding measures of SOC reflect the level to which this need is met.

SOC has been defined as “a feeling that members have of belonging, a feeling that members matter to one another and to the group, and a shared faith that members’ needs will be met through their commitment to be together” (McMilan & Chavis, 1986). These authors identified the following four components of sense of community as central to this definition:

1. Membership: a feeling of belonging or of sharing a sense of personal relatedness;
2. Influence: a sense of mattering, of making a difference to a group and of the group mattering to its members;
3. Integration and fulfillment of needs: a feeling that member’s needs will be met by the resources received through their membership in the group;

4. Shared emotional connection: the commitment and belief that members have shared and will share history, common places, time together and similar experiences.

SOC is a commonly used phrase in higher education. It is used both formally and informally as a goal or outcome for a variety of student programs and activities. Though there have been few empirical studies of SOC in higher education, there is general consensus that a sense of community is beneficial and contributes to the success of both individuals and institutions (Astin, 1985, Davis & Daugherty, 1992; Kuh, 1991), and prior work has yielded some important findings.

The majority of SOC research in higher education settings has focused on residence halls. A 1990 study showed sense of community was positively associated with the social climate of the residential unit (Pretty, 1990), and another study conducted the same year showed students who reported low sense of community were more likely to experience physical and emotional exhaustion than students who reported a higher sense of community (McCarthy et al., 1990). The McCarthy study also demonstrated that SOC was an important factor in helping undergraduate students to adjust to and cope with college life (McCarthy et al., 1990). A few years later, Lounsbury and DeNuie (1995) found that students who live on campus have a higher SOC than students who live off campus, and that student characteristics, institutional characteristics, and campus experiences all affected students' on campus sense of community. Berger (1997) examined SOC in residence halls and found a direct positive link between sense of community, social integration and retention. By incorporating Tinto's student integration model, this study found that sense of community positively influenced social integration which subsequently positively influenced students' intent to return to the institution (Berger, 1997). Going beyond the study of residence halls in general, residential learning communities have been shown to

facilitate a sense of community (Jafee et al., 2008). In this study, students who participated in a learning community had higher levels of sense of community than student who did not participate in a learning community.

Measurement of Sense of Community

In higher education contexts, sense of community has been measured in several ways. Some studies have utilized a single item indicator (e.g. Jaffe et al., 2008) while others have employed a multiple item instrument called the sense of community index (SCI) which was adapted from the field of community psychology (Berger, 1997). Berger's study utilized the SCI and employed an exploratory factor analysis because the SCI factor structure has shown to be highly contextual and the four original theorized components of SOC identified above have rarely been confirmed in empirical studies (both inside and outside of higher education contexts) (Tagg et al., 2010). Additionally, Berger's study examined sense of community as a source of social integration and found positive relationships between sense of community factors and three variables in the Tinto model: social integration, institutional commitment, and intent to persist. However, a careful inspection of the SCI reveals that several items in the index are arguably reflective of "social integration" and "institutional commitment" in the student integration model (Tinto, 1993) and should be operationalized as such. For example, several SCI items address relationships between individuals and their peers which is reflective of social integration, and other SCI items probe relationships between an individual and the institution, which is reflective of institutional commitment. Therefore, this study operationalized two sense of community factors as variables in the student integration model (social integration and institutional commitment) in order to test a more parsimonious version of this framework.

In summary, learning communities have been shown to facilitate a sense of community (Jafee et al., 2008) and they have been shown to be effective in increasing retention rates (Baker & Pomerantz, 2000/2001; Hotchkiss, Johnson, 2000/2001; Moore, & Pitts, 2003; Tinto, 2000; Soldner, Lee, & Duby, 1999/2000). However, it is unclear whether learning communities' ability to foster a sense of community accounts for their effectiveness in retaining students. To address this gap in the literature, this study uses the student integration framework to study the relationship between sense of community and student persistence (Tinto, 1993). Despite a lack of strong empirical support of various aspects of the student integration model, this framework is still widely used in current studies of student retention (Dunn et al., 2013; Gross et al., 2013). Thus, this framework was selected so that the results of this study can contribute to the wider body of work which has used the student integration model.

This study used comparative samples of freshman students; a sample of residential learning community participants and a sample of residential students who did not participate in a learning community to address the following research questions:

1. Do students who participate in learning communities have higher levels of sense of community for both students who intend and do not intend to persist?
2. Is sense of community equally predictive of students' intent to persist for RFLC participants and non-participants?
3. Do sense of community factors function similarly to the variables "social integration" and "institutional commitment" in the Student Integration Model (Tinto, 1986)?

H₂: Sense of community can predict a students' intent to return to the institution.

H₃: Students who participate in a learning community will have higher levels of sense of community than students who do not participate in a learning community.

H₄: Does sense of community on retention will differ by learning community participation.

Methodology

Approximately 10% (roughly 30 students) of first year students the Warner College of Natural Resources at Colorado State University have the opportunity to participate the college specific learning community. In order to study the effects of these learning communities using quantitative methods, this study used a sample composed of students who participated in learning communities from a variety of disciplines to maximize statistical power.

Because the primary purpose of this study was to determine to what extent learning communities effectiveness can be attributed to sense of community, it was beneficial to include a comparison group to examine differences between sense of community and persistence based on learning community participation. The comparison group used in this study included first year students who lived on campus, but did not participate in a residential learning community.

Sample

The sample was drawn from the population of first-time, full-time, first-year students, living in on-campus residence halls at a large, public, research-extensive, predominantly white institution located in the Rocky Mountain region.

This study was conducted using a web-based survey near the end of the fall 2010 semester. An email invitation was sent out to approximately 1500 students participating in a RFLC and 1500 living in campus dormitories but not participating in an RFLC. Accounting for non-delivered emails, the email invitation was successfully sent to 2762 students. 478 students responded to the email, resulting in response rate of 17% which is what can be expected of an online survey of this size launched after the year 2000 (Sheehan 2001). We received responses

from 188 RFLC participants and 157 non-participants. 171 (91%) RFLC participants planned to persist and 17(9%) indicated they intended to leave the institution. 137 (87%) non-participant students planned to persist and 20 (13%) indicated they would not persist.

Variables Measured

As previously mentioned, SOC has been measured in a variety of ways, the two most common of which are one item indicators and the sense of community index (SCI). Owing to its proven reliability (REFS) and due to the multifaceted nature of this construct, we chose to use the SCI. The version of the SCI used for this study was adapted from the original SCI (McMillan & Chavis, 1986). The original version of the SCI that dealt with neighbors and neighborhood blocks was modified by changing the context of the questionnaire from a neighborhood block to a college campus. All of the items in the index were worded to measure an institutional level of sense of community, rather than sense of community within their specific place of residence. 12 items measuring sense of community were included in this study and are shown in Appendix A. Responses were coded on a five-point Likert scale (1 = strongly disagree, 5 = strongly agree). One question asked students' intent to return to the institution for the next academic year (yes or no). Respondents who indicated that they would not return were asked to provide an open-ended response to addressing why they did not intend to persist.

Several student background characteristics known to influence persistence decisions were measured: gender, ethnicity, financial aid assistance, and parent education level (Kuh et al., 2006; Tinto, 1993).

Data Analysis

In this study, data analysis was conducted in two phases. The first phase was focused on the measurement of sense of community in the context of this study and to accurately

operationalize sense of community factors as variables in the theoretical framework (student integration model) utilized in this study. The second analysis phase was focused on determining to what extent sense of community could explain the effectiveness of learning communities and how sense of community factors were able to represent variables in the student integration model. Due to the high variability of the factor structure of the SCI, this study utilized exploratory factor analysis which allowed for the possibility of factor structure that may be unique to this context of this study. Next several confirmatory factor analyses were conducted to determine the factor structure best suited for the sample: a one factor sense of community model, a three factor model used in a similar context (Berger, 1997), a four factor model reflective of the original SOC framework and (McMillan and Chavis 1986, Peterson et al.'s 2008), and two factor model developed using exploratory factor analysis. The factor structure that showed the best fit to the data was used in the second phase of data analysis.

The second phase of data analysis concerned the central purpose of this study, which was to determine the extent to which learning communities effectiveness in student persistence can be explained by sense of community. This phase of the analysis included comparisons between the learning community sample and the non-learning community sample and included the following comparisons: mean sense of community scores, mean sense of community subscales (as determined in phase one), logistic regression coefficients and explained variance, multi-group structural equation model regression coefficients and explained variance.

To determine if students perceptions' of sense of community differed by learning community participation, means of sense of community scores by learning community participation were compared using ANOVA. ANOVAs were conducted for the total sense of community index, and subscales found in the factor analyses in phase one. Two additional

ANOVA were conducted to determine if sense of community scores differed by learning community participation and intent to persist.

Next, logistic regression analyses were conducted for separately for the RFLC participant sample and the non-participant sample to determine the relationships between sense of community and intent to persist differed by learning community participation. Conducting these analyses separately by RFLC participation allowed for comparisons of the effect sense of community on students' intent to persist for both groups and the amount of variability in intent to persist that could be explained by sense of community. Both logistic regression models included sense of community factors from the best fitting model found in the CFA comparison, as well as several student background characteristics as independent variables.

A multi-group structural equation model tested for differences by RFLC participation in the relationships between the "peer" and "institution" dimensions of SOC and persistence as they relate to hypothesized relationships in the student integration model (Tinto, 1993). In order to make valid and meaningful comparisons of regression coefficients between groups, measurement invariance of latent variables must be tested (social integration and institutional commitment). Measurement invariance was tested using a multiple group confirmatory factor analysis to determine if the measured latent variable were equivalent across groups as outlined by Chen et al. (2005).

Finally, a structural model comparison of RFLC participants and non-participants was conducted. In fitting the structural model, the assumption of maximum likelihood estimation that all of our variables in the model are continuous was violated- the dependent variable (intent to persist) was a dichotomous variable. It is not uncommon for this assumption to be violated in research which has utilized SEM (Byrne, 2004), however following the advice of Byrne

Bayesian estimation was used to confirm the results of maximum likelihood estimation. In AMOS, maximum likelihood estimates produce more model fit statistics than Bayesian estimation, and allow us to conduct pairwise comparisons of regression coefficients between groups. Therefore, both estimation techniques were utilized to increase the interpretability and validity of the results.

Qualitative Methods

To help determine the extent to which sense of community contributed to the learning communities effectiveness in retaining students, respondents were asked to provide an qualitative open-ended response if they did not plan to persist. Of the respondents who indicated they did not plan to persist, 34 of 37 (92%) provided a qualitative open-ended response. Open-ended responses were classified into several broad categories using thematic coding.

Results

Factor Structure of Sense of Community Index

The first phase of analysis was necessary to accurately operationalize sense of community factors as variables in the theoretical framework (student integration model) utilized in this study. An exploratory factor analysis of the sense of community index resulted in a two factor solution. Two items were removed from each factor to improve reliability and to make the emergent sense of community factors conceptually congruent with the concepts of “institutional commitment” and “social integration” in the student integration model (Tinto, 1993). The factor that represented social integration contained four items concerning the relationship between the individual and peers ($\alpha = .80$). The factor that represented institutional commitment contained three items that addressed relationships between an individual student and the institution ($\alpha = .89$). Specific scale items can be found in appendix A.

The exploratory two factor solution was then compared against three other factor structures: a one factor sense of community model, a three factor model used in a similar context (Berger, 1997), a four factor model reflective of the original SOC framework (McMillan and Chavis, 1986; Peterson et al.'s 2008). As shown in table 2.1, the two factor solution was the best fitting model. All other models fit these data poorly as indicated by “goodness of fit” statistics. Our subsequent analyses utilized this two factor structure of sense of community as measures of social integration and institutional commitment and determine how they relate to persistence as specified in Tinto’s student integration model.

Table 2.1
Confirmatory Factor Analysis Model Comparison of Sense of Community Factor Structure

<i>Model</i>	χ^2	<i>df</i>	CFI	RMSEA
One factor sense of community	104.38	15	.83	.18
Two factor sense of community	42.43	11	.98	.07
Three factor sense of community	109.12	41	.91	.09
Four factor sense of community	371.21	38	.81	.15

Differences in Sense of Community by Learning Community Participation

Literature has suggested that students who participate in learning communities have higher reported sense of community than those who do not (Jafee, et al., 2008). A one way ANOVA was conducted to see whether this sample would show a similar result (table 2.2). This test showed no statistically significant differences for participants and non-participants.

Table 2.2
ANOVA of Sense of Community Scores by Learning Community Participation

	Participant	Non-participant	<i>F</i>	<i>p</i>	<i>Eta</i>
Total sense of community index	3.89	3.80	2.6	.11	.09
Peer subscale	3.87	3.79	1.6	.21	.07
Institution subscale	4.15	3.99	3.2	.08	.10

Note: Variables coded on a five point scale (1= strongly disagree-5= strongly agree)

A second one way ANOVA was used to determine differences in mean sense of community scores between learning community participants and non-participants based on their

intent to persist (table 2.3). Mean learning community scores were the same regardless of RFLC participation for students who intended to stay at the institution. However, RFLC participants who did not intend to persist had significantly higher mean sense of community scores than non-participants who did not intend to persist.

Table 2.3

ANOVA of Sense of Community Scores by Learning Community Participation

Persistence intent	Participant	Non-participant	<i>F</i>	<i>p</i>	<i>Eta</i>
Intend to persist	3.98	3.98	.002	.966	.00
Intend not to persist	3.47	2.75	9.84	.003	.47

Note: Variables coded on a five point scale (1= strongly disagree-5= strongly agree)

Effect of Sense of Community on Intent to Persist by Learning Community Participation

In order to assess the extent to which learning communities effectiveness in retaining students could be explained sense of community (SOC), we compared logistic regressions for the RFLC sample and the non-RFLC sample (Table 2.4). Several student background characteristics (gender, ethnicity, financial aid status, and parental education) were controlled for in the analysis, however none of the student background variables were statistically significant. The institution factor was a statistically significant predictor of persistence intent for both RFLC participants and non-participants; but the effect was considerably stronger for non-participants than RFLC participants. Interestingly, the peer factor was not statically significant regardless of RFLC participation. The RFLC participant logistic model explained only 27% of the variance for persistence intent, while the non-participant logistic explained 70% of the variance for persistence intent.

Table 2.4
Logistic Regression Analysis of Student Persistence Intent.

Predictor	β	SE β	Wald's χ^2	df	p	e^β
RFLC						
Peer	-1.20	.71	2.83	1	.093	.302
Institution	1.69	.42	16.30	1	.000	5.43
Gender	.50	.59	.73	1	.394	1.65
Ethnicity	-.30	.26	1.33	1	.249	.74
Financial aid	.18	.45	.16	1	.692	1.19
Parent education level	-.04	.61	.01	1	.944	.96
Constant	.96	2.81	.12	1	.732	2.61
Non Learning Community						
Peer	-.29	.98	0.89	1	.766	.75
Institution	2.91	.72	16.20	1	.000	18.32
Gender	-.19	.85	.050	1	.823	.83
Ethnicity	.55	.32	3.00	1	.083	1.73
Financial aid	.41	.62	.43	1	.510	1.50
Parent education level	.50	.93	.29	1	.593	1.65
Constant	-1.21	4.35	6.65	1	.010	.00
Goodness-of-fit test			χ^2	df	p	
Hosmer & Lemeshow			5.49*, 2.88**	8	.704*.941**	
Explained Variance			Nagelkerke			
			R^2			
						.27*.70**

Note: *= learning community **= non learning community

Logistic Regression classification tables (table 2.5) show that SOC factors were effective predictors of persistence for non-participants and a poor predictor of persistence intent for RFLC participants. The logistic model correctly predicted persistence intent of 80% of RFLC participants and 90% of non-participants. However, for students who did not intend to persist, the model functioned very differently based on RFLC participation. This model was ineffective in identifying (65%) RFLC participants who did not intend to persist and proved very effective (95%) for non-participants who did not intend to persist. These results indicate that RFLC participants' intent to persist was weakly associated with SOC and that intent to persistence is

strongly related to SOC for non-participants.

Table 2.5
Logistic Regression Classification of Persistence Intent

Observed	Predicted		% Correct
	Persist	Not Persist	
RFLC			
Persist	140	31	82
Not Persist	6	11	65
Overall			80
Non-learning Community			
Persist	122	15	89
Not Persist	1	19	95
Overall			90

A structural equation model was used to further analyze the relationships between learning community participation, sense of community and persistence. More specifically, this aspect of our analysis explored whether social integration and institutional commitment (as reflected by sense of community factors peer and institution respectively) functioned as hypothesized by the student integration model (Tinto, 1993). Tinto’s model specifies that the relationship between social integration and persistence intent is fully mediated by institutional commitment. However, several studies have found social integration to have a direct relationship with persistence (Berger, 1997; Braxton et al, 1997). For this study a model which specified a direct and indirect relationship between social integration and persistence intent was used to determine the extent to which institutional commitment mediates this relationship.

Bootstrapping was used to calculate 95% confidence intervals of the indirect effects of social integration on persistence. The results of this analysis confirmed the results of the logistic regressions and showed a non-significant direct effect of social integration on persistence intent, and a statistically significant indirect effect of social integration on persistence intent for both RFLC participants ($\beta = .24, p \leq .001$) and non-participants ($\beta = .48, p \leq .001$). These results

indicated that institutional commitment fully mediated the relationship between social integration and persistence intent for our sample.

As shown in table 2.6, results indicated “strong” (factor loadings and intercepts invariant) measurement invariance which allowed for comparisons of the regression coefficients of the RFLC participant and non-participant models. Aside from a statically significant chi square statistic ($\chi^2 = 110.37$ (df) = 35 $p < .001$), all other goodness of fit statistics were acceptable (CFI= .96, RMSEA= .08). Chi square significance testing is sensitive to sample size and is there is general agreement that other fit indices are more appropriate for smaller sample sizes (Hu & Bentler, 1999).

Table 2.6
Measurement Invariance Testing of Learning Community Participation Samples

<i>Model</i>	χ^2	<i>df</i>	<i>CFI</i>	<i>RMSEA</i>	<i>Model Comparison</i>	$\Delta\chi^2$	Δdf	ΔCFI	$\Delta RMSEA$
Model 1- Configural invariance	62.53	22	.968	.073					
Model 2- Weak invariance Factor loadings invariant	67.31	27	.968	.066	model 1 vs. model 2	4.85	5	.000	.007
Model 3- Strong invariance Factor loadings and intercepts invariant	78.17	30	.961	.068	model 2 vs. model 3	15.65	8	.007	.002
Model 4- Strict invariance Factor loadings, intercepts, residuals invariant	103.68	39	.948	.069	model 3 vs. model 4	41.16*	17	.013	.001

Regardless of RFLC participation, the relationship between social integration and persistence intent was fully mediated by institutional commitment. There was a significant difference in the relationship between institutional commitment and intent to persist. The relationship between institutional commitment and intent to persist was significantly ($z= 2. p < .01$) stronger for non-participants than RFLC participants. Additionally, the model explained 11% of the variability in persistence intent for RFLC participants and 36% of the variability in

persistence intent for non-participants. These results compliment the logistic regression by showing that institutional commitment is more strongly related to persistence for non-participants than RFLC participants. Having violated an assumption of maximum likelihood estimation by using a dichotomous dependent variable in the structural model, the model was tested using Bayesian estimation. As shown in table 2.7, the results obtained through Bayesian estimation were nearly identical to the results obtained through maximum likelihood estimation.

Table 2.7
Multi-group Comparison of SEM Coefficients

Predictor	SE β	β	<i>p</i>	Bayesian β
RFLC				
Peer-Persistence	-.19	-.14	.068	-.14
Institution- Persistence	.41	.18*	<.001	.18
Peer-Institution	.59	.94	<.001	.95
Non Learning Community				
Peer-Persistence	-.07	-.04	.576	-.05
Institution- Persistence	.65	.28*	<.001	.28
Peer-Institution	.74	1.08	<.001	1.11

*= coefficients differ at $p \leq .01$

Qualitative Findings

To help determine the extent to which sense of community contributed to the learning communities effectiveness in retaining students, respondents were asked to provide an qualitative open-ended response if they did not plan to persist. Of the respondents who indicated they did not plan to persist, 34 of 37 (92%) provided a qualitative open-ended response. An analysis of these responses revealed that roughly two thirds of the responses fit two dominant themes (economic & social), with the remaining responses represented a mixture of themes not related to social or economic factors with no theme being more dominant than another. As shown in figure 2.1, students who did not plan to persist and did not participate in a learning community reported

leaving for social reasons at a greater rate than RFLC participants. Additionally, non-participants did not plan to persist due to social reasons more than for any other reason. Of the RFLC participants who reported that they would not persist, the highest proportion was due to economic factors, followed by a nearly equal proportion of respondents who did not plan to persist because of social or other factors. Some examples of responses from students who did not intend to persist for economic reasons included: “I might not be able to afford it” and “Looking at my options for financial purposes”. There were several illustrative examples from student who did not plan to persist for social reasons: “I have had nothing but horrible experiences with dorm life. Girls here are still acting like they are in middle school with ridiculous drama and antics. I hate it and I hate CSU.” and “I want to be closer to friends and family”, and “I have not felt at home one bit at CSU”.

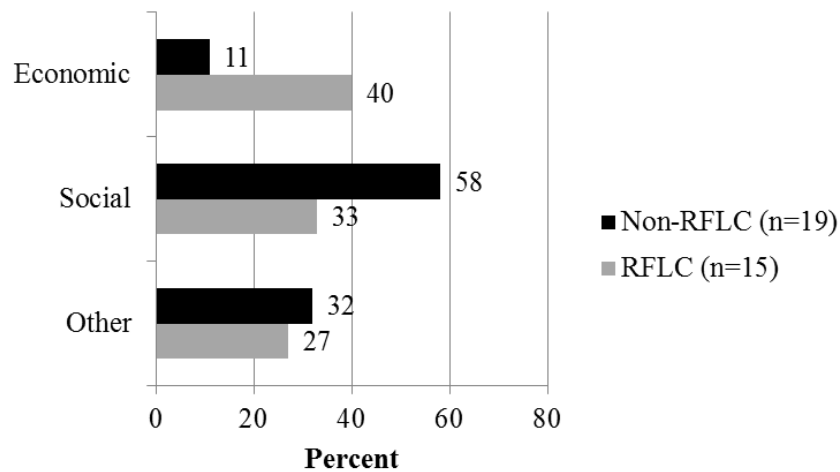


Figure 2.1. Qualitative Themes of Open-ended Responses Related to Reasons Why Respondents Did Not Plan to Persist by Learning Community Participation

Discussion

The purpose of this study was to determine the value of the sense of community created by learning communities in influencing student persistence. This determination was made by

conducting a series of comparative analyses between a learning community sample and a non-learning community sample. The sum of these results indicated that sense of community had value in student persistence, and that learning communities seem to be more effective than traditional learning and living environments in student persistence. This conclusion was based on two results; a comparison of mean sense of community scores by learning community participation and intent to persist, and a comparison of the effect of SOC on persistence by learning community participation. It was expected that RFLC participants would exhibit higher levels of sense of community than non-participants and that the relationships between sense of community and persistence would be stronger for non-participants and weaker for RFLC participants. These relationships may seem counter-intuitive without consideration of the needs based logic of SOC theory and its corresponding measurement (Nowell & Boyd 2010). Applying this needs based logic of SOC theory to this study, it was expected that the greater the extent to which sense of community needs are met, the less influential these needs should be in influencing an individual's decision to leave an institution. RFLC participants were expected to exhibit higher levels of SOC than non-participants and thus, SOC should have less of an influence on persistence decisions for RFLC participants.

Prior work has shown that learning community participants had higher levels of sense of community than non-participants (Jafee et al., 2008). In the aggregate, the results of this study showed no differences in mean SCI scores based on RFLC participation. However, a comparison of mean sense of community by intent to persist showed that of students who did not intend to persist, RFLC participants had significantly higher levels of sense of community than non-participants. These results suggest that non-participants may intend to leave as a result of not

having their SOC needs fully met, while it appeared that RFLC participants had their SOC needs adequately met, and therefore plan to leave for other reasons.

More specifically, the results of the comparative logistic regressions revealed a weak relationship between SOC and persistence for RFLC participants and a strong relationship for non-participants. We reasoned that if SOC needs were met, then SOC would be weakly related to persistence intent. For RFLC participants we found higher variability, less effective predictive ability, and weaker effects of SOC on persistence intent than non-participants. These results indicate that RFLC participants' persistence intent was poorly explained by sense of community and non-participants persistence intent was well explained by sense of community. Collectively, these findings indicate that SOC is a weak factor in persistence intent for RFLC, presumably because this need has been more fully satisfied for RFLC participants than non-participants. This is congruent with human needs theory, upon which sense of community is based, which asserts that when basic physiological and psychological (including social) needs are satisfied, motivation and behavior are influenced by higher order needs (Maslow, 1946).

The qualitative findings support the quantitative findings that sense of community needs were more fully met for RFLC participants than for non-participants. Responses from RLFC participants indicate that they are leaving for different reasons than their non-participant counterparts. Non-RFLC participants did not plan to persist for social reasons more than for any other reason. These results confirmed that learning communities' ability to promote sense of community has value in student persistence.

This study demonstrated the appropriate factor structure of the SCI for the context of first time, first year students who lived in on campus housing at a predominantly white, research-extensive, four-year institution. The exploratory factor analysis identified two unique factors of

sense of community that aligned with two key components of Tinto's student integration model (1993). The peer interaction factor of sense of community aligned well with social integration, and the institution factor aligned well with institutional commitment in the Tinto model.

Additionally, this study demonstrated how the concept of sense of community aligned with student retention theory. In both the logistic and structural models, the institution factor of sense of community was found to be a strong predictor of persistence and the peer factor was found to be a weak and statistically non-significant predictor of persistence. This finding supports Tinto's model (1993) which specified a direct link between institutional commitment and persistence. Structural equation modeling showed that the relationship between social integration and persistence was fully mediated by institutional commitments as Tinto hypothesized. These findings were not consistent with previous work which found direct links between social integration and persistence (Berger, 1997; Braxton et al., 1997). These inconsistent findings highlight the need to be cautious in the operationalization of social integration and other variables in the Tinto framework. For example, if a single item measure of sense of community had been used, or a single factor version of the index as a measure of social integration, the results of this study could have easily misrepresented variables in the Tinto model by testing measures assumed to reflect social integration, when they were actually more reflective of institutional commitment.

Limitations

Perhaps the most significant limitation of this study is the uncertainty in whether the value provided by learning communities is a result of the learning community environment itself or if the value comes from the students who self-select to participate in these programs. It is certainly plausible, that self-selection has some impact on learning community outcomes, but this

and other studies have not controlled for this possibility. For example, learning communities at the institution studied are competitive based on high school GPA and academic majors (which are also based on high school GPA). Learning community participants may start with a higher level of commitment to the institution than non- participants. Thus, care must be taken in applying causality to the relationships observed between sense of community and persistence based on learning community participation alone.

This study was also limited in its ability to attribute effectiveness of learning communities to specific environmental experiences and factors. This study used a sample composed of students from a variety of learning communities who had different majors, lived in different dormitories, and had varying classroom experiences. RFLCs also differed in terms of physical environments and resources. For example, some RFLCs have diverse physical environments including integrated classrooms and live-in faculty while others are located in traditional dormitories without a live in faculty member. Previous research has shown that the physical environments of learning communities are influential in fostering a variety of student outcomes (Wawrzynski & Jessup-Anger, 2010), and the physical aspects of the learning communities included in this study were not accounted for in the analysis. It is likely that student experiences differ for each RFLC, and that the relationships explored in this study may have differed based on individual RLFCs. However, due to small sample sizes within individual learning communities, there were no valid quantitative means to explore these potential differences.

This study was also limited by the measurement of variables. This study measured students' intent to persist rather than actual persistence, thus this measure may not accurately reflect which students persisted and those who did not. Additionally, the degree to which sense

of community factors reflected the complexity of variables in the student integration model is questionable. In this study, “social integration” was operationalized by the sense of community factor “peer” which was limited to measures of students’ perceptions of sense of community related to peer interactions. However, the student integration model and related studies include measures of faculty interactions as a component of social integration, which was not accounted for here.

Because this study was conducted near the end of students first semester, it is not known whether non-participants become socially integrated to the same degree as RFLC participants by the end of their freshman year. According to recent work, non-learning community participants may have these needs equally met, but the process may take longer (Smith, 2011). Lastly, the results of this study may not be generalizable to institutions with less homogenous and more diverse student backgrounds.

Implications & Future Research

The needs based theory used in this study has some interesting implications for college student retention practice. Of practical importance, this study showed that learning communities are effective in promoting a SOC and that learning communities’ effectiveness in student persistence is in part due to their ability to meet students’ SOC needs. The Warner College of Natural Resources and other learning community sponsors at this institution should continue to emphasize SOC in their programs and researchers should examine aspects of learning community participation that are most effective in promoting a sense of community.

While this study demonstrated that RFLC students have their SOC needs met more fully than non-participants, many RFLC participants indicated that they would not persist despite having their SOC needs met. According to human needs theories (e.g. Maslow 1943) when basic

needs are satisfied, higher order needs become more influential in determining motivation, so long as the basic need continues to be met. Translated into retention theory, for students who are sufficiently socially integrated, higher order needs will influence persistence decisions to a greater degree than more basic needs such as SOC. Therefore practitioners should recognize the value of learning communities in fulfilling and maintaining sense of community needs, but need to be considerate of other factors driving persistence decisions after sense of community needs have been fulfilled.

Future work investigating which aspects (e.g. peer interactions, faculty interactions, classroom experience, residence hall experiences) of learning community participation contribute to meeting SOC needs is warranted. Designing and implementing large-scale learning community programs can be resource intensive, and understanding the specific aspects that make them successful in fostering SOC could allow institutions to duplicate only those that make the most efficient contributions. Further research is needed to examine the role of faculty interactions in influencing SOC. This relationship may be particularly important for learning communities where students spend significant amounts of time with specific faculty. Finally this study measured SOC at the institution level, but additional work examining SOC at various scales and contexts (e.g. specific learning communities, residence halls or floors, college level, majors, classrooms) could provide a more complete picture of specific environmental factors which contribute to the effectiveness of learning communities.

CHAPTER III

Sense of Community in Natural Resources Fieldwork

“Learning is not the product of teaching. Learning is the product of the activity of learners.” – John Holt

Learning doesn't take place in a vacuum and the classroom experience is affected by a number of factors including the setting and the cast of characters. Dewey was perhaps the first to emphasize the importance of social interaction in experiential learning (1916, 1966). He has also been credited as the first to apply the community concept to education (Solomon et al., 1997). Dewey argued that it was essential for schools to function as democratic communities allowing students to combine their individual skills and interests to experience the democratic process through collaborative activities enhancing their commitment to common goals (1966).

Studies of experiential learning have focused on the context of the learning experience, emphasizing "learning by doing and learning from doing within a specific social context with a support group, or set, which helps members to engage in reflection upon their practices" (Jarvis, 2006, p. 154). The inclusion of social interactions is especially evident in fieldwork in environmental disciplines which relies heavily on “hands on” small group work.

Fieldwork is a common form of experiential learning and is of particular interest to students studying natural resources and related disciplines because “students are often attracted to the field at least in part due to the potential to work outdoors” (Newman, Bruyere, Beh, 2007, p.57). Furthermore, it has been argued that in order to truly learn about the environment, one must go outside and experience it first-hand (Dillon et al., 2006). It has also been argued that fieldwork is valuable because it allows students to learn “real world content” and enables transformative and “deep” learning (Herrick, 2010; McGuinness & Simm, 2005), both of which

help make the knowledge and skills gained from fieldwork transferable to subsequent academic and professional work.

The Warner College of Natural Resources at Colorado State University utilizes fieldwork in a variety of academic programs. The oldest and most intensive of these programs is a summer course at Pingree Park. Most Warner College of Natural Resources students participate in this four week residentially based course located adjacent to Rocky Mountain National Park in the summer between their sophomore and junior year. In this summer camp like setting, there is a high level of interaction between students and their peers and staff during formal class time and during unstructured free time. While the effects of these intensive social interactions have not been formally measured in the Pingree Park fieldwork course, experiential education and fieldwork literature has demonstrated that social components are of pivotal importance. A recent study conducted by Jacobs and Archie (2008) showed a positive relationship between sense of community (SOC) and experiential learning and others have demonstrated links between social factors and outcomes such as engagement, academic and personal gains, and social integration and confidence (Alzona & Simon, 2011; Elkins & Elkins, 2007; Fuller et al., 2006).

While fieldwork literature has loosely described how social factors may influence outcomes, no study has attempted to explicitly describe or quantify the degree to which social factors, such as a sense of community, are responsible for these outcomes. This study helped to fill this gap in the literature by determining the extent to which sense of community influences student learning outcomes such as gains in knowledge and the transferability of the field work experience to future academic and professional work.

Literature Review

Fieldwork

Fieldwork can be defined as any component of the curriculum that involves leaving the classroom and learning through first-hand experience (Boyle et al., 2007). Fieldwork typically involves work in small groups with a large amount of social interaction between students and between students and staff. Fieldwork often includes a residential component with students and staff living at or near remote field sites. Therefore, field work requires much more social interaction than traditional classroom learning environments. A significant amount of literature on fieldwork has identified relationships between social factors and a range of outcomes. Algona and Simon (2011) identified small-group dynamics as a key factor which contributed to increased student interest and engagement in their discipline, and Goralnik (2011) found that social relationships fostered academic and personal gains in a field based environmental ethics course. Similarly, Boyle et al., found that a residentially based field course in environmental science “appears to be a powerful tool for social integration, boosting students’ confidence in working with their peers and developing skills that are transferable beyond the course (p. 315, 2007)”

Perhaps one of the more valuable outcomes associated with fieldwork courses is the transferability of knowledge and skills that will potentially help students in subsequent academic and professional work. This outcome has been attributed to the “real world” content and “deep” and “transformation learning” characteristic of fieldwork experiences (Boyle et al., 2007; Scott et al., 2012). The basic premises of these concepts are simple: hands-on work provides a deeper and more practical level of understanding and thus transforms students’ perceptions of the object of study. This outcome is not unique to fieldwork; other forms of experiential education have been

shown to produce knowledge and skills transferrable beyond the course. For example, undergraduate students in STEM disciplines who took part in research projects have reported increased confidence that the knowledge and skills gained through the experience would make them more successful both academically and professionally (Hunter et al., 2007). Researchers have developed an instrument designed in part to measure confidence in the degree to which knowledge and skills are transferable beyond the experience (IBID). An adapted version of this instrument was used in this study to measure this important outcome in the fieldwork context.

Experiential learning theory and studies of fieldwork have emphasized the importance of social factors in the learning process, but have not specifically addressed how they contribute to other outcomes. This gap in the literature is likely due in part to the varying conceptualizations of what constitutes social factors. One such way conceptualization of social factors is “sense of community” which has been shown to be positively associated with experiential learning (Jacobs & Archie, 2008).

Sense of Community

In higher education literature, it is well established that social factors affect a wide range of student outcomes including engagement, persistence and GPA, (Kuh, 2006). These relationships are so well established that social outcomes are often used as outcomes themselves. Social factors have been operationalized and measured in a variety of ways and studied in a variety of contexts. “Sense of community” is one such way of operationalizing and measuring social effects in higher education and has been found to be positively associated with experiential learning (Breunig et al., 2010; Jacobs & Archie, 2008).

Sense of community (SOC) has been defined as “a feeling that members have of belonging, a feeling that members matter to one another and to the group, and a shared faith that

members' needs will be met through their commitment to be together'' (McMillan & Chavis, 1986). The following four components of SOC have been identified as central to this definition: membership: a feeling of belonging or of sharing a sense of personal relatedness; influence: a sense of mattering, of making a difference to a group and of the group mattering to its members; integration and fulfillment of needs: a feeling that member's needs will be met by the resources received through their membership in the group; shared emotional connection: the commitment and belief that members have shared and will share history, common places, time together, and similar experiences(McMillan & Chavis, 1986).

Purpose

Prior studies of fieldwork have loosely described a relationship between social factors and outcomes such as knowledge and confidence, but little is known about the extent to which social factors are *account* for other outcomes. This distinction is important as understanding the drivers of measurable outcomes can provide insight valuable for both designing new and improving existing programs. Thus, the primary purpose of this study of college level fieldwork was to explicitly address and quantify how social factors (operationalized by sense of community) affect learning (reflected by knowledge) and the degree to which knowledge and skills are transferrable to future academic and professional work (reflected by confidence).

Beyond the primary purpose of understanding the effects of SOC on knowledge and personal gains, unforeseen circumstances allowed for a unique opportunity to investigate additional research questions. The High Park wildfire was detected on June 9th just before the start of the first session of the 2012 Pingree Park summer field course. The Pingree Park campus is located in a high valley of the Rocky Mountains (9,000 feet above sea level), approximately two hours drive west of the city of Fort Collins and is bordered by two National Forests and

Rocky Mountain National Park. The close proximity of the campus to the active area of the fire prompted school officials to require that the first section of the field course take place on the main campus in Fort Collins. Improved conditions later in the summer allowed the second session to take place as scheduled at the residential mountain campus. Thus, the sample analyzed here is comprised of participants from both the main campus based course and the course which took place at residential mountain campus. Students who participated in the CSU main campus based course were not required to stay on campus (although some did), while all of the Pingree Park based course participants shared cabins with classmates. Faculty and staff did their best to create a similar experience for those taking the course on the main campus by creating alternative fieldwork at sites comparable to those at Pingree Park.

While the basic research goal for this study remained the same, the wildfire allowed for additional investigations that would not otherwise be possible. The most unique opportunity was a comparison of two samples of students participating in the same curriculum, during the same summer, but under different formats. Comparison of these two groups provided an opportunity to examine differences in students' reported outcomes, and differences in the relationships between these outcomes based on where and how they took the course. More specifically, this study addressed the following research questions:

1. Is sense of community positively related to students' assessment of their learning and confidence in the transferability of their new knowledge and skills and do these relationships differ by course type (place based vs. non-place based)?
2. Do students who participated in the Pingree Park course have higher levels of sense of community, knowledge and confidence than students who participated in the CSU based course?

Methods

Sampling Approach

The sample consisted of students in a field based undergraduate natural resources measurements course at large, public, research-extensive, predominantly White institution located in the rocky mountain region. Approximately 100 undergraduate students with majors in forestry, natural resource management, rangeland ecology, watershed, ecosystem science and sustainability, and fish, wildlife, and conservation biology are required to attend a four-week summer session at Pingree Park, typically in the summer between their sophomore and junior years. A survey was included as part of the end of course evaluation given at the conclusion of the final exam on the last day of the course. The survey was voluntary, thus not all students completed the survey. A total of 87 usable surveys were collected for the first session course and 62 usable surveys for the second session course based at Pingree Park.

Variables Measured

Sense of Community: In the higher education context, sense of community has been measured in several ways. This concept has been operationalized and measured by original items developed by authors, often as a single item indicator (Jaffe, et al., 2008). This construct has also been measured by a valid and reliable instrument called the Sense of Community Index (SCI) which was adapted from the field of community psychology known as (Berger, 1997). This study used an adapted version of the 8 item brief sense of community index developed by Long and Perkins (2003). The original version of the SCI that dealt with neighbors and neighborhood blocks was modified by changing the context of the questionnaire from a neighborhood block to the summer session course (NR 220). All of the items in the index were worded to measure sense of

community within the course. Items are coded on a 5-point scale (1=strongly disagree, 5=strongly agree).

Knowledge: Five items measuring students perceptions of gains in knowledge related to five course objectives were measured on a 5-point scale (1=strongly disagree, 5= strongly agree).

Student assessment of learning gains (SALG): This study adapted items from a student assessment of learning gains instrument (Hunter et al., 2007). This self-assessment includes Likert type scale items that focus on students' gains from undergraduate research and was adapted for use in the present study. This instrument measures students' perceptions of how their experience translates into gains in the following areas:

- Conceptual knowledge and linkages in their field
- Deeper understanding of the intellectual and practical work of natural resource professionals
- Growth in confidence
- Career preparation
- Greater clarity in understanding what career or educational path students might wish to pursue.

Expectations: Seven items measured student's expectations and motivations. These were designed to measure students' level of interest and expectations in advance of the course.

Additionally, students' perceptions of importance and performance of 16 items related to their experience with the course were measured. Items were wide ranging, covering academic, social, and accommodation aspects. A complete version of the instrument can be found in Appendix B.

Data Analyses

The first step in data analysis was to determine the factor structure of the adapted versions of the brief sense of community index (SCI) used in this study. Confirmatory factor analysis was used to compare three possible factor structures of sense of community: a single factor solution, a three factor solution, and a three factor solution represented by a single higher order factor. The purpose of the model comparison was to determine which factor structure best suited our data and the context of our study.

We used AMOS 20 to conduct several CFA's of the SCI and used the best fitting model for our subsequent analyses.

The exploratory approach was used because the items included in this study did not include all items of the original SALG instrument due to the different context of this study. The SALG instrument was originally designed for use in undergraduate research STEM disciplines and adapted for use in the present study of undergraduate experiential education in natural resources and included several items specific to gains in knowledge directly related to the course.

A principal components exploratory factor analysis was conducted to determine to what extent SALG items could be represented as scale items. This was followed by reliability testing of scale items found in the exploratory factor analysis. Then the SALG derived scales and the sense of community index were tested in a confirmatory factor analysis using AMOS 21.

Structural Equation Modeling

Item means from composite scores were computed for each of constructs in the structural model and used ANOVA to descriptively compare means across the two samples. Using IBM SPSS 20, we conducted an ANOVA to compare composite means included in our model by gender, class level, transfer status, and department of all latent factors included in our model.

Second, the relationships between the variables included in the model were compared between samples. Structural equation modeling (SEM) was used to simultaneously examine the relationships between multi-dimensional constructs included in the model. We used the statistical package IBM AMOS 20 to perform SEM using maximum likelihood estimation. To examine differences in student outcomes by course type, we conducted multi-group comparisons. Multi-group comparisons involve two sequential steps. First measurement invariance must be established for each group comparison. If measurement invariance is established, then comparisons of regression coefficients can be made.

A primary purpose of this study was to test determine if the relationships between variables in our model were moderated course type. In order to make valid and meaningful comparisons of regression coefficients between groups, it must be ensured that latent variables are measured similarly regardless of course type. Measurement invariance (MI) involves testing the equivalence of measured constructs across groups. MI testing is a hierarchical process and must be done for each group comparison. In this study, we tested measurement invariance for a group comparison by course type. Measurement invariance was tested using a multiple group confirmatory factor analysis to determine if the measured latent variable were equivalent across groups. Tests of measurement invariance established that our latent variables including our second order latent variable social engagement are measured similarly within our group comparisons. Measurement invariance testing for second order latent variables was conducted as outlined by Chen et al. (2005).

Next, evidence of moderation by course type was tested by performing z-tests of regression coefficients between groups for each group comparison. Additionally, mediation was tested in all group comparisons using a mediation testing sequence for structural equation

modeling outlined by Iacobucci et al., (2007). Indirect effects were calculated using a bootstrapping technique in AMOS 20 with estimation based on 3000 samples for each multi-group analysis.

Focus Groups

Approximately 25% (n=26) of the students who participated in Pingree Park based fieldwork course provided qualitative responses during focus groups conducted on the second to last day of the course. This data was collected to compare to the quantitative survey data and to verify the hypothesized relationships presented in the results section of this study. The qualitative data was limited to students who participated in the Pingree Park based course only; students who participated in the CSU based course did not accept an offer to participate in a focus group.

Results

Descriptive findings

Means and standard deviations were computed for all course expectation, interest, and outcome items for both course types. On average and regardless of course type, students' neither agreed nor disagreed that they had a special interest in the course prior to participating. However, students agreed that they expected to be engaged in the course, to learn more in the field course than they would in traditional semester long classroom based course, to make new friends, and to be a more successful student after participating in the field course.

Regardless of course type, students reported gains in all outcome items. For CSU course participants, the highest gains were related to persistence (within college & major), while Pingree Park participants reported the largest gains in their connection with other students and in both persistence related outcomes (college & major). Regardless of course type, participants reported the lowest gains an item related to gains in critical thinking skills and the scientific

method. Critical thinking skills and the scientific method were not specifically emphasized in either course, thus the fact that respondents from both groups rated the lowest gain in this area signals that the adapted version of the SALG instrument is a valid measure. Although the gains in all but three other outcomes were nearly equal across both course types, including a “control” item which was not an emphasized element of either course type provides evidence of the validity of the instrument. Had this non-emphasized element showed similar levels as other elements which were emphasized, then the validity of the instrument could be considered questionable.

An ANOVA was conducted to determine differences in student interests & expectations and outcomes by course location. As shown in table 5.1, there were statistically significant differences in two interest items and in one outcome item based on course type. Generally, students who participated in the CSU based course indicated that they neither agreed nor disagreed that one of their reasons for choosing to study in the college of natural resources was to participate in the field course, while Pingree Park based students generally disagreed that the field course influenced their decision to study in the natural resources college. However, this difference was shown to have a minimal effective size and has no practical significance- regardless of course type, interest in the field course did not dictate students’ course of study. Students who participated in the CSU based course reported agreed more strongly than Pingree Park based students that they “heard good things” about the field course. This result is not surprising given that the Pingree Park participants most recent feedback came from CSU based course participants who did not get the opportunity to study at Pingree Park due to the High Park wildfire. The only statistically significant differences in outcome variables between course type concerned participants’ social connections with other students. Pingree Park reported their

connection with other students as the largest gain, while for participants in the CSU based course reported their connection with other students as the third lowest gain. The differences in social connections with other students based on course type had a moderate effect size ($\eta^2 = .35$).

Table 3.1
ANOVA of Expectations & Interests and Student Outcomes by Course Type

Expectations & Interest:	Campus						
	CSU		Pingree Park		ANOVA		
	Mean	SD	Mean	SD	F	p	Eta
One of the reasons I chose to study in Warner College of Natural Resources was to be able to participate in the NR220 summer session	3.16*	1.05	2.61	1.13	8.85	.003	.24
I would have participated in the summer session even if it was not required.	3.07	1.30	2.72	1.41	2.32	.129	.12
I expected to make new friends while in NR220.	4.17	1.03	4.19	.80	.02	.885	.01
I expected to learn more in the NR220 summer session than I would if the class was over an entire semester on campus	3.71	1.12	3.38	1.28	2.66	.105	.13
I expected that I would be engaged in my studies in NR220	4.23	.94	4.32	.84	.35	.551	.05
I expected this experience would make me a more successful student	3.84	1.01	3.93	1.09	.28	.596	.04
Before this experience, I have heard a lot of great things about NR220.	4.28*	1.00	3.79	1.29	6.81	.010	.21
Outcomes: As a result of this class, I am more:							
Knowledgeable of the natural history and biophysical environment of the Rocky Mountain Ecosystem	4.07	.76	4.08	.99	.00	.959	.00
Understanding of ecological and socio-cultural relationships	4.00	.62	3.91	1.06	.32	.570	.05
Developed critical thinking skills and experience with the scientific method	3.79	.68	3.55	1.16	2.30	.131	.13
Knowledgeable and experienced in research techniques(sampling, data collection, evaluation, reporting)	4.13	.66	4.03	1.18	.43	.510	.06
Interested in my major.	4.12	.93	3.91	1.51	.98	.324	.08
Knowledgeable about other majors and subjects.	4.01	.67	4.11	.97	.53	.466	.06
Engaged in academic subjects I studied here.	4.02	.71	3.98	1.15	.06	.794	.02
Connected to other students.	3.86*	.70	4.43	.82	20.01	.000	.35
Connected to faculty.	4.00	.72	4.06	.98	.20	.651	.04
Aware of what I can do with my major after I graduate.	3.72	1.00	3.56	1.43	.64	.422	.07
Likely to remain a Warner College of Natural Resources student.	4.35	.77	4.38	1.04	.03	.849	.02
Likely to remain in my major.	4.27	.80	4.27	1.11	.00	.987	.00
Likely to be academically successful.	4.02	.76	4.08	1.19	.11	.732	.03
Likely to be professionally successful.	4.17	.73	4.11	1.08	.14	.704	.03
Able to understand the connections among scientific disciplines.	4.11	.61	4.11	.97	.00	.989	.00
Comfortable in discussing scientific concepts with others.	4.02	.67	4.01	.94	.00	.948	.01
Comfortable in working collaboratively with others.	4.01	.78	4.01	.89	.00	.980	.00
Confidence in my ability to do well in future science courses.	4.10	.77	3.85	1.19	2.17	.142	.12
Able to defend an argument when asked questions about my field of study.	4.00	.77	3.69	1.18	3.44	.065	.16
Able to explain the importance of field of study to people outside my field.	4.22	.69	3.98	1.24	2.13	.146	.12

Means and standard deviations were calculated of the importance and satisfaction of 16 items related to participants course experience by course type (table 5.2). On average, participants from both courses reported most items to be important to strongly important. CSU based course participants reported the quality of instruction, the physical setting of the course, out of classroom learning opportunities, faculty interaction, and student interaction as the top five most important aspects of the course. Pingree park participants reported out of classroom learning opportunities as the most important aspect, followed by the physical setting of the course, the quality of instruction, free time on weekends, student interaction, and faculty interaction. Regardless of course type, participants reported the quality of housing, the quality of food, and working independently as the least important aspects of the course- overall, participants were neutral about these aspects of the course. Descriptively, Pingree Park course participants reported higher importance on all but two course aspects than CSU participants (academic curriculum and assignments). However, there was a statistically significant difference between course types on five of the importance items. The largest differences were in out of classroom learning opportunities followed by free time on weekends, working independently, free time during the course, and quality of food. Regardless of course type, participants reported that most course aspects were important. Additionally, the differences in reported importance between the two course types were few and relatively small.

Table 3.2
ANOVA of Importance & Satisfaction Items by Course type.

Importance	Campus				ANOVA		
	CSU		Pingree		F	p	eta
	Mean	SD	Mean	SD			
Academic curriculum	4.15	.61	4.11	1.05	.10	.755	.03
Assignments	3.89	.66	3.79	1.04	.51	.477	.06
Working in groups	3.77	.80	3.79	.94	.02	.895	.01
Working by yourself	3.18*	.91	3.54	.89	5.69	.018	.20
Quality of instruction	4.54	.59	4.58	.75	.11	.732	.03
Sense of community	4.08	.87	4.30	.89	2.24	.136	.12
Quality of housing	2.95	1.12	3.14	1.03	1.11	.292	.09
Quality of food	3.18*	1.10	3.58	.95	5.17	.024	.19
Free time during the course (excluding weekends)	3.90*	1.03	4.25	.72	5.35	.022	.19
Free time on weekends	4.18*	.81	4.50	.64	6.48	.012	.21
Social activities	4.04	.81	4.11	.99	.18	.667	.04
Non-academic activities	3.93	.81	4.08	1.04	.83	.364	.08
Faculty Interaction	4.27	.75	4.37	.81	.51	.475	.06
Student Interaction	4.25	.78	4.38	.70	1.07	.302	.09
Out of classroom learning opportunities	4.30*	.74	4.62	.65	7.33	.008	.22
Physical setting of the course	4.31	.95	4.59	.85	3.30	.071	.15
Satisfaction	Mean	SD	Mean	SD	F	p	eta
Academic curriculum	3.96	.72	3.67	1.12	3.40	.067	.15
Assignments	3.68*	.60	3.33	1.18	5.13	.025	.19
Working in groups	3.91	.77	3.66	1.03	2.75	.099	.14
Working by yourself	3.62	.87	3.61	1.01	.01	.916	.01
Quality of instruction	4.28*	.67	3.95	1.06	5.14	.025	.19
Sense of community	3.21*	1.15	4.25	1.02	31.45	.000	.43
Quality of housing	2.90*	1.15	3.72	1.04	19.44	.000	.35
Quality of food	2.82*	1.06	3.53	1.14	14.48	.000	.30
Free time at during the course (excluding weekends)	2.86	1.20	3.03	1.41	.58	.444	.06
Free time on weekends	3.67	1.10	3.67	1.35	.00	.974	.00
Social activities	3.22*	1.06	3.90	.91	16.23	.000	.32
Non-academic activities	3.30*	1.00	3.75	1.08	6.74	.010	.21
Faculty Interaction	4.01	.69	4.06	.98	.14	.706	.03
Student Interaction	3.74*	.83	4.23	.94	10.73	.001	.27
Out of classroom learning opportunities	3.41*	1.05	4.14	1.05	16.55	.000	.32
Physical setting of the course	2.37*	1.24	4.59	.877	142.86	.000	.71

1= very unimportant/unsatisfied, 2= unimportant/unsatisfied, 3= neutral, 4= important/satisfied, 5= very important/satisfied

On average, participants in both course types were neutral to satisfied on most course aspects. CSU based course participants were most satisfied with the quality of instruction, the academic curriculum, group work, student interaction and assignments. Pingree Park based course participants were most satisfied with the physical setting of the course, the sense of community, student interaction, the out of classroom learning opportunities, faculty interaction, and the quality of instruction. CSU based course participants were least satisfied with the

physical setting of the course, the quality of food, and free time during the course. Pingree Park based participants were least satisfied with free time during the course, assignments, quality of food, group work, free time on weekends, and the academic curriculum. An ANOVA showed several statistically significant differences levels of satisfaction between the two course types. The largest difference was in satisfaction with the physical setting of the course. Pingree park participants were most satisfied with this aspect of the course and CSU bases course participants were least satisfied with this aspect. Course participants differed in their level of satisfaction with the sense of community in the course. Pingree park participants reported being satisfied to very satisfied with the sense of community within the course, while CSU based course participants were generally neither satisfied nor unsatisfied with the sense of community within the course. Pingree park course participants were statistically significantly more satisfied with out of classroom learning opportunities, food, housing, social activities, and non-academic activities than CSU based course participants. CSU based course participants were more satisfied with the quality of instruction and assignment than Pingree Park course participants.

Sense of Community Factor Structure

Confirmatory factor analysis was used to test three possible factor structures of sense of community index utilized in this study: a single factor solution, a three factor solution, and a three factor solution represented by a single higher (second) order factor. As shown in table 3.3, second order model was marginally better fitting than the three factor and single factor models. All models showed similar goodness of fit statistics. All models failed the chi square significance test, but showed great fit for the comparative fit index (CFI) and acceptable fit for root mean square error of approximation.

Table 3.3
Sense of Community Index Factor Structure Comparison

<i>Model</i>	χ^2	<i>df</i>	<i>CFI</i>	<i>RMSEA</i>
One factor	27.82*	17	.989	.065
Three factor	23.94**	14	.990	.069
Three factor second order	24.05**	17	.991	.063

* $p \geq .05$ ** $p \geq .01$

All three factor structures fit the data well with no statistically significant difference between any model. Given that all models were nearly equally well fitting and there was no statistically significant difference between models, the second order model was chosen because it was the best fitting and the most interpretable model. Additionally, the more parsimonious second order model was preferable given the smaller sample sizes in the multi-group analysis because there were less parameters to be estimated than either first order model.

Exploratory factor analysis of student assessment of learning gains

An exploratory factor analysis was conducted to determine which adapted versions of student assessment of learning gains (SALG) items could be represented as scale or latent variables. The exploratory approach was used because the items included in this study did not include all items of the original SALG instrument and because of different context of this study. The SALG instrument was originally designed for use in undergraduate research in STEM disciplines and adapted for use in the present study of undergraduate fieldwork in Natural Resources. A principal components analysis yielded three unique factors. Items in two of the factors were conceptually related and retained for future analyses, while another factor included items that were not conceptually related and were not used in subsequent analysis. One factor contained seven items related to gains in knowledge as a result of participation the fieldwork course, and another factor contained five items related to gains in confidence in the students' academic and professional future as a result of participation in the field course. Next, reliability was tested for the knowledge and confidence scales. Knowledge ($\alpha = .91$) and confidence ($\alpha = .89$)

showed acceptable reliability and were then used in subsequent analyses. Specific SALG items for each scale can be found in appendix B.

Descriptive Findings of Scale Items

An ANOVA of scale items (sense of community, knowledge, confidence) were conducted by course type (CSU based course & Pingree Park based course) and are shown in table 3.4. There were no statistically significant differences in means of these scales by course type. On average, course participants agreed that they perceived a sense of community, agreed that they gained knowledge, and agreed that the experience instilled confidence in their future preparation.

Table 3.4
ANOVA of *Sense of Community, Knowledge, and Confidence by Course Type*

	Total Sample	CSU	PP	<i>F</i>	<i>p</i>	<i>eta</i>
Sense of community	3.57	3.50	3.66	1.338	.249	.095
Knowledge	4.04	4.05	4.03	.046	.830	.018
Confidence	4.07	4.07	4.08	.009	.923	.008

1= strongly disagree, 2= disagree, 3= neutral, 4= agree, 5= strongly agree

The Effect of Sense of Community on Student Outcomes

A primary interest of this study was to determine to what extent sense of community influenced other course outcomes (knowledge & confidence). Structural equation modeling was used to determine how sense of community related to the knowledge & confidence variables derived from an exploratory factor analysis. Additionally, a multi-group comparison was conducted to determine if the relationships between these outcomes differed by course type (CSU based course vs. Pingree Park based course). A confirmatory factor analysis was conducted to determine how well these data could be represented by these latent variables. The results of the confirmatory factor analysis (figure 3.1) showed these data fit the model well on two of three goodness of fit indices (CFI= .96 RMSEA .06), despite a statistically significant Chi

square statistic ($\chi^2 = 259.64$ $df= 157$). Chi square significance testing is sensitive to sample size and there is general agreement that other fit indices are more appropriate for smaller sample sizes (Hu & Bentler, 1999).

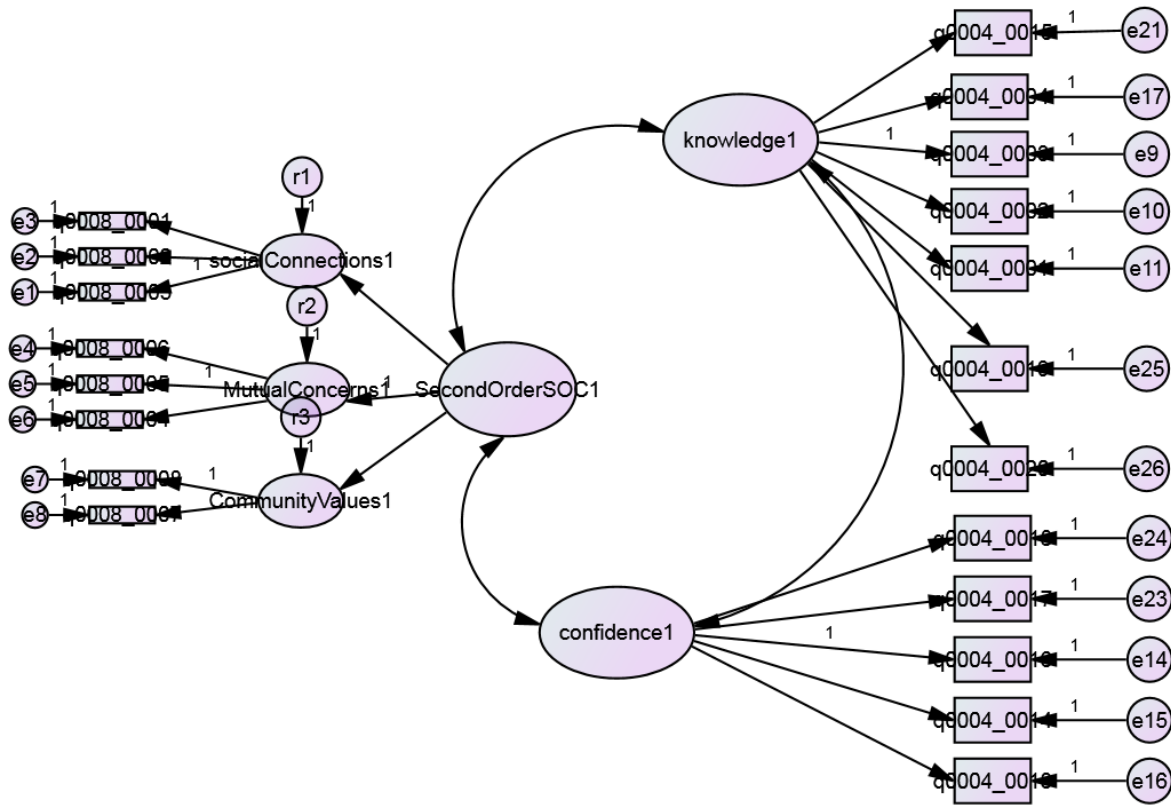


Figure 3.1. Confirmatory Factor Analysis of Sense of Community, Knowledge, and Confidence Model Specification

The confirmatory factor analysis showed that the latent variables could be well represented in a structural model. A partial mediation model (figure 5.2) was tested on the entire sample ($n= 151$) and fit these data well on two goodness of fit statistics (CFI= .97, RMSEA=.06), but showed a statistically significant chi square statistic ($\chi^2 = 305.12$ $df= 159$). Sense of community had a statistically significant strong positive direct effect on knowledge and

a non-statistically significant near zero direct effect on confidence. Knowledge had a statically significant strong positive effect on confidence. Bootstrapping estimates of indirect effects found a statistically significant effect of SOC on confidence ($\beta = .52$ of $p = .002$). The sum of these analyses indicated that the relationship between sense of community and confidence was fully mediated by knowledge.

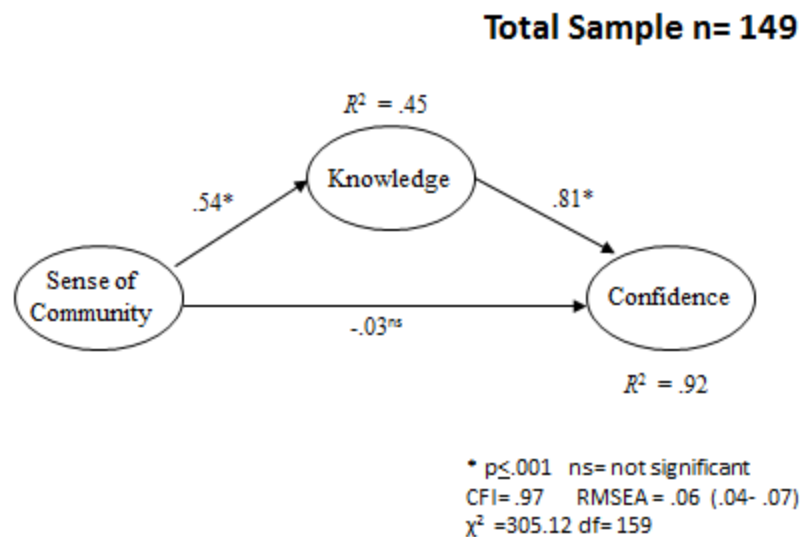


Figure 3.2. Partial Mediation Model of the Unstandardized Effect of Sense of Community on Knowledge & Confidence.

Moderation by Fieldwork Course Type

Another purpose of this study was to determine if the relationships between sense of community, knowledge, and confidence was moderated by field course type. A multi-group analysis was conducted as outlined in the methods section of this study. Evidence of moderation by course type could not be determined using this approach, because measurement invariance testing failed at the configural level. Because, the multi-group analysis could not be performed, tests of moderation were conducted using ordinary least squares regression techniques outlined

in the methods section of this study. The results of the moderation analysis are summarized in path model shown in figure 3.3.

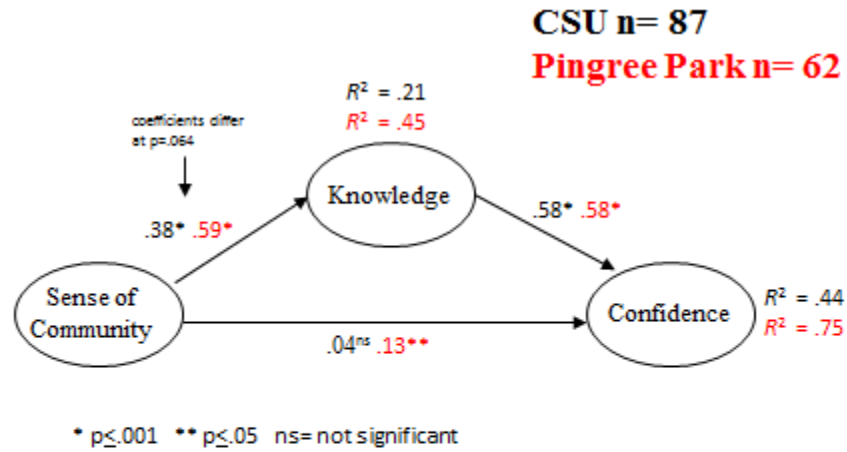


Figure 3.3 Moderated Partial Mediation Model of the Unstandardized Effect of Sense of Community on Knowledge & Confidence by Course Type.

These results show that the relationship between sense of community and knowledge was moderated by course type ($p = .064$ significance level). Sense of community had a significantly stronger effect on knowledge for Pingree Park based course participants than CSU based participants. Additionally, the indirect effect of sense of community on confidence (table 5.5) was statistically significant for the Pingree Park sample and not statistically significant for the CSU sample. Lastly, the model explained roughly twice as much of the variability of the dependent variables (knowledge & confidence) in the Pingree Park sample than in the CSU sample.

Table 3.5
Indirect effects of SOC on Confidence by Course Type

	Effect Beta	95% confidence interval		Bootstrap SE
		Lower	Upper	
CSU	.15	-.0048	.29	.074
Pingree Park	.28	.15	.42	.067

Qualitative Results

Interview data was used to verify the hypothesized relationships represented the structural equation model and to provide context for the quantitative results. The qualitative results were consistent with the quantitative findings that social factors positively influenced knowledge gains. A common theme reported from Pingree Park participants was that was free and unstructured time involved other students and was often used for academic pursuits. For example one interviewee reported that he and another student created a study guide and probably would not have done so if he was in the campus based course because “the social component in Fort Collins is *not* school based”. Participants also indicated that social interactions were crucial for knowledge gains; for example one interviewee explained that social interaction was necessary for studying for a plant identification test because he/she would not know if they identified the plant correctly without at least another person to verify. Another interviewee reported that they felt more comfortable around faculty and that they would be more likely to approach faculty in the future as a result of the fieldwork experience. Participants reported gains in confidence as a result of the fieldwork experience; “I could be a tech (technician) for any forestry (U.S. Forest Service) project now”.

Discussion

Overall, this study demonstrated that sense of community (SOC) in fieldwork courses has value. SOC positively influenced students’ perceptions of gains in knowledge and subsequently gains in confidence. These findings suggest that increases in SOC may translate into increased

knowledge and greater confidence in transferability of knowledge and skills outside of the course.

This study contributes to the literature by further specifying the role of social factors in experiential learning and fieldwork. This study described and quantified a causal sequence between SOC, knowledge and confidence. Prior work has acknowledged the importance of social factors in fieldwork, but has not critically examined SOC in relation to knowledge gains and confidence in the transferability of the experience to future academic and professional work. These results help to explain the process by which some of the commonly reported outcomes of field work come about and detail the role of social factors in influencing these outcomes. These findings empirically confirm what prior work in this area has purported (Herrick, 2010; McGuinness & Simm, 2005; Scott et al., 2012): that social factors directly contribute to students perceptions of their knowledge gains and indirectly affected the degree to which students perceived the field experience to be transferrable to future academic and professional work. Also, these findings suggest that as levels of sense of community increase, so should gains in knowledge and subsequently gains in confidence. Fieldwork practitioners can use these findings to emphasize SOC and thereby enhance other desired outcomes such as gains in knowledge and confidence.

Another goal of this study was to determine the how the format of a field-based, natural resources course affects participants' SOC. Most CSU based course participants did not use the campus residences that were made available to them, and instead used their normal residence during the field course. Pingree Park based course participants all stayed in residences at Pingree Park (excluding weekends) for the duration of the course. These drastically different conditions could have had an effect on SOC, due to the extremely different amounts of time spent with

other students and faculty. While there was no difference in reported SOC as indicated by the sense of community index (SCI) or in the reported level of importance of SOC by course type, there was a difference in participants' satisfaction with SOC. Additionally, there were differences in participants' satisfaction with items conceptually linked to SOC including student interactions, social activities, and non-academic activities. Pingree Park based course participants were significantly more satisfied with SOC and these related items than the CSU based course participants. These findings have several implications. First, the finding of no difference in the magnitude of SOC (as reflected by the SCI) and the significant difference in satisfaction with SOC, is indicative that the SCI may not be effective in measuring students' evaluation of SOC. Due to the needs based nature of this concept at its corresponding measures, the sensitivity of the index may be limited to demonstrating the level to which the need has been met, but not necessarily if an individual is satisfied with the level to which the need has been met.

Although there were no differences in the magnitudes of SOC, knowledge, and confidence by course type, there were differences in the relationships between these variables. SOC had a significantly larger effect on knowledge for the Pingree Park sample than the CSU sample. These results suggest that the *quality* of SOC during the Pingree Park based course may have been more effective in positively influencing knowledge gains and subsequently confidence than the CSU based course. Students who participated in the Pingree Park course had more unstructured time for social interactions with other students and staff. The qualitative findings suggest that much of this interaction was academically focused (e.g. study groups), and provided time for reflection, which is an integral process of experiential learning (Kolb, 1984). Fewer than half of the students who participated in the CSU based course took advantage of the on-campus

housing. As a result, most students in this course did not have the opportunity for informal interaction with other students and staff, but did have access to their established social networks in town. It appears that regardless of course type, participants' SOC needs were met as measured by the SCI. However, it is likely that the needs were met by differing mechanisms. For CSU based course participants, SOC needs were likely met through their prior established social networks. For Pingree Park participants, their existing social networks were largely unavailable due to the remote location of the field course and lack of mobile phone and limited internet service, thus these participants sense of community needs were met through interactions with their fellow participants and staff.

The results of this study indicated that a one factor, a two factor, and a three factor solution reflected by a single higher order factor all fit the data well and were appropriate for use. Similar to prior work in community psychology literature (Wombacher et al., 2010) this study used a second order factor structure for additional analyses because this factor structure was more parsimonious and aided in the interpretability of the findings compared to the other factor structures. Of ancillary importance, these findings contribute to community psychology literature by demonstrating an additional context in which the SCI instrument has been confirmed.

Conclusion

This study demonstrated that SOC in fieldwork courses has value. SOC positively influenced measures of gains in knowledge and subsequently gains in confidence. These findings suggested that increases in SOC may translate into increased knowledge and greater confidence in transferability of knowledge and skills outside of the course. However, the relationships between these outcomes were dependent upon the format of the fieldwork course. SOC was

more strongly associated with knowledge and confidence; presumably because the quality of community in this format is more congruent with knowledge and confidence outcomes than a non-residential course. Future research should examine specific aspects of fieldwork and experiential education that are effective in promoting SOC, such as the effects of place, the quantity and quality of social interactions, and the role of instructors.

CHAPTER IV

Social Engagement in a Natural Resources College

Introduction

Student engagement is one of the most dominant topics in higher education research and is a commonly used benchmark for institutions nationwide (Kuh, 2009). While engagement is a relatively new term, the concept is deeply rooted in decades of educational research. Various iterations of the idea of engagement have built upon each other to form the construct and term commonly used today. In the 1970's Robert Pace developed the College Student Experience Questionnaire based on what he described as "quality of effort." Pace's research showed that the more time and energy spent on educationally purposeful tasks, the more students gained from their studies and other college experiences (Pace, 1990). Astin's (1984) theory of involvement explored "quality of effort" and how it relates to student achievement. Other researchers have addressed different dimensions of student effort and their relationships to student outcomes such as persistence. For example, Tinto's student integration model explored social and academic integration as they relate to persistence (1993). In this model, social and academic integration are influenced by a student's effort to integrate into these aspects of the university (Tinto, 1986, 1993). More recently, Kuh conceptualized engagement as a combination of various aspects of the preceding theories and is used to "represent constructs such as quality of effort and involvement in productive learning activities" (2009).

Kuh created the NSSE and helped to popularize and establish engagement as an important indicator of student and organizational performance. This conceptualization of engagement and its corresponding measure emphasize the institution's role in facilitating educationally purposeful activities. He argued that using student engagement as a predictor of

student learning is a more meaningful approach to evaluating an institution than other metrics such as retention and grade point averages (Kuh et al., 2001, 2003). As a result, engagement is frequently part of higher education policy discussions, higher education research, and popular media (Kuh, 2009).

Student engagement is a multi-dimensional concept; however its basic premise is relatively simple: the more a student is engaged in study, the more they learn. Similarly, the more students practice and get feedback on their writing, analyzing, or problem solving, the more adept they become (Kuh et al., 2001) Continuing this logic, the more socially engaged (as a result of interactions with other students, faculty and staff) a student is, the more socially integrated into the college community a student will be.

The Warner College of Natural Resources (WCNR) at Colorado State University is a vibrant community fueled by a myriad of programs designed, in part, to promote a sense of community. However, it is not clear what value this warm and welcoming atmosphere has on student outcomes or which aspects of the student experience within the college influence sense of community. This study investigates the value of community and its sources within WCNR, using an adapted version of the National Survey of Student Engagement (NSSE).

The NSSE measures students' perceptions of engagement and students' participation in educationally purposeful behaviors indicative of engagement. The NSSE measures several domains of engagement which are referred to as "benchmarks," two of which measure students' perceptions and their level of activity related to social components of the student experience: student-faculty interaction and supportive campus environment. The items contained in these "social engagement" benchmarks are, arguably, reflective of students' perceptions and participation in the WCNR community. Another NSSE benchmark measures students' level of

participation in active and collaborative learning (ACL), which is a prominent feature in several WCNR programs (experiential learning curriculum, learning communities, service learning) and has been positively associated with student outcomes such as social integration (Braxton et al., 2000). This study explored the value of community by analyzing the relationship between social engagement (student participation in and perceptions of the WCNR community) and students' satisfaction with their overall experience within WCNR. Further, this study also explored the sources of community (as reflected by social engagement) by analyzing the degree to which social engagement is affected by common features of WCNR programs such as ACL.

Theoretical Framework

This study utilized NSSE benchmarks that potentially influence or are reflective of social engagement. This section provides an overview and reviews prior research of these benchmarks.

Active and Collaborative Learning (ACL)

ACL approaches are contrary to the traditional, passive lecture format where student contributions are limited. ACL approaches feature three elements that matter to student learning: involving students, increasing their time on task, and taking advantage of peer influence (Kuh, 2004). Science, engineering, technology, and mathematics (STEM) disciplines commonly use ACL practices in the form of problem-based and inquiry-based learning (Allen and Duch 1998; Duch, Gron, and Allen 2001; Rutherford and Ahlgren 1991). Ebert-May and Brewer (1997) tested the effectiveness of ACL techniques used in place of the traditional lecture format in introductory biology courses and found numerous benefits. For example, students learned more effectively by participating in cooperative groups and enjoyed the social interaction; students characterized the ACL classroom environment as friendly, non-threatening, fun, and dynamic; and students reported a sense of belonging and camaraderie because they regularly interacted

with peers and learned from each other. They also found that requiring students to frequently report their progress on assignments to the class had a positive impact on both their level of effort and attention. These and other results indicate that ACL has a positive effect on peer interaction which is an important component of social engagement, social involvement, and sense of community (Astin, 1993; Tinto, 1993; Jacobs & Archie, 2008).

ACL has also been shown to influence constructs in Tinto's student integration model (1993) including social integration, institutional commitment, and intent to return (Braxton et al., 2000). ACL experiences have been positively associated with increased frequency of student contacts with faculty members (because the class activities and assignments require it) and more positive views of the campus environment (likely a result of getting to know classmates better through the collaborative exercises). Prior work suggests that through these experiences, ACL exerts a positive influence on student integration and persistence (Braxton et al., 2000).

Level of Academic Challenge (LAC)

LAC is a measure of students' effort in educationally purposeful activities. Prior work has shown that as LAC increases, so do student outcomes such as learning gains (Carini et al., 2006). However, prior work has not tested the relationship LAC and social engagement factors such as student faculty interaction and supportive campus environments. It is plausible that LAC may be positively related to social engagement factors. For example, if a student finds coursework to be especially challenging, this may cause a student to seek help from faculty and peers thereby increasing levels of social engagement.

Student Faculty Interaction (SFI)

SFI is another engagement benchmark related to social factors. As the name suggests, this construct and its corresponding NSSE measure address the level to which students interact

with faculty. Respondents are asked to report the frequency in which they engage in several types of interactions with faculty including discussing grades, discussing career plans, discussing ideas outside of class, getting feedback from faculty, and working with faculty on extra and/or co-curricular activities

Supportive Campus Environment (SCE)

The rationale for this benchmark is that campus environments that are supportive increase levels of satisfaction and the quality of relationships that students form in college. The measures used in this benchmark include ratings on how much a campus emphasizes the provision of academic and non-academic support and the quality of relationships students develop with other students, faculty, and administrators. In a recent study, this NSSE benchmark was found to be predictive of first year to second year retention (Gordon et al., 2008).

NSSE and Student Outcomes

Several recent studies have used NSSE engagement scales and items to predict student outcomes including persistence and GPA. Kuh et al. found that engagement variables are predictive of GPA and first year to second year persistence (2008). They found that as engagement increases, so does GPA and likelihood of persistence. This study did not use specific dimensions of engagement; rather it used items related to students' self-reported behavior in educationally purposeful activities. Thus, these results did not describe which domains of engagement are predictive of GPA and persistence. Carini et al. conducted an extensive evaluation of 14 institutions examining the relationships between NSSE benchmarks and student outcomes (2006). Their results suggest a link between engagement measures and educational outcomes as measured by GPA and standardized tests. However, in this case NSSE benchmarks accounted for very little variability (less than 3%) in student outcomes and roughly

2% of the variance in outcomes and showed statistically weak associations between benchmarks and outcomes.

A 2008 study by Gordon et al. also conducted a study of NSSE benchmarks and student outcomes. Their analysis was limited to one institution where they found similar results with weak associations between benchmarks and student outcomes. However, they did find a statistically significant association between the SCE benchmark and persistence.

Student Group Differences in NSSE Benchmarks and Student Outcomes

It is well established in higher education research that that student outcomes such as GPA, persistence, and learning, differ by students' demographic characteristics such as ethnicity, parents income and education levels, high school, GPA, gender, transfer status, major, and living situation (Pascarella & Terenzini, 2005). Student engagement research is no different and has demonstrated differences in levels of engagement based on a wide range of student characteristics (Carini et al., 2006; Kuh, 2004). For example, first-generation students who report more participation in ACL had higher probability of success than those only taking more traditionally run courses (Amelink, 2005). Transfer students differ from their non-transfer counterparts in several aspects of engagement. Transfer students have been shown to interact less with faculty, participate in fewer educationally enriching activities, view the campus as less supportive, gain less during college, and are generally less satisfied with college (Carini et al., 2006). On the other hand, psychometric testing of NSSE dimensions found no differences in engagement scores by class level (Kuh, 2001).

Prior work has also shown differences in NSSE benchmarks based on institutional differences (Carini et al., 2006; Kuh, 2004). Generally, results have shown that students at large public research oriented universities are less engaged than students at smaller private, teaching

oriented institutions. These results are not surprising given that the educational practices and policies at these types of institutions differ greatly from each other. It is also likely that educational practices vary widely within an institution with differences in colleges, departments and majors; which is an area that seems to be lacking in engagement literature.

Despite these established differences in engagement levels, there is a need for more research about how various engagement dimensions interact with background characteristics such as gender, race, ethnicity, and first generation status (Kuh et al., 2008). Additionally, “the precise relationships among the various types of engagement” has yet to be determined (Axelson & Flick, 2010, p. 43). Little is known about differences in the relationships between engagement variables by potential moderators such as class level (Axelson & Flick, 2010), gender, and transfer status.

Summary and Purpose

This study addresses several gaps in the student engagement literature. First, this study utilizes satisfaction with college education experiences as an outcome measure, instead of GPA, learning outcomes, and persistence which have primarily been used in prior work. Satisfaction is highly correlated with students’ voluntary intent to return, which is more indicative of students’ evaluation of their experience and does not include factors beyond institutions’ and students’ control that may cause a student to leave the institution (e.g. the need to care for a family member). Also, “the student’s degree of satisfaction with the college experience proves to be much less dependent on entering characteristics... and more susceptible to influence from the college environment” (Astin, 1993, p. 277), making this outcome more reflective of institutional conditions rather than individual characteristics.

This study also addresses the gap identified by Axelson & Flick that “the precise relationships among the various types of engagement” is not fully known (2010, p.43). Specifically, this study investigated how several student engagement dimensions contributed to a higher order global measure of social aspects of engagement. Utilizing structural equation modeling, the relationships between two engagement benchmarks (ACL and LAC) and two social engagement dimensions (SFI and SCE) we investigated. Prior work has shown that ACL has positive effects on peer and faculty interactions and LAC can potentially influence social interactions/engagement. Greater academic challenge may encourage students to interact with faculty and their peers, which could presumably increase social engagement. However, this relationship has not been specifically addressed in prior student engagement research and is thus of primary interest to this study.

Lastly, this study addresses gaps in knowledge about how the relationships between various engagement dimensions may differ by gender, transfer status, and class level. More specifically this study will address the following research questions:

1. Is the relationship between level of academic challenge and college educational experience satisfaction and the relationship between active & collaborative learning and college educational experience mediated by social engagement?

2. Are the relationships between level of academic challenge, active & collaborative learning, social engagement, and college educational experience satisfaction moderated by gender, class level, and transfer status?

Methods

Sample

The sample was drawn from approximately 1000 undergraduate students in a natural resources college at large public research intensive university in the rocky mountain region. Students were asked to complete the electronic survey from an email solicitation. The response rate was approximately 25% resulting in 241 usable surveys.

Variables measured

This study used the following NSSE benchmarks each of which is measured by several items each and coded seven point Likert type scales (appendix C):

- Level of Academic Challenge:
- Active and Collaborative Learning
- Supportive Campus Environment
- Student Faculty Interaction
- Satisfaction with College Educational Experiences

A principal components exploratory factor analysis was conducted to determine if these data reflected the structure of NSSE benchmarks. As shown in appendix C, all but one NSSE benchmark was represented by a single factor. The NSSE benchmark supportive campus environment was represented by two factors for these data: one related to relationships with faculty and one related to student/peer relationships which we called faculty support and student support respectively. We then tested the reliability of the benchmarks; each of the benchmarks yielded acceptable reliability ranging from $\alpha = .84$ to $\alpha = .88$. Overall college educational experience satisfaction was a single item variable thus no reliability coefficient was computed.

Analytic Approach

This study used two primary approaches; first, means of composite scores for each of constructs in the structural model were calculated. An ANOVA was then conducted to compare composite means included in the model by gender, class level, and transfer status of all latent factors included in the model. Second, the relationships between the variables included in the model were compared by gender, class level, transfer status, and department. Structural equation modeling (SEM) was used to simultaneously examine the relationships between multi-dimensional constructs included in the model.

One purpose of this study was to test determine if the relationships between variables in our model were moderated by several variables including: gender, class level, transfer status, and department. In order to make valid and meaningful comparisons of regression coefficients between groups, a sequence of tests must be taken to ensure that latent variables are measured similarly regardless of group memberships (e.g. transfer student vs. non transfer student). Measurement invariance (MI) involves testing the equivalence of measured constructs across groups. MI testing is a hierarchical process and must be done for each group comparison. In this study, measurement invariance was tested for four group comparisons: gender, class level, and transfer status.

Measurement invariance was tested using a multiple group confirmatory factor analysis (CFA) to determine if the measured latent variable were equivalent across groups. Tests of measurement invariance established that our latent variables including our second order latent variable *social engagement* were measured similarly within group comparisons. Measurement invariance testing for second order latent variables was conducted as outlined by Chen et al. (2005).

Next, evidence of moderation by gender, class level, transfer status, and department was tested by performing z-tests of regression coefficients between groups for each group comparison. Additionally, mediation was tested in all group comparisons using a mediation testing sequence for structural equation modeling outlined by Iacobucci et al. (2007). Indirect effects were calculated using a bootstrapping technique in AMOS 20 with estimation based on 3000 samples for each multi-group analysis.

Results

In this results section, descriptive findings of the mean of engagement by group memberships are presented first. This is followed by a comparison of confirmatory factor analyses of social engagement dimensions. Next, structural equation models which tested the relationships between engagement variables and satisfaction of the entire sample and three multi-group analyses (including measurement invariance testing) are presented.

Descriptive findings

An ANOVA was conducted to determine differences in students reported levels of engagement by gender, transfer status, major and class level. As shown in table 4.1, there were statistically significant differences in reported levels of engagement across all group comparisons except for the analysis based on transfer status. There was a statistically significant difference in the faculty support dimension of engagement and overall satisfaction of the college experience based on gender. Women reported higher levels of faculty support and higher levels of overall satisfaction with the college educational experience than men. Lastly, there were statically significant differences in three dimensions of engagement based on class level. Freshmen and sophomore level students reported lower levels of academic challenge, less student-faculty

interaction, and fewer opportunities for active and collaborative learning than Junior and Senior level students.

Table 4.1
ANOVA of Composite Engagement Variables by Gender, Transfer Status, Major, and Class

Latent Variables	Reliability <i>Alpha</i>	Mean Scores					
		Gender		Transfer Status		Class	
		Female	Male	Non-transfer	transfer	1 st & 2 nd	3 rd & 4 th
Faculty Support	.87	5.50**	5.03	5.32	5.21	5.37	5.23
Student Support	.90	5.42	5.20	5.39	5.18	5.38	5.29
Level of Academic Challenge	.86	5.13	4.88	4.93	5.17	4.62**	5.14
Student-Faculty Interaction	.81	3.93	3.69	3.85	3.82	3.49*	3.93
Active & Collaborative Learning	.80	4.51	4.26	4.50	4.37	3.88*	4.57
Satisfaction	single item	4.34**	4.12	4.28	4.14	4.25	4.22

* $p \leq .05$ ** $p \leq .001$

Note: 1= strongly disagree/ never participated, 7=strongly agree/ always participated

Model Specification

A structural equation model was used to determine how student engagement variables related to overall satisfaction of the college educational experience. Prior to testing these relationships in a structural model, the appropriate factor structure of the social dimensions of engagement was determined. Two models were tested; one model (figure 4.1) included a second order factor that was reflective of three social dimensions of student engagement: faculty support, student-faculty interaction, and student support. The second order model was then compared to a first order (figure 4.2) model to determine which model was a better fit for the data. As shown in table 4.2, both models fit the data very well (aside from Chi square statistics) with no statistically significant difference between the first order model and the second order model. Chi square significance testing is sensitive to sample size and as there is general agreement that other fit indices are more appropriate for smaller sample sizes (Hu & Bentler, 1999), thus chi square fit indices were not used to make model fit determinations in this study. Given that both models were nearly equally well fitting and there was no statistically significant difference between models, the second order model was chosen because it was more

parsimonious and made the model more interpretable. Additionally, the more parsimonious second order model was preferable given the smaller sample sizes in our multi-group analyses because there were less parameters to be estimated than in the first order model.

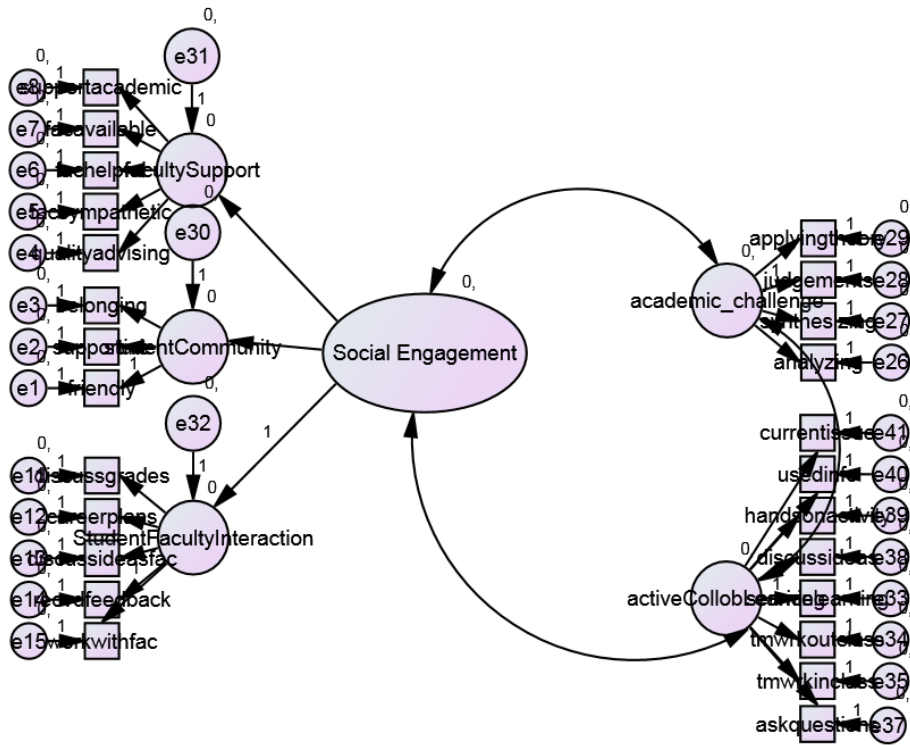


Figure 4.1 Second Order Measurement Model of Student Engagement Factors

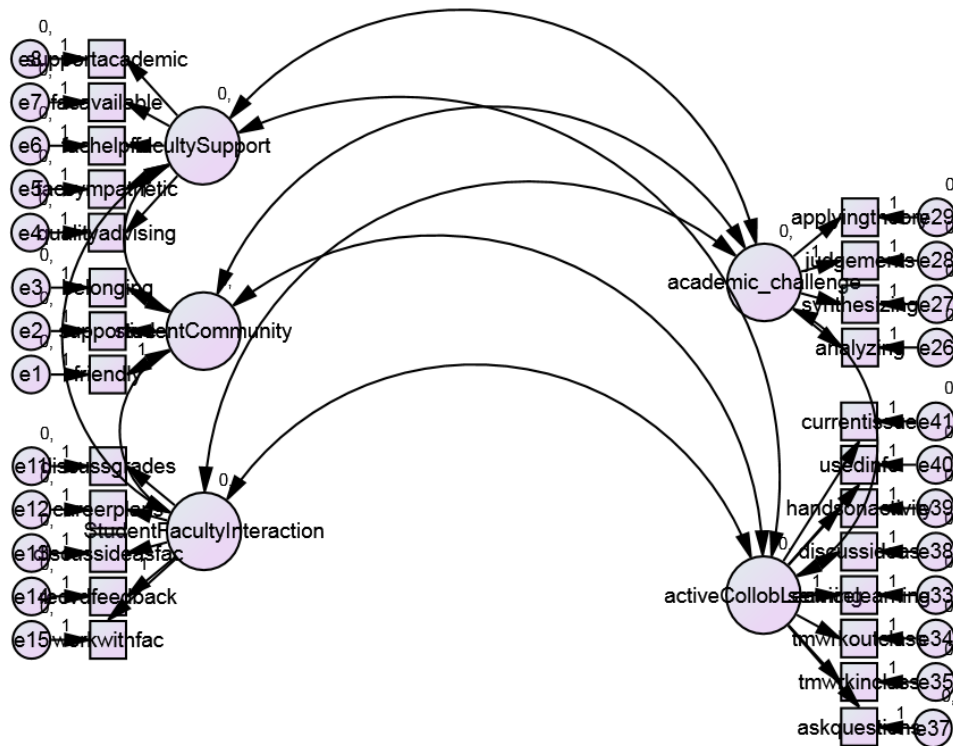


Figure 4.2. First Order Measurement Model of Student Engagement Factors

Table 4.2

Confirmatory Factor Analysis Goodness of Fit Statistics for First and Second Order Models

Model	χ^2	df	CFI	RMSEA
First Order CFA	393.34*	257	.949	.048
Second Order CFA	400.31*	260	.948	.048

* $p \leq .001$

Structural Model

The second order model was then included in a structural model shown in figure 4.3. Active & collaborative learning and level of academic challenge were specified to have both indirect effects (through social engagement) and direct effects on overall satisfaction of education experiences within the college.

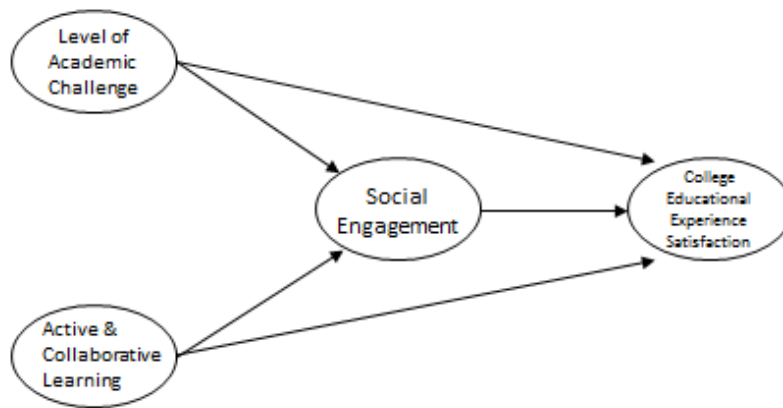


Figure 4.3. Proposed Structural Model of Student Engagement Dimensions

As shown in figure 4.4, a structural model of the entire sample tested the relationships between level of academic challenge (LAC), active and collaborative learning (ACL), social engagement (SE) and college level educational experience satisfaction (CEES). The model fit the data well (CFI= .94, RMSEA= .05) and explained a large proportion of the variability in our dependent measure (79%). There were statistically significant positive relationships between active & collaborative learning and social engagement, as well as a between social engagement and satisfaction with college experience. Social engagement had a strong positive association with satisfaction of college education experience, indicating that the more socially engaged students are, the more satisfied with their educational experience they are. The relationships between level of academic challenge and satisfaction and between level of academic challenge and social engagement were minimal and not statistically significant. There was a statistically significant moderate negative relationship between active and collaborative learning and college educational experience satisfaction. Bootstrapping estimates of indirect effects (table 4.3)

confirmed that the relationship between active & collaborative learning and satisfaction was partially mediated by social engagement. Additionally the positive indirect effect was much stronger than negative direct effect, indicating that active and collaborative learning positively influences social engagement which subsequently positively influences college educational experience satisfaction.

A more parsimonious model which omitted the direct path between LAC and CEES was tested. This more parsimonious model showed nearly identical goodness of fit statistics (CFI=.93 RMSEA =.05). Despite this finding, the partial mediation model was retained for subsequent analyses to determine the extent of mediation for each multi-group analysis, which was of primary interest to this study.

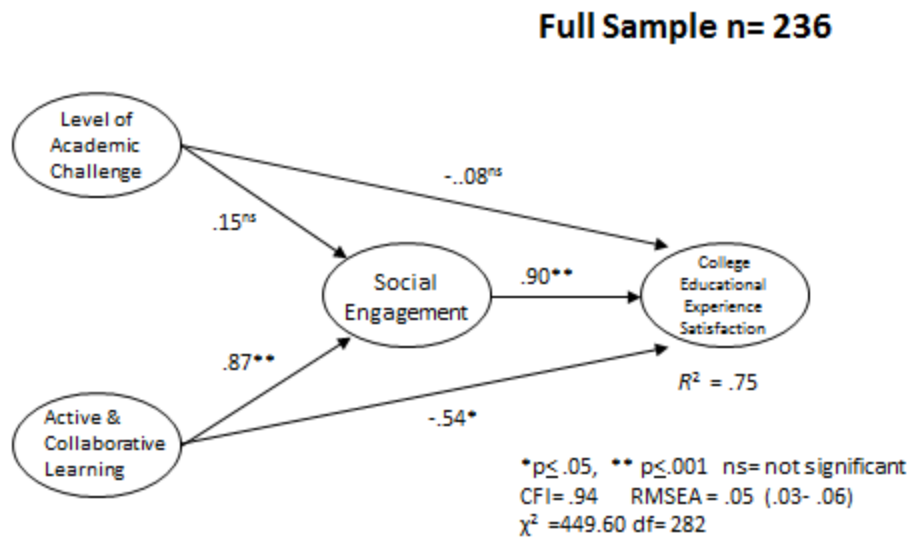


Figure 4.4. Structural Model of Student Engagement Dimensions

Measurement invariance

Measurement invariance was tested for each group comparison using the sequence outlined by Chen et al. (2005) for second order models. Chi square difference tests, comparative

fit index (CFI) difference, and root mean square error of approximation (RMSEA) difference tests were used to evaluate the measurement invariance at various levels. Tests of measurement invariance indicated “strong” measurement invariance (factor loadings and intercepts invariant) on all four group comparisons (Meredith, 1993). Chi square difference tests and CFI difference tests of all multi-group measurement invariance tests can be found in appendix C. Having established a “strong” level of measurement invariance, valid comparisons of the relationships between variables in model for each group comparison can be made.

Multi-group comparisons

The purposes of the group comparisons were to test for differences in the relationships between variables in the model. More specifically, we tested the hypothesis that social engagement mediated the relationship between active and collaborative learning and satisfaction, and the mediated the relationship between level of academic challenge and satisfaction differed (was moderated) by various group memberships.

Gender

First, a multi-group analysis comparing gender was conducted. This comparison was shown to fit the data well on two (CFI & RMSEA) of the three computed fit indices. The model explained more variability in CEES for men (71%) than for women (59%). There were no statistically significant differences between regression coefficients of each group, thus we had no evidence of moderation. For both groups, direct paths between LAC and CEES, ACL and CEES, and LAC and CEES were not statistically significant. Bootstrapping estimates of indirect effects (table 4.3) showed the indirect effect of ACL on CEES to be statistically significant. These results indicated that that the relationship between ACL and CEES was fully mediated by

social engagement. LAC had no statistically significant direct effect on SE, and no statistically significant direct or indirect effect on CEES.

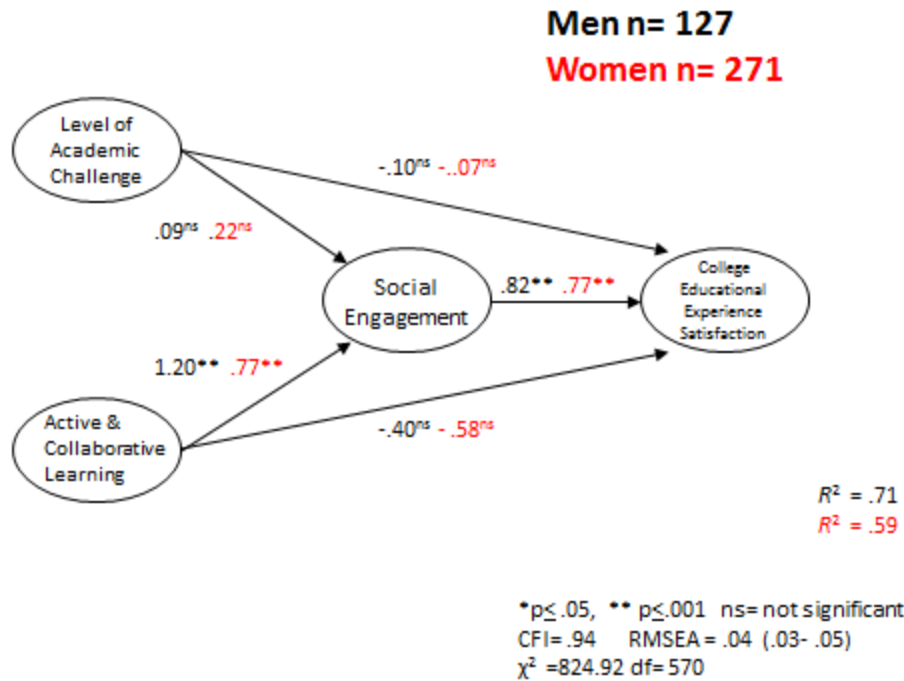


Figure 4.5. Structural Model of Student Engagement Dimensions by Gender

Transfer status

Second, a multi-group analysis comparing transfer status was conducted. This comparison was shown to fit the data well on two (CFI & RMSEA) of the three computed fit indices. The model explained more variability in CEES for transfer students (71%) than non-transfer (61%) students. z- tests of unstandardized coefficients indicated no statistically significant differences between regression coefficients of each group, indicating there was no moderation based on transfer status. Direct paths between LAC and CEES and ACL and CEES were not statistically significant. Bootstrapping estimates of indirect effects (table 4.3) of ACL on CEES was shown to be statistically significant. These results indicate that the relationship between ACL and CEES was fully mediated by social engagement. LAC had no statistically

significant direct relationship or indirect relationship with CEES and no significant relationship with social engagement.

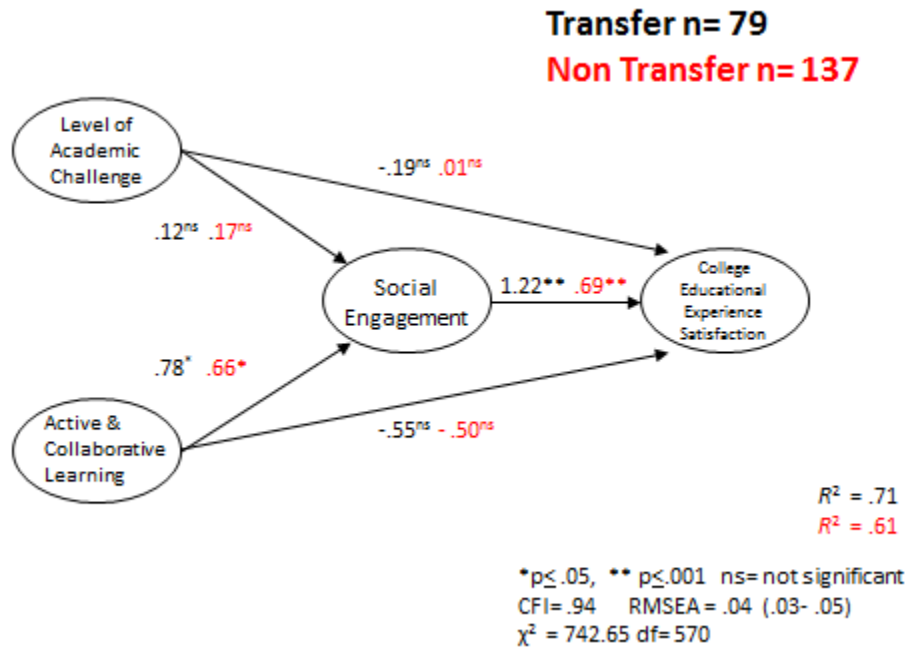


Figure 4.6. Structural Model of Student Engagement Dimensions by Transfer Status

Class Level

Next, a multi-group analysis comparing class level was conducted. This comparison was shown to fit the data well on two (CFI & RMSEA) of the three computed fit indices. The model explained more variability in CEES for upper classmen (69%) than lowerclassmen (61%). There was a statistically significant difference in the relationship between ACL and SE. Upper classmen (juniors and seniors) showed a strong positive relationship between ACL and SE while lower classmen (freshmen and sophomores) showed a moderate positive relationship that was not statistically significant. Lower classmen showed a statistically significant moderate positive relationship between LAC and SE, however this relationship was not statistically significant for upperclassmen and direct paths between LAC and CEES and ACL and CEES were not

statistically significant for lower classmen. For upperclassmen, the direct relationship between LAC and CEES was not statistically significant, but the ACL and CEES was statistically significant. For lower classmen students, bootstrapping estimates of the indirect effect of LAC on CEES (table 4.3) was statistically significant. For upper classmen students, bootstrapping estimates of the indirect effect of ACL on CEES was statistically significant. These results indicate that relationships between variables in the model are moderated by class level. For lower classmen, social engagement mediates the relationship between level of academic challenge and CEES. Additionally, SE does not mediate the negative relationship between ACL and CEES. For upperclassmen SE partially mediates the relationship between ACL and CEES, although the positive mediated effect on CEES is much stronger than the negative direct effect.

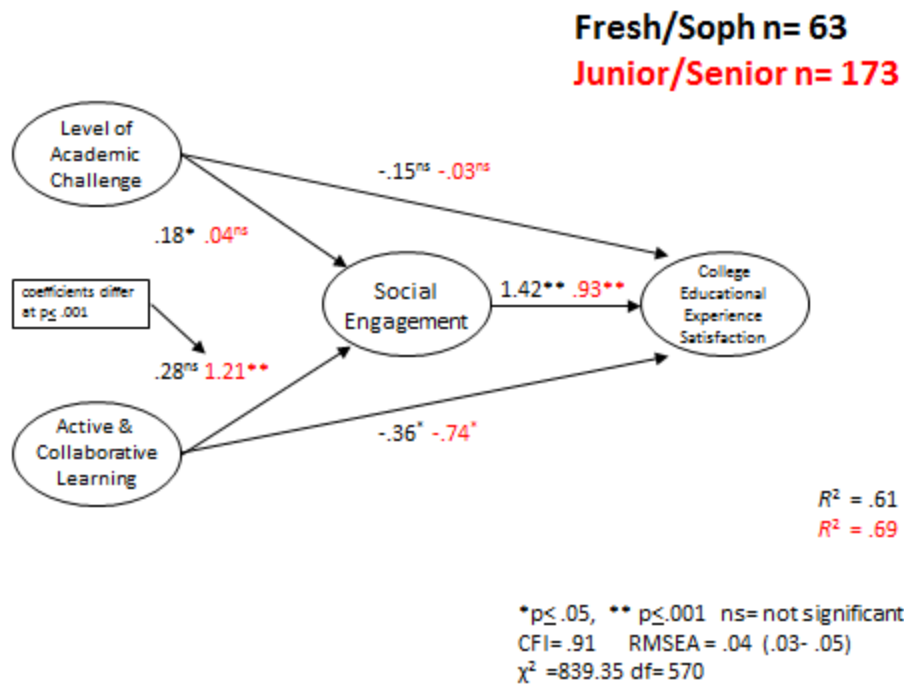


Figure 4.7. Structural Model of Student Engagement Dimensions by Class Standing

Table 4.3

Boostrapping Estimates of Indirect Effects by Gender, Transfer Status, and Class level,

<i>Model</i>	<i>Group</i>	Unstandardized Indirect effects	Indirect effects significance <i>p</i>
Total Sample			
LAC-Satisfaction		.13	.164
ACL-Satisfaction		.78	≤.001
Gender			
Men			
LAC-Satisfaction		.07	.646
ACL-Satisfaction		.98	≤.001
Women			
LAC-Satisfaction		.17	.124
ACL-Satisfaction		.59	.007
Transfer status			
Transfer			
LAC-Satisfaction		.14	.510
ACL-Satisfaction		.96	.020
Non-transfer			
LAC-Satisfaction		.12	.295
ACL-Satisfaction		.65	.001
Class level			
Fresh/soph			
LAC-Satisfaction		.26	.048
ACL-Satisfaction		.39	.128
Junior/senior			
LAC-Satisfaction		.04	.810
ACL-Satisfaction		1.13	.002

Discussion

Overall, the results of this study demonstrated that the strong sense of community in the WCNR has value. The more strongly students perceived and participated in this community (reflected by levels of social engagement), the more satisfied they were. It also appears that, overall, WCNR programs (in the aggregate) designed to facilitate social interactions are effective in promoting positive perceptions and participation in the WCNR community.

In the context of prior research, the findings of this study have been largely confirmatory; social engagement was strongly related to satisfaction and social engagement was positively related to learning approaches (active & collaborative learning) that emphasize social factors. While previous research has shown that engagement is related to persistence and academic success (Amelink, 2005; Carini et al., 2006; 2004; Gordon et al., 2006 Kuh, 2006) it has been unclear as to how various engagement factors relate with each other to produce these outcomes. This study contributed to student engagement literature by further exploring relationships between various engagement variables and student outcomes. This study demonstrated that three aspects of engagement (faculty interaction, student support, faculty support) can be represented by a higher order measure of social engagement.

Moreover, this expansive measure of social engagement was shown to be strongly related to satisfaction with college educational experiences. Generally, the more socially engaged within the college a student is, the more satisfied they are with their overall educational experience within the college.

This social engagement factor was tested in a structural equation model to determine to what extent social engagement mediated the relationships between level of academic challenge and satisfaction and active & collaborative learning. Active and collaborative learning had a

negative direct relationship with college educational experience satisfaction, but had positive relationship with social engagement and positive indirect effect on college satisfaction. However, the positive indirect (mediated) effect was stronger than the negative direct effect. This finding suggests that active and collaborative learning opportunities positively influence student satisfaction *because* these activities make them more socially engaged, and not by virtue of participation in active and collaborative learning activities alone.

This relationship was constant across all but one multi-group comparison. This finding supports previous work which has found that active and collaborative learning positively influences social interactions and satisfaction (Braxton et al., 2000; Ebert-May & Brewer, 1997). This finding suggests active and collaborative learning opportunities may positively influence social engagement which subsequently positively influenced satisfaction with educational experiences.

For freshmen and sophomore students, active and collaborative learning was not related to social engagement and had a negative relationship with their college educational experience satisfaction. This finding is consistent with the descriptive findings which indicated that underclassmen reported significantly less opportunities for active & collaborative learning than upperclassmen. Taken together, these results suggest that underclassmen may have had less opportunity for active and collaborative learning, thus active and collaborative learning opportunities had less of an impact on social engagement and subsequently satisfaction compared to upperclassmen.

Level of academic challenge did not have a significant direct or indirect relationship with college educational experience satisfaction, nor did it have a significant relationship with social engagement, except for freshmen and sophomore students. Interestingly, for freshman and

sophomore students level of academic challenge had a significant positive relationship with social engagement and a statistically significant indirect effect on college educational experience satisfaction. This finding may be indicative that level of academic challenge may have similar effects similar to active and collaborative learning, but this effect may be only present in the absence (freshman & sophomore reported fewer active and collaborative learning experiences than upperclassmen) of active and collaborative learning activities.

This study was not consistent with previous studies of transfer students and engagement. The results of this study showed no differences in the levels of engagement or any differences in the relationships between engagement variables by transfer status. These findings are contrary to previous work which has found that transfer students are generally less engaged than non-transfer students (Carini et al., 2006).

There were not statistically significant differences in the relationships of engagement variables by gender despite several differences in the reported levels of engagement. These results showed that regardless of gender, the relationships between engagement variables do not widely vary, indicating that the relationships tested in this study are not specific to gender. Thus the relationships tested in the equation are generalizable beyond a particular gender.

This study also contributed to student engagement literature by studying engagement variables at the college level rather than the university level, which is the standard scale of measurement for the NSSE items used in this study. This study argued that the college level of measurement is a more meaningful than an institutional level measurement because the student's experience is largely defined by the community (places and people) in which they spend a majority of their time during their higher education experience. This study demonstrated

that engagement variables measured at the college level may have more explanatory power on student outcomes than engagement variables at the institutional level.

Lastly, this study contributes to student engagement literature by using satisfaction as the primary student outcome measure. Prior student engagement research focused on testing linkages between engagement variables and student outcomes such as persistence and GPA. However, studies which have used GPA and persistence have shown little or no associations between engagement variables and these outcomes (Carini et al., 2006). Satisfaction is a meaningful outcome because it is less influenced by student background characteristics such as high school GPA than other outcomes such as college GPA (Astin, 1993). Additionally, satisfaction is a more accurate measure of student experiences than persistence. Persistence is not necessarily reflective of the student experience; students leave for a myriad of reasons often in spite of academic success and satisfaction with their college experience. This may explain the lack of significant findings in previous work which has examined the relationships between engagement variables and persistence. This study showed that social engagement is strongly related to satisfaction and explained a relatively large amount of variability in satisfaction with college educational experiences. Generally, the more socially engaged a student is, the more satisfied they will be with the college educational experience.

Conclusion

This study demonstrated that the strong sense of community in the WCNR has value. The more strongly students perceived and participated in this community (reflected by levels of social engagement), the more satisfied they were. These findings also implied that programs (at least the ones which promote active and collaborative learning) are effective in promoting feeling of and participation in the WCNR community. However, first year and second year

students reported lower levels of participation in these types of learning opportunities than upperclassmen. Active and collaborative learning opportunities such as service learning, fieldwork, and general group work should be incorporated to a greater degree into first and second year classes and other programs. Major or department specific first year and second year seminars would be ideal venues for active and collaborative learning approaches and would maximize social engagement.

Limitations and Future Research

This study was limited by the lack of program specific data. Therefore, the effectiveness of any particular WCNR program in promoting community could not be assessed. While it appears that these programs are effective in the aggregate, no determination could be made as to the contributions of individual programs. Future work should examine the role of individual programs to determine which programs are most effective.

Another limitation was the small sample size. A larger sample size would provide more confidence in the findings, as well as allow for analyses that could further account for the differences in students' experiences. For example, there may be aspects of the student experience that vary by majors and departments. Future work could further pinpoint these differences with larger samples. Additionally, because this sample was limited to a single natural resources college generalizations of these results cannot be made about other contexts.

CHAPTER V

Community in Natural Resources Education

The purpose of this dissertation was to determine the value of community in natural resources education. This determination was made by studying the role of community in influencing student outcomes in two types of academic programs (learning communities & fieldwork courses) and examined how students' level of social engagement within the WCNR community is related to their overall experience within the college. Chapters two and three examined academic programs that have been shown to promote a sense of community: a residential first year learning community (chapter two) and a fieldwork course (chapter 3). Learning communities have been shown to effectively retain students and promote a sense of community, but it is unclear to what extent learning communities' effectiveness in retaining students can be attributed to sense of community. Similarly, fieldwork courses have been shown to be effective in producing knowledge and skills that are transferable beyond the course, and a sense of community, but it is unclear to what extent the effectiveness of fieldwork courses in producing these outcomes can be attributed to a sense of community. In chapter four, the investigation of community was expanded beyond single programs and explored the extent to which students' social experience and participation in the WCNR community is related to their satisfaction with their overall experience within the college.

Summary of Results

Learning Community Results Summary

The primary purpose of this study was to determine the value of the sense of community created by learning communities in influencing student intent to persist. This determination was made by conducting a series of comparative analyses between a learning community sample and

a non-learning community sample. The sum of these results indicated that sense of community had value in retaining students, and that learning communities seem to be more effective than traditional learning and living environments at retaining students. This study found that sense of community was not a strong factor in learning community participants' persistence decisions because sense of community needs were more fully met for learning community participants than non-participants.

Learning Community Implications

The Warner College of Natural Resources and other learning community sponsors at this institution should continue to emphasize SOC in their programs and researchers should examine aspects of learning community participation that are most effective in promoting a sense of community. While this study demonstrated that RFLC students have their SOC needs met more fully than non-participants, many RFLC participants indicated that they would not persist despite having their SOC needs met. According to human needs theories (e.g. Maslow 1943) when basic needs are satisfied, higher order needs become more influential in determining motivation, so long as the basic need continues to be met. Translated into retention theory, for students who are sufficiently socially integrated, higher order needs will influence persistence decisions to a greater degree than basic needs such as SOC. Therefore practitioners should recognize the value of learning communities in fulfilling and maintaining sense of community needs, but need to be considerate of other factors driving persistence decisions after sense of community needs have been fulfilled.

Fieldwork Results Summary

The purpose of this study was to determine the value of community in fieldwork by explicitly addressing and quantifying how social factors (operationalized by sense of

community) affect learning (reflected by knowledge) and the degree to which knowledge and skills are transferrable to future academic and professional work (reflected by confidence). This study demonstrated that regardless of course format, students' level of sense of community within the course was significantly positively related to their perceptions of gains in knowledge and subsequently gains in confidence in their knowledge and abilities. However, the relationship between sense of community and knowledge gains was significantly stronger for students who participated in the Pingree Park based course than the CSU based course. This result indicates that residentially based fieldwork courses are more effective at promoting a sense of community and can thus enhance knowledge and confidence gains to a greater degree than campus based field work courses.

Fieldwork Implications

These findings suggest that as levels of sense of community increase, so should gains in knowledge and subsequently gains in confidence. Fieldwork practitioners can use these findings to emphasize SOC and thereby enhance other desired outcomes. Where possible, fieldwork should be at a minimum maintained, and ideally expanded. Other forms of experiential learning such as service learning, may be effective in producing similar experiences and gains to fieldwork, and can be far less resource intensive than fieldwork.

WCNR Results Summary

Overall, the results of this study demonstrated that the strong sense of community in the WCNR has value. The more strongly students perceived and participated in this community (reflected by levels of social engagement), the more satisfied they were. It also appears that, overall, WCNR programs (in the aggregate) designed to facilitate social interactions are effective in promoting positive perceptions and participation in the WCNR community. This study

measured students' perceptions of the WCNR "community" using student engagement items related to student-faculty interactions, peer support, and support by faculty & staff. This study demonstrated that these three social factors could be represented by a single factor reflective of students' level of social engagement within the WCNR community. This study also explored how active & collaborative learning and level of academic challenge effect social engagement and subsequently satisfaction. This study demonstrated that as active and collaborative learning opportunities increase, so do levels of engagement and subsequently satisfaction. However, for freshmen and sophomore students this relationship did not hold, presumably because the results showed that lower classmen reported fewer opportunities for active and collaborative learning than upper classmen. Level of academic challenge did not have any effect on levels of social engagement or satisfaction, except for freshmen and sophomore students. This finding suggests that the level of academic challenge may have a positive effect on social engagement, but this effect is weak and perhaps only detectable in the absence of active and collaborative learning opportunities.

WCNR Implications

The results of this study indicated that the sense of community in WCNR is a valuable attribute. The college should maintain, if not expand, programs designed to promote a sense of community especially for first and second year students who reported low levels of participation in active and collaborative learning. Active and collaborative learning opportunities such as service learning, fieldwork, and general group work should be incorporated to a greater degree into first and second year classes and other programs. Major or department specific first year and second year seminars would be ideal venues for active and collaborative learning approaches and would maximize social engagement.

This study also demonstrated that the National Survey of Student Engagement (NSSE) items can be used effectively with the college as the unit of measurement rather than the institution. Typically, NSSE data is often grouped by college or major, but these results do not necessarily reflect students' perceptions of these groups; the item wording remains at the institutional level. The findings from this dissertation are useful because they allow administrators more details about students' perceptions of engagement that correspond areas within their management control.

Limitations and Future Research

Perhaps the most significant limitation of the learning community study was the uncertainty in whether the value provided by learning communities was a result of the learning community environment itself or if the value comes from the students who self-select to participate in these programs. It is certainly plausible, that self-selection has some impact on learning community outcomes, but this study did not control for this possibility. This study was also limited in its ability to attribute effectiveness of learning communities to specific environmental experiences and factors. Future work investigating which aspects (e.g. peer interactions, faculty interactions, classroom experience, residence hall experiences) of learning community participation contribute to meeting SOC needs is warranted. Designing and implementing large-scale learning community programs can be resource intensive, and understanding the specific aspects that make them successful in fostering SOC could allow institutions to duplicate only those that make the most efficient contributions. Further research is needed to examine the role of faculty interactions in influencing SOC. This relationship may be particularly important for learning communities where students spend significant amounts of time with specific faculty. Finally this study measured SOC at the institution level, but additional

work examining SOC at various scales and contexts (e.g. specific learning communities, residence halls or floors, college level, majors, classrooms) could provide a more complete picture of specific environmental factors which contribute to the effectiveness of learning communities.

Additionally, first year students' sense of community needs can be met using learning communities, these students planned to persist at rates nearly equal to students who did not participate in leaning communities. Future research (both in natural resources education and in higher education in general) should continue to investigate why students decide to leave an institution even though their social needs have been met.

The fieldwork study was limited in explaining the relationships between sense of community and other outcomes, but did not address specific aspects of the fieldwork course that create a sense of community. Future work should investigate which aspects of the fieldwork experience are responsible for creating a sense of community. Future work should also examine the long term effects of fieldwork experiences, particularly regarding the transferability of knowledge and skills to professional careers and how social factors of the experience may influence this outcome.

The study of social engagement in the WCNR study was limited by the lack of specific program participation data. Therefore, the effectiveness of any particular WCNR program in promoting community could not be assessed. While it appears that these programs are effective in the aggregate, no determination could be made as to the contributions of individual programs. Future work should examine the role of individual programs to determine which programs are most effective. Another limitation was the small sample size. A larger sample size would provide more confidence in the findings, as well as allow for analyses that could further account

for the differences in students' experiences. For example, there may be aspects of the student experience that vary by major, not necessarily by department. Future work could further pinpoint these differences with larger samples.

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APPENDIX A

Please indicate your level of agreement with the following statements:

Q1 Students at CSU generally get along with each other.

Strongly disagree [Code = 1]

Disagree [Code = 2]

Neither agree nor disagree [Code = 3]

Agree [Code = 4]

Strongly agree [Code = 5]

Required answers: 1 Allowed answers: 1

Q2 If there is a problem at CSU, students here can get it solved.

Strongly disagree [Code = 1]

Disagree [Code = 2]

Neither agree nor disagree [Code = 3]

Agree [Code = 4]

Strongly agree [Code = 5]

Required answers: 1 Allowed answers: 1

Q3 Other students want the same things from CSU as I do.

Strongly disagree [Code = 1]

Disagree [Code = 2]

Neither agree nor disagree [Code = 3]

Agree [Code = 4]

Strongly agree [Code = 5]

Required answers: 1 Allowed answers: 1

Q4 On a daily basis, I recognize people at CSU.

Strongly disagree [Code = 1]

Disagree [Code = 2]

Neither agree nor disagree [Code = 3]

Agree [Code = 4]

Strongly agree [Code = 5]

Required answers: 1 Allowed answers: 1

Q5 I feel at home at CSU.

Strongly disagree [Code = 1]

Disagree [Code = 2]

Neither agree nor disagree [Code = 3]

Agree [Code = 4]

Strongly agree [Code = 5]

Required answers: 1 Allowed answers: 1

Q6 On a daily basis, almost no one at CSU recognizes me.

Strongly disagree [Code = 1]

Disagree [Code = 2]

Neither agree nor disagree [Code = 3]

Agree [Code = 4]

Strongly agree [Code = 5]

Required answers: 1 Allowed answers: 1

Please indicate your level of agreement with the following statements:

Q7 I care about what other students think of my actions.

Strongly disagree [Code = 1]

Disagree [Code = 2]

Neither agree nor disagree [Code = 3]

Agree [Code = 4]

Strongly agree [Code = 5]

Required answers: 1 Allowed answers: 1

Q8 I have influence over what CSU is like.

Strongly disagree [Code = 1]

Disagree [Code = 2]

Neither agree nor disagree [Code = 3]

Agree [Code = 4]

Strongly agree [Code = 5]

Required answers: 1 Allowed answers: 1

Q9 Students at CSU share the same values I do.

Strongly disagree [Code = 1]

Disagree [Code = 2]

Neither agree nor disagree [Code = 3]

Agree [Code = 4]

Strongly agree [Code = 5]

Required answers: 1 Allowed answers: 1

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Q10 It is very important for me to be a student at CSU.

Strongly disagree [Code = 1]

Disagree [Code = 2]

Neither agree nor disagree [Code = 3]

Agree [Code = 4]

Strongly agree [Code = 5]

Required answers: 1 Allowed answers: 1

Q11 I think CSU is a good place for me.

Strongly disagree [Code = 1]

Disagree [Code = 2]

Neither agree nor disagree [Code = 3]

Agree [Code = 4]

Strongly agree [Code = 5]

Required answers: 1 Allowed answers: 1

Q12 I want to return to CSU next year.

Strongly disagree [Code = 1]

Disagree [Code = 2]

Neither agree nor disagree [Code = 3]

Agree [Code = 4]

Strongly agree [Code = 5]

Required answers: 1 Allowed answers: 1

Next Page: [Sequentia](#)

ige - Section B

Please indicate your level of agreement with the following statements:

Q13 We are approaching the limit of the number of people the earth can support.

Strongly disagree [Code = 1]

Disagree [Code = 2]

Neither agree nor disagree [Code = 3]

Agree [Code = 4]

Strongly agree [Code = 5]

Required answers: 1 Allowed answers: 1

Q30 Where do you live?

Off campus [Code = 1]

Aspen Hall [Code = 2]

Allison Hall [Code = 3]

Braiden Hall [Code = 4]

Corbett Hall [Code = 5]

Durward Hall [Code = 6]

Edwards Hall [Code = 7]

Engineering Hall [Code = 8]

Honors Hall [Code = 9]

Ingersoll Hall [Code = 10]

Newsom Hall [Code = 11]

Parmelee Hall [Code = 12]

Summit Hall [Code = 13]

Westfall Hall [Code = 14]

Required answers: 1 Allowed answers: 1

Q31 Are you part of a residential learning community?

Yes [Code = 1]

No [Code = 2]

Required answers: 1 Allowed answers: 1

Next Page: Sequential

Q32 Please select your residential learning community:	
Honors Residential Learning Community - Academic Village or Edwards Hall [Code = 1]	
Key Academic Community - Braiden Hall [Code = 2]	
Key Explore Community - Parmelee Hall [Code = 3]	
Key Service Community - Braiden Hall [Code = 4]	
Engineering Residential Learning Community - Academic Village and Edwards Hall [Code = 5]	
Global Village - Braiden Hall [Code = 6]	
Health and Exercise Science Community - Corbett Hall [Code = 7]	
Ingersoll Residential College (College of Natural Sciences) - Ingersoll Hall [Code = 8]	
Live Green Community - Summit Hall [Code = 9]	
Equine Community - Edwards Hall [Code = 10]	
Leadership Development Community - Durward Hall [Code = 11]	
Living Substance Free - Parmelee Hall [Code = 12]	
	<i>Required answers: 1 Allowed answers: 1</i>
Q31='Yes'	

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Q33 What is your parent's political affiliation?	
Republican [Code = 1]	
Democrat [Code = 2]	
Independent [Code = 3]	
Other [Code = 4]	
Don't know [Code = 5]	
	<i>Required answers: 1 Allowed answers: 1</i>

Q34 What is your ethnicity?

American Indian or Alaskan Native [Code = 1]

Asian [Code = 2]

Black [Code = 3]

Latino [Code = 4]

Pacific Islander [Code = 5]

White [Code = 6]

Other (please specify) [Code = 7] [TextBox]

Required answers: 1 Allowed answers: 1

Q35 Do you receive a Federal Pell Grant?

Yes [Code = 1]

No [Code = 2]

Don't know [Code = 3]

Required answers: 1 Allowed answers: 1

Q36 What is your gender?

Male [Code = 1]

Female [Code = 2]

Required answers: 1 Allowed answers: 1

Next Page: Sequential

Page - 6

Please answer the following questions:

Q37 Are you currently member of, or do you plan to join, a sorority or fraternity?

Yes [Code = 1]

No [Code = 2]

Required answers: 1 Allowed answers: 1

Q38 Are you currently a member of a campus club?

Yes [Code = 1]

No [Code = 2]

Required answers: 1 Allowed answers: 1

Q39 Do you participate in campus recreational sports (club sport or intramurals)?

Yes [Code = 1]

No [Code = 2]

Required answers: 1 Allowed answers: 1

Q40 Did either of your parents complete a Bachelor's degree?

Yes [Code = 1]

No [Code = 2]

Required answers: 1 Allowed answers: 1

Q41 As a first year student, did you participate in RAM Welcome?

Yes [Code = 1]

No [Code = 2]

Required answers: 1 Allowed answers: 1

Q42 What type(s) of social media do you use? (Check all that apply)

MySpace [Code = 1]

Facebook [Code = 2]

Twitter [Code = 3]

LinkedIn [Code = 4]

Blogs [Code = 5]

Other (please specify) [Code = 6] [TextBox]

None [Code = 7]

Required answers: 1 Allowed answers: 7

Q43 On average, how many minutes per day do you spend using social media? (Please round to the nearest 10 minutes.)

[Code = 1] [TextBox - Numeric]

Required answers: 0 Allowed answers: 1

Q44 Do you currently have a job?
On-campus work study [Code = 1]
On-campus hourly [Code = 2]
Off campus [Code = 3]
None [Code = 4]
<i>Required answers: 1 Allowed answers: 1</i>

Q45 Do you plan on changing your major?
Yes (please specify) [Code = 1][TextBox]
No [Code = 2]
Uncertain [Code = 3]
<i>Required answers: 1 Allowed answers: 1</i>

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Q46 Do you intend to return to CSU next year?
Yes [Code = 1]
No (please explain) [Code = 2][TextBox]
Uncertain (please explain) [Code = 3][TextBox]
<i>Required answers: 1 Allowed answers: 1</i>

APPENDIX B

Pingree Park

Your Expectations

We would like to know about some of your expectations of your Pingree Park experience BEFORE you participated.

Please rate your level of agreement with the following statements.

	(A) Strongly Disagree	(B) Disagree	(C) Neutral	(D) Agree	(E) Strongly Agree
1. One of the reasons I chose to study in Warner College of Natural Resources was to be able to participate in the Pingree Park summer session	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. I would have participated in the summer session even if it was not required.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. I expected to make new friends while at Pingree Park.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. I expected to learn more in this Pingree Park summer session than I would if the class was over an entire semester on campus	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. I expected that I would be engaged in my studies at Pingree Park	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. I expected this experience would make me a more successful student	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. Before this experience, I have heard a lot of great things about Pingree Park.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Pingree Park

Your Experience

How important to you were the following aspects of your Pingree Park experience?

	(A) Very Unimportant	(B) Unimportant	(C) Neutral	(D) Important	(E) Very Important
8. Academic curriculum	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. Assignments	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10. Working in groups	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11. Working by yourself	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
12. Quality of instruction	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
13. Sense of Community	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
14. Quality of Housing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
15. Quality of Food	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
16. Free time at Pingree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
17. Free time on weekends	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
18. Social activities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
19. Non academic activities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
20. Faculty Interaction	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
21. Student Interaction	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
22. Out of classroom learning opportunities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
23. Physical setting of Pingree Park	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Pingree Park

How satisfied were you with the following aspects of your Pingree Park experience?

	(A) Very Unsatisfied	(B) Unsatisfied	(C) Neutral	(D) Satisfied	(E) Very Satisfied
24. Academic curriculum	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
25. Assignments	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
26. Working in groups	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
27. Working by yourself	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
28. Quality of Instruction	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
29. Sense of Community	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
30. Quality of Housing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
31. Quality of Food	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
32. Free time at Pingree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
33. Free time on weekends	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
34. Social activities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
35. Non academic activities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
36. Faculty interaction	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
37. Student interaction	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
38. Out of classroom learning opportunities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
39. Physical setting of Pingree Park	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please rate your level of agreement with the following statements.

My experience at Pingree Park has made me more:

	(A) Strongly Disagree	(B) Disagree	(C) Neutral	(D) Agree	(E) Strongly Agree
40. Knowledgeable of the natural history and biophysical environment of the Rocky Mountain Ecosystem	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
41. Understanding of ecological and socio-cultural relationships	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
42. Developed critical thinking skills and experience with the scientific method	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
43. Knowledgeable and experienced in research techniques (sampling, data collection, evaluation, reporting)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
44. Interested in my major.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
45. Knowledgeable about other majors and subjects.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
46. Engaged in academic subjects I studied here.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
47. Connected to other students.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
48. Connected to faculty.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
49. Aware of what I can do with my major after I graduate.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
50. Likely to remain a Warner College of Natural Resources student.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
51. Likely to remain in my major.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
52. Likely to be academically successful.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
53. Likely to be professionally successful.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
54. Able to understand the connections among scientific disciplines.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Pingree Park

55. Comfortable in discussing scientific concepts with others.
56. Comfortable in working collaboratively with others.
57. Confidence in my ability to do well in future science courses.
58. Able to defend an argument when asked questions about my field of study.
59. Able to explain the importance of field of study to people outside my field.

60. How would you describe the class sizes at Pingree Park?

- (A) There were too many students
- (B) There were too few students
- (C) There was the right number of students

61. Which of following summer session formats appeals to you most?

- (A) 3 week session with 1 weekend day off
- (B) 4 week session with 2 weekend days off

62. Which of following types of instruction do you think works best at Pingree?

- (A) The same instructor for each subject
- (B) Several instructors for each subject

Pingree Park

Sense of Community

Please rate your level of agreement with the following statements.

	(A) Strongly Disagree	(B) Disagree	(C) Neutral	(D) Agree	(E) Strongly Agree
63. I can get what I need at Pingree Park	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
64. Pingree Park helps me fulfill my needs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
65. I feel like a member of Pingree Park	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
66. I feel like I belong at Pingree Park	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
67. I have a say about what goes on at Pingree Park	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
68. People at Pingree Park are good at influencing each other	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
69. I feel connected to Pingree Park	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
70. I have a good bond with others at Pingree Park	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Pingree Park

Demographic Information

71. What is your gender?

- (A) Female
- (B) Male

72. Are you White, Black or African-American, American Indian or Alaskan Native, Asian, Native Hawaiian or other Pacific islander, or some other race?

- (A) White
- (B) Black or African-American
- (C) American Indian or Alaskan Native
- (D) Asian
- (E) Native Hawaiian or other Pacific Islander

73. How old are you?

- (A) 18-20
- (B) 21+

74. Are you an out of state student?

- (A) Yes
- (B) No

75. Do you receive financial aid?

- (A) Yes
- (B) No
- (C) Uncertain

Pingree Park

76. What is your major?

- (A) Fish, Wildlife and Conservation Biology
- (B) Forestry
- (C) Geology
- (D) Natural Resource Recreation and Tourism
- (E) Natural Resources Management
- For the majors below please leave #76 blank and fill in answer for question # 77
- (A) Rangeland Ecology
- (B) Watershed Sciences
- (C) Other

Rotated Component Matrix^a

	Component		
	1	2	3
40. Knowledgeable of the natural history and biophysical environment of the Rocky Mountain Ecosystem	.680	.337	.160
41. Understanding of ecological and socio-cultural relationships	.712	.402	.102
42. Developed critical thinking skills and experience with the scientific method	.656	.456	.141
43. Knowledgeable and experienced in research techniques(sampling, data collection, evaluation, reporting)	.681	.463	.047
44. Interested in my major.	.430	.660	.189
45. Knowledgeable about other majors and subjects.	.695	.134	.110
46. Engaged in academic subjects I studied here.	.605	.453	.430
47. Connected to other students.	.134	.117	.849
48. Connected to faculty.	.568	.112	.525
49. Aware of what I can do with my major after I graduate.	.414	.479	.386
50. Likely to remain a Warner College of Natural Resources student.	.457	.717	.147
51. Likely to remain in my major.	.125	.845	.162
52. Likely to be academically successful.	.243	.670	.535
53. Likely to be professionally successful.	.249	.598	.557

54. Able to understand the connections among scientific disciplines.	.675	.395	.239
55. Comfortable in discussing scientific concepts with others.	.641	.309	.328
56. Comfortable in working collaboratively with others.	.709	.203	.359
57. Confidence in my ability to do well in future science courses.	.592	.542	.349
58. Able to defend an argument when asked questions about my field of study.	.435	.728	.108
59. Able to explain the importance of field of study to people outside my field.	.413	.749	.110

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.^a

a. Rotation converged in 6 iterations.

Knowledge

a= .91

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
40. Knowledgeable of the natural history and biophysical environment of the Rocky Mountain Ecosystem	23.9464	19.682	.689	.532	.906

54. Able to understand the connections among scientific disciplines.	23.9055	20.033	.729	.540	.902
58. Able to defend an argument when asked questions about my field of study.	24.1682	18.513	.747	.661	.900
59. Able to explain the importance of field of study to people outside my field.	23.9046	18.614	.744	.658	.900
41. Understanding of ecological and socio-cultural relationships	24.0531	19.418	.766	.643	.898
42. Developed critical thinking skills and experience with the scientific method	24.3284	18.973	.754	.599	.899
43. Knowledgeable and experienced in research techniques(sampling, data collection, evaluation, reporting)	23.9324	18.996	.744	.563	.900

Confidence

$\alpha = .89$

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
--	----------------------------	--------------------------------	----------------------------------	------------------------------	----------------------------------

52. Likely to be academically successful.	16.2072	8.537	.764	.745	.862
53. Likely to be professionally successful.	16.1139	8.980	.753	.743	.864
55. Comfortable in discussing scientific concepts with others.	16.2535	9.722	.697	.599	.877
56. Comfortable in working collaboratively with others.	16.2670	9.822	.645	.525	.887
57. Confidence in my ability to do well in future science courses.	16.2805	8.255	.829	.692	.846

APPENDIX C

WCNR Student Engagement Survey – 2009

In your experience in WCNR during the current semester, about how often have you done each of the following?

	Very often	Often	Sometimes	Never			
a. Asked questions in class or contributed to class discussions	7	6	5	4	3	2	1
b. Made a class presentation	7	6	5	4	3	2	1
c. Worked with other students on projects DURING CLASS, in a teamwork setting	7	6	5	4	3	2	1
d. Worked with classmates OUTSIDE OF CLASS to prepare class assignments, in a teamwork setting	7	6	5	4	3	2	1
e. Participated in a community-based project (e.g., service learning) as part of a regular course	7	6	5	4	3	2	1
f. Discussed ideas from your readings or classes with others outside of class (students, family members, co-workers, etc.)	7	6	5	4	3	2	1
g. Participated in hands-on activities during (e.g. case studies) and/or outside of class (e.g. fieldwork/ service learning)	7	6	5	4	3	2	1
h. Used information from a class and applied it to another class	7	6	5	4	3	2	1
i. Worked harder than you thought you could to meet an instructor's standards or expectations	7	6	5	4	3	2	1
j. Discussed grades or assignments with an instructor	7	6	5	4	3	2	1
k. Talked about career plans with a faculty member or advisor	7	6	5	4	3	2	1
l. Discussed ideas from your readings or classes with faculty members outside of class	7	6	5	4	3	2	1
m. Received prompt written or oral feedback from faculty on your coursework	7	6	5	4	3	2	1

n. Worked with faculty members on activities other than coursework (committees, orientation, student life activities, etc.)	7	6	5	4	3	2	1
o. Researched or discussed a current issue as part of a regular course	7	6	5	4	3	2	1

During the current semester, how much has your coursework in WCNR emphasized the following activities?

	Very much	Quite a bit	Some	Very little			
Analyzing the basic elements of an idea, experience, or theory, such as examining a particular case or situation in depth and considering its components	7	6	5	4	3	2	1
Synthesizing and organizing ideas, information, or experiences into new, more complex interpretations and relationships	7	6	5	4	3	2	1
Making judgments about the value of information, arguments, or methods, such as examining how others gathered and interpreted data and evaluated the soundness of their conclusions	7	6	5	4	3	2	1
Applying theories or concepts to practical problems or in new situations	7	6	5	4	3	2	1

How challenging do you find coursework from WCNR classes?

Not at all Challenging		Slightly Challenging		Moderately Challenging		Extremely Challenging		
1	2	3	4	5	6	7	8	9
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

About how many hours do you spend in a typical 7-day week doing the following?

a. Preparing for class (studying, reading, writing, doing homework or lab work, analyzing data)?

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
0	1-5	6-10	11-15	16-20	21-25	26-30	More than 30

b. Academic activities (e.g., pre-professional organizations, student government, campus publications)?

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
0	1-5	6-10	11-15	16-20	21-25	26-30	More than 30

c. Extracurricular activities (e.g., fraternity or sorority, intercollegiate or intramural sports)?

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
0	1-5	6-10	11-15	16-20	21-25	26-30	More than 30

Total number of activities: [Drop down menu]

Which of the following have you done or do you plan to do before you graduate from CSU?

	Have done already	Plan to do	Do not plan to do	Have not decided
a. Practicum, internship, field experience, co-op experience, or clinical assignment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Community service or volunteer work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Participate in a learning community or some other formal program where groups of students take two or more classes together	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Foreign language coursework	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. Study abroad	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. Independent study or self-defined major	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. Culminating senior experience (capstone course, senior project or thesis, comprehensive exam, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

To what extent does WCNR emphasize each of the following?

	Very much	Quite a bit	Some	Very Little			
a. Providing the support you need to help you succeed academically	7	6	5	4	3	2	1
b. Helping you cope with your nonacademic responsibilities (work, family, etc.)	7	6	5	4	3	2	1
c. Providing the support you need to thrive socially	7	6	5	4	3	2	1

Select the box that best represents the quality of your relationships with people in WCNR.

a. Relationships with other students in WCNR

Unfriendly

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	2	3	4	5	6	7

Friendly

Unsupportive

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	2	3	4	5	6	7

Supportive

Sense of
alienation

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	2	3	4	5	6	7

Sense of
belonging

b. Relationships with faculty members in WCNR

Unavailable

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	2	3	4	5	6	7

Available

Unhelpful

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	2	3	4	5	6	7

Helpful

Unsympathetic

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	2	3	4	5	6	7

Sympathetic

Overall, how would you evaluate the quality of academic advising you have received in WCNR?

- | | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| A | B | C | D | F | Have not seen an advisor |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

If you have not seen an advisor, why not?

How would you evaluate your entire educational experience:

- | | | | | | |
|-----------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| | A | B | C | D | F |
| a. At CSU? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| b. Within WCNR? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

If you could start over again, would you choose:

- | | | | |
|--------------------|--------------------------|--------------------------|--------------------------|
| | Yes | No | I Don't Know |
| a. CSU? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| b. WCNR? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| c. The same major? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

What is your year of birth: [Drop down menu]

Your sex: Male Female

What is your current resident status? (Please check one)

- In-state / Colorado resident
- Out-of-state / Nonresident
- International student or foreign national

What is your current classification at CSU?

- Freshman/first-year (0-29 credits)
- Sophomore (30-59 credits)
- Junior (60-89 credits)
- Senior (90+ credits)

Of your total credits, about how many have you taken in WCNR?

- 0 credits (have not taken any courses in WCNR)
- 1-9 credits (approx. 1-3 courses)
- 10-18 credits (approx. 4-6 courses)
- 19-27 credits (approx. 7-9 courses)
- 28-36 credits (approx. 10-12 courses)
- 36+ credits (approx. 12 or more courses)

Thinking about this current academic term, how would you characterize your enrollment?

- Full time (12 or more credit hours)
- Less than full time

Did you begin college at CSU or elsewhere?

- Started here

Started elsewhere

Since graduating from high school, which of the following types of schools have you attended other than CSU? (Select all that apply.)

- Vocational or technical school
- Community or junior college
- 4-year college other than this one
- None
- Other

What is your approximate GPA?

- A 4.000
- A- 3.667 – 3.999
- B+ 3.334 – 3.666
- B 3.000 – 3.333
- B- 2.667 – 2.999
- C+ 2.334 – 2.666
- C 2.000 – 2.333
- C- or lower Below 2.000

What is your major(s) or your expected major(s)?

a. Primary major in WCNR:

- Conservation Biology
- Environmental Communication
- Environmental Geology
- Fisheries & Aquatic Sciences
- Forestry
- Forest Biology
- Forest Fire Science
- Forest Management
- Forestry Business
- Geology
- Global Tourism
- Natural Resource Tourism
- Natural Resource Management
- Parks & Protected Area Management
- Range and Forest Management
- Restoration Ecology
- Rangeland Management
- Watershed Science
- Wildlife Biology

b. If applicable, second major (not minor, concentration, etc.): [Drop down menu with College/Major]

Would you like to make any additional comments?

Transfer

<i>Model</i>	χ^2	<i>df</i>	<i>CFI</i>	<i>RMSEA</i>	<i>Model Comparison</i>	$\Delta\chi^2$	Δdf	ΔCFI	$\Delta RMSEA$
Model 1 configural invariance	268.732	220	.974	.032					
Model 2 first-order factor loadings invariant	283.718	233	.973	.032	Model 1 vs. model 2	14.99	13	.001	0
Model 3 first- and second-order factor loadings invariant	284.157	235	.974	.031	Model 2 vs. model 3	.44	2	.001	.001
Model 4 first- and second-order factor loadings and intercepts of measured variables invariant	311.902	252	.968	.033	Model 3 vs. model 4	27.74*	17	.006	.002
Model 5 first- and second-order factor loadings, intercepts, and disturbances of first-order factors invariant	335.599	273	.967	.033	Model 4 vs. model 5	23.69	21	.001	0
Model 6 first- and second-order factor loadings, intercepts, disturbances of first-order factors, and residual variances	344.407	277	.964	.034	Model 5 vs. model 6	8.81	4	.003	.001

* $p \leq .05$

Class

<i>Model</i>	χ^2	<i>df</i>	<i>CFI</i>	<i>RMSEA</i>	<i>Model Comparison</i>	$\Delta\chi^2$	Δdf	ΔCFI	$\Delta RMSEA$
Model 1 configural invariance	333.447	220	.946	.047					
Model 2 first-order factor loadings invariant	351.222	233	.944	.047	Model 1 vs. model 2	17.78	13	.002	0
Model 3 first- and second-order factor loadings invariant	353.866	235	.943	.046	Model 2 vs. model 3	2.64	2	.001	.001
Model 4 first- and second-order factor loadings, and intercepts of measured variables and first-order factors invariant	383.757	330	.937	.047	Model 3 vs. model 4	29.89*	17	.004	.001
Model 5 first- and second-order factor loadings, intercepts, and disturbances of first-order factors invariant	416.340	348	.932	.047	Model 4 vs. model 5	32.58	21	.005	0
Model 6 first- and second-order factor loadings, intercepts, disturbances of first-order factors, and residual variances	423.990	352	.930	.048	Model 5 vs. model 6	7.65	4	.002	.001

* $p \leq .05$

Department

<i>Model</i>	χ^2	<i>df</i>	<i>CFI</i>	<i>RMSEA</i>	<i>Model Comparison</i>	$\Delta\chi^2$	Δdf	ΔCFI	$\Delta RMSEA$
Model 1 configural invariance	488.969	330	.920	.047					
Model 2 first-order factor loadings invariant	513.867	356	.920	.045	Model 1 vs. model 2	24.90	26	0	.002
Model 3 first- and second-order factor loadings invariant	517.662	360	.920	.045	Model 2 vs. model 3	3.40	4	0	0
Model 4 first- and second-order factor loadings, and intercepts of measured variables and first-order factors invariant	559.601	394	.916	.044	Model 3 vs. model 4	41.94	34	.004	.001
Model 5 first- and second-order factor loadings, intercepts, and disturbances of first-order factors invariant	599.002	436	.918	.041	Model 4 vs. model 5	39.40*	42	.002	.003
Model 6 first- and second-order factor loadings, intercepts, disturbances of first-order factors, and residual variances	602.421	444	.920	.040	Model 5 vs. model 6	3.42	8	.002	.001

* $p \leq .05$

Gender

<i>Model</i>	χ^2	<i>df</i>	<i>CFI</i>	<i>RMSEA</i>	<i>Model Comparison</i>	$\Delta\chi^2$	Δdf	ΔCFI	$\Delta RMSEA$
Model 1 configural invariance	337.136	220	.943	.048					
Model 2 first-order factor loadings invariant	350.827	233	.943	.047	Model 1 vs. model 2	13.69	13	0	.001
Model 3 first- and second-order factor loadings invariant	352.840	235	.943	.046	Model 2 vs. model 3	2.01	2	0	.001
Model 4 first- and second-order factor loadings, and intercepts of measured variables and first-order factors invariant	369.906	252	.943	.045	Model 3 vs. model 4	17.06	17	0	.001
Model 5 first- and second-order factor loadings, intercepts, and disturbances of first-order factors invariant	412.371	273	.933	.047	Model 4 vs. model 5	42.47**	21	.001	.002
Model 6 first- and second-order factor loadings, intercepts, disturbances of first-order factors, and residual variances	420.688	277	.931	.047	Model 5 vs. model 6	8.36	4	.002	0

* $p < .01$